Draft Environmental Assessment

Sherman Pass Project

Three Rivers and Republic Ranger Districts, Colville National Forest
Ferry County, Washington

United States
Department of Agriculture
Forest Service
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For information contact: Rodney D. Smoldon, District Ranger
Three Rivers Ranger District
255 West 11th, Kettle Falls, WA, 99141
(509) 738-7700
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Chapter 1 – Purpose and Need

Introduction
The Colville National Forest proposes to manage vegetation and hazardous fuels in the Sherman Pass Project area. The proposed Sherman Pass Project would treat approximately 18,055 acres moving the forest vegetation towards its natural disturbance regime and reducing hazardous fuels.

Background
The Sherman Pass proposed project is based on priorities laid out in the Ferry County Community Wildfire Protection Plan (Schlosser et al. 2006). For more information, visit the Ferry County Community Wildfire Protection Plan webpage at Ferry County Community Links under Topic Downloads.

The primary concerns listed in the Ferry County Community Wildfire Protection Plan for this area are “Infrastructure Area Wildland Urban Interface”, in particular the “Access Route Wildland Urban Interface”. These concerns include key ingress and egress along State Highway 20 (Sherman Highway) and the Bonneville Power Administration (BPA) high-tension power line, which provides electricity to the town of Republic and the surrounding areas of Ferry County. According to the Washington State Department of Transportation, Sherman Highway has an annual average daily traffic volume of 1,700 vehicles, with seasonal peaks exceeding 5,000 vehicles daily (Washington State Department of Transportation website, 2014 and Sherman Pass Scenic Byway Corridor Plan, 2004). The Sherman Highway and BPA power line corridor are surrounded by hazardous fuels conditions that could pose impacts and disruptions to critical service such as emergency services, commerce traffic, as well as disruption in power services.

Project Location
The approximately 34,043-acre Sherman Pass Project area is located in Ferry County, Washington on the Three Rivers and Republic Ranger Districts on the Colville National Forest in Northeast Washington. The project area is located approximately 4 miles southeast of Republic, Washington, and approximately 5
miles west of Kettle Falls, Washington. The project area encompasses a corridor along Washington State Route Highway 20 (the Sherman Pass Scenic Byway) and crosses the Kettle Crest Mountain Range.

The Sherman Pass Project area includes portions of the Sherman Creek and Upper Sanpoil River 10th code watersheds. The streams in these watersheds flow into main channel systems that then flow into the Sanpoil and Columbia Rivers.
Figure 1. Sherman Pass Project Vicinity Map
Purpose and Need for Action

The Sherman Pass Project will comply with the Forest Plan as amended. The project aims to address hazardous fuels and forest conditions that are contributing to fuels buildup within the wildland urban interface as described in the Ferry County Community Wildfire Protection Plan and the Collaborative Forest Landscape Restoration Program. Stand conditions are such that fuel reduction is needed to thin and/or remove some canopy fuels, reduce ladder fuels, and reduce surface fuels.

- **Need**: Reduce hazardous fuel conditions along identified key travel routes including Sherman Highway; identified critical infrastructure including the BPA high-tension power line; important ridgelines; and along the Colville National Forest System land boundary with private land.
- **Purpose**: Alter fire behavior within strategically important areas: to minimize fire impacts to identified key travel routes for public and firefighter safety; to increase wildfire suppression opportunities and success; to minimize disruptions of service of the BPA power line; to minimize adverse effects to property and forest resource values; and to restore and maintain stand and landscape resiliency to fire disturbances.

Evaluation of the current fire danger and fuels conditions shows a clear need to meet the purpose and need of the project. Fuel loads and expected fire behavior along State Highway 20, an escape route identified in the Ferry County Community Wildfire Protection Plan, are such that in the event of a wildfire the viability of the highway as an escape route would be greatly reduced. The predicted fire behavior along the BPA power lines could cause disruptions of service and damage to critical infrastructure. Most major roads within the project area that would be used as escape routes by firefighters and recreating public are in a similar condition. Given the typical pattern of fires on the Kettle Crest on the Republic and Three Rivers Ranger Districts (fires typically start in the higher elevations and move down toward private land), a fire start in the Sherman Pass Project area would likely pose a threat to infrastructure and access/egress routes. A fire start could also damage forest values such as wildlife habitat, scenic views, streams, and soils. Modeling shows that fire starts in over 70% of the project area would likely exhibit fire behavior that would limit success. Treatments to reduce fire behavior would improve fire suppression abilities and could reduce the risk of impacts to critical infrastructure, key access/egress routes, and forest values. The current fuel conditions (abundant ladder fuels and heavy surface fuel loadings) are not conducive to a fire resilient forest landscape.

**BPA Power Line**

Central to the treatment success in this category is the ability to limit disturbance to the BPA power line. Maintenance of the vegetation along the power line corridor is an ongoing concern for BPA officials. BPA maintains the vegetation within 50 feet of either side of the power line. However, there is a concern that trees outside this 100-foot corridor may fall and impact the power lines, causing fires and/or breakage caused outages. This concern is not unprecedented. An extreme storm event with wind microbursts exceeding 70 mph occurred in 2012. High winds uprooted and snapped off trees hurling them towards power lines causing broken and down lines that shut off electrical services in western Ferry County for three weeks or more. In addition, in 1995, a wildfire ran through the town of Republic after high winds caused trees to fall on power lines and arc. The Fish Hatchery Fire of 2010 is thought to be due to a power line failure following a wind event. The fire spread uphill to the
neighboring residential area and toward Forest Service land. Discussion with BPA officials point to two major concerns with power line maintenance and transmission: trees may fall on power lines, creating fire starts and disrupting service and wildfire from adjacent forestland may impact the power line.

**Highway 20 Travel Corridor**

State Highway 20 (Sherman Pass Highway) is the main east-west travel route to western Ferry County and the town of Republic (the County seat). As was identified in the Ferry County Community Wildfire Protection Plan, the potential for wildfire spreading towards and across the highway is a real concern. Wildfires can cause highway closures and increase the potential for detrimental secondary effects of landslide and soil movement onto the highway. Recent examples of this are the 2014 Devil’s Elbow Fire and the 2014 Carlton Complex Fires. Both fires burned severely on sections of Highway 20 (in Okanogan County) and Highway 21 (in south Ferry County). Subsequent rainstorms caused culvert failures and slumping of blackened land onto highways. The wildland adjacent to Highway 20 in Okanogan burned hot enough that long-term road closures and construction efforts on the highway are expected to continue for years (personal communication, Wenatchee National Forest Dispatch personnel). Another concern is that mortality caused by wildfire and insect/disease damage will result in trees falling on the highway. This is a public safety issue. An example of this occurred during the 2012 windstorm. The highway was blocked due to snapped and up-rooted trees. For at least a year following the event, weakened trees continued to fall on the highway damaging cars and causing injury to passengers.

**Recreation Areas**

Recreation areas within the project area have been substantially affected by forest health issues. These include bark beetles, Douglas-fir and western larch dwarf mistletoe, and western spruce budworm. These forest health problems have caused dead and dying vegetation and added the resulting fuels to the landscape.

**Ecosystem Resilience**

The Sherman Pass Project area is losing resiliency and is not in a good condition to withstand future stresses and disturbances. Fire exclusion has promoted dense homogenous landscapes full of fire intolerant species and fire prone stands. Insects and diseases, including bark beetle outbreaks and high indigenous levels of other pests, are causing mortality and intensifying conditions for severe fire behavior.

**Decision Framework**

Based upon the effects of the proposed action as they relate to the purpose and need, public input, and the project file in its entirety, the responsible official will decide:

- The specific activities that will take place on the areas selected for treatment. These specific activities include the Silviculture systems, logging methods, and fuel treatment methods.
- The associated actions that will be included such as road reconstruction, post-activity road management, noxious weed treatments, and specific provisions such as Best Management Practices and Design Elements.
- The monitoring that will be done during and after project implementation.
Management and Direction
This Environmental Assessment is guided by federal and state law, including the Forest and Rangeland Renewable Resource Planning Act, National Forest Management Act, the National Environmental Planning Act (NEPA), and the Clean Water Act. The NEPA requires analysis of projects to ensure the anticipated effects are considered prior to project implementation (40CFR 1502.16). The analysis for the Sherman Pass Project followed the guidelines of NEPA as provided by the Council on Environmental Quality.

Colville National Forest Land and Resource Management Plan
The Colville National Forest Land and Resource Management Plan (Forest Plan) is the guiding management direction for the Sherman Pass Project. This Environmental Assessment incorporates the Forest Plan by reference and is tiered to the Forest Plan’s Final Environmental Impact Statement (USDA Forest Service 1988) and its amendments. The proposed action is consistent with the Forest Plan standards, guidelines, and management area designations that apply to the Sherman Pass Project area.

The Forest Plan includes amendments that are also management direction for this project and include:

- Regional Forester's Forest Plan Amendment #2 entitled Revised Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sales (USDA Forest Service 1995a). This amendment replaced the interim ecosystem and wildlife standards from Regional Forester’s Forest Plans Amendment #1. In this interim direction, the Regional Forester directs National Forests in Eastern Washington to maintain, and or enhance late and old structural stages in stands subject to timber harvest. Forest Plan Amendment #2 is also known as the “Eastside Screens.”
- Inland Native Fish Strategy or “INFISH” (USDA Forest Service 1995b). This amendment replaced the interim riparian standard from Regional Forester’s Forest Plans Amendment #1.
- Regional Forester’s October 11, 2005 amendment to forest plans in Region 6, Preventing and Managing Invasive Plants, (USDA Forest Service 2005a). This management direction includes invasive plant prevention and treatment and restoration standards to achieve desired future conditions, goals, and objectives.

For distribution of Forest Plan management areas, refer to the maps below. A written description of the management areas follows.

- Management Area 1 (1,551 acres) Emphasis is on 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.
- Management Area 3A (3,814 acres) Emphasis is on recreation: The goal is to provide roaded and unroaded recreation opportunities in a natural appearing setting.
- Management Area 4 (1,130 acres) Emphasis is on Research Natural Area: The goal is to provide opportunities for research in ecosystems influenced only by natural processes.
- Management Area 5 (10,477 acres) Emphasis is on scenic/timber: The goal is to provide a natural appearing foreground, middle, and background along major scenic travel routes while providing wood products.
• Management Area 6 (431 acres) Emphasis is on scenic/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.
• Management Area 7 (8,424 acres) Emphasis is on wood/forage: The goal is to achieve optimum production of timber products while protecting basic resources.
• Management Area 8 (2,146 acres) Emphasis is on 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.
• Management Area 10 (23 acres) Emphasis is on semi-primitive, motorized recreation: The goal is to provide opportunities for dispersed, motorized recreation.
• Management Area 11 (5,045 acres) Emphasis is on semi-primitive and 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.
Figure 2. Sherman Pass Project Management Areas West Side Map
Figure 3. Sherman Pass Project Management Areas East Side Map
Inventoried Roadless Areas, Potential Wilderness Areas, and Congressionally Designated Areas

Small portions of the Profanity, Bald-Snow, Hoodoo, South Huckleberry, and Bangs Inventoried Roadless Areas, as identified in Appendix C of the 1988 Final Environmental Impact Statement for the Colville National Forest Land and Resource Management Plan and confirmed under the 2001 Roadless Rule, are located within the Sherman Pass Project area. To remain consistent with the direction given in the 2001 Roadless Rule, these areas would not be available for road construction or commercial harvest if the Sherman Pass Project were implemented.

The Sherman project area also includes portions of the Profanity, Bald-Snow, Hoodoo, and the South Huckleberry Potential Wilderness Areas. There are six other Potential Wilderness Areas (Cougar Mountain, Deer Creek, Jackknife, Owl Mountain, Thirteenmile, and Twin Sisters) within fifteen air miles of either the Profanity or Bald-Snow Potential Wilderness Areas. Combined, these ten Potential Wilderness Areas account for 138,747 acres within the Okanogan Highlands ecoregion on the Colville National Forest.

In addition, the project area includes small portions of the Kettle Crest Trail #13 North and the Kettle Crest Trail #13 South, which are both classified as a National Recreation Trail and are part of the congressionally designated Pacific Northwest National Scenic Trail corridor.

National Forest Management Act

The National Forest Management Act includes provisions applicable to all projects and requires the following: (a) resource plans and permits, contracts and other instruments shall be consistent with the forest land management plan; (b) ensure consideration of the economic and environmental aspects of management, to provide for outdoor recreation, range, timber, watershed, wildlife, and fish; and (c) provide for diversity of plant and animal communities. All of these considerations and requirements are addressed in this Environmental Assessment and the various resource reports in the project analysis file. Therefore, project actions are consistent with the provisions of this Act.

Collaborative Forest Landscape Restoration Program

Congress established the Collaborative Forest Landscape Restoration Program with Title IV of the Omnibus Public Land Management Act of 2009. More information regarding this act is available at http://www.fs.fed.us/restoration/documents/cflrp/titleIV.pdf. The purpose of the Collaborative Forest Landscape Restoration Program is to encourage the collaborative, science-based ecosystem restoration of priority forest landscapes.

The Collaborative Forest Landscape Restoration Program covers the Sherman Pass Project. Under this program, forest restoration treatments would be implemented that would reduce hazardous fuels by focusing on thinning small diameter trees and treating strategic fuel breaks to modify fire behavior measured by the projected reduction of uncharacteristically severe wildfire effects for the forest type. The project would also maximize the retention of large trees, as appropriate for the forest type, promoting fire-resilient stands.
PUBLIC INVOLVEMENT
The Sherman Pass Project was first listed in the January 1, 2015 edition of the Colville National Forest Schedule of Proposed Actions. Letters inviting consultation were sent to the Confederated Tribes of the Colville Reservation, the Spokane Tribe, and the Kalispel Tribe of Indians on April 25, 2014. The letters included a description of the preliminary proposed action along with a vicinity map and project area boundary map. No response was received from any of the tribes.

Forest Service representatives met with the following government agencies and stakeholder groups to gather input regarding the proposed action.

Ferry County Commissioners
On October 15, 2014, the district rangers from both the Three Rivers and Republic Ranger Districts met with the Ferry County Commissioners and the Ferry County Natural Resource Board to discuss the Sherman Pass Project. The Forest Service project team leader and members of the interdisciplinary team assigned to the project were also present.

This is a priority project for the commissioners from a public safety standpoint. The Natural Resource Board had concerns regarding visual quality and hazard trees along the Sherman Pass Scenic Byway. They also thought that thinning the vegetation along the highway would increase safety by making wildlife approaching and crossing the road more visible.

The commissioners expressed concern about Heritage Resources, specifically the old rail grade in the project area. The County would like to see these areas protected. In addition, the commissioners would like to see the scenic byway concept enhanced. The proposed project would enhance the scenic byway from a visual quality standpoint. They suggested posting signs along the highway during project implementation to explain the project and activities taking place. They were also concerned about the potential impact of the project on jobs in Ferry County.

Bonneville Power Administration and the Washington Department of Transportation
The Forest Service met with officials from the BPA on June 10, 2013 to discuss ongoing projects along the power line corridor. BPA officials discussed their concern with the fuels along the power line and said that they would like to be a part of the Sherman Pass Project planning process. The BPA also discussed maintenance work that was scheduled to be implemented in years 2013-14.

On October 9, 2014, Forest Service representatives and representatives from the BPA and Washington State Department of Transportation visited the project area to discuss the proposed action.

The Washington State Department of Transportation expressed concern about logging systems operating along Highway 20 and traffic control. They offered to develop a traffic control plan for both logging and prescribed fire activity adjacent to the highway, which would include providing reader boards. They also had concerns about standing dead trees hitting the highway.

The BPA had concerns about the implementation of the Sherman Pass Project conflicting with their yearly power line rebuilding efforts. They were also very concerned about Forest Service operations near the power line. The BPA would like any trees that could hit the power line removed.
Northeast Washington Forestry Coalition
The Three Rivers District Ranger, the Forest Service project team leader, and members of the interdisciplinary team met with representatives of the Northeast Washington Forestry Coalition on October 31, 2014. The Northeast Washington Forestry Coalition would like to see more mechanical thinning in the proposed action to keep logging equipment operators skilled and employed. Members also expressed concerns about the viewshed as seen from the Kettle Crest Trail South and Sherman Peak. The Northeast Washington Forestry Coalition also requested that the Forest Service manage mule deer security habitat along the ridge of Paradise Peak by managing access on Forest Service road 2000-420.

Tri-County Motorized Recreation Association
The Three Rivers District Ranger and the project team leader met with representatives of the Tri-County Motorized Recreation Association on November 21, 2014. Their main concern, aside from identifying new opportunities for off-highway vehicle recreation, was to ensure that the proposed project would not preclude any off-highway vehicle recreation opportunities in the future. They were supportive of the proposed vegetation treatments along the Sherman Pass Scenic Byway corridor.

Backcountry Horsemen
Forest Service representatives met with the local chapter of the Backcountry Horsemen on November 5, 2014. Members expressed concerns regarding the effectiveness of the proposed non-mechanical treatments, funding for treatments around recreation sites, proposed mechanical treatments adjacent to the Kettle Crest Trail, clear-cutting, and the type of contract used if the project were to be implemented.

Chapter 2 – Alternatives

Alternatives Eliminated From Detailed Study

Restoration Projects including Road Decommissioning
Identifying potential road decommissioning candidates was considered but the Forest Service chose not to identify and analyze road decommissioning under the proposed action. The intention is to keep the Sherman Pass Project planning process streamlined to specifically address the needed fuels reduction. Restoration projects have been incorporated into the proposed action where they are an integral part of actions needed for fuels management and reduction, but additional restoration activities were not considered because they would have added time and complexity to the project, reduced streamlining, and shifted focus from the vegetation treatments needed to protect the power line and Highway 20.

Treatments in Inventoried Roadless and Potential Wilderness Areas

Jungle Hill
To address concerns regarding public safety at the Jungle Hill Trailhead and in the Jungle Hill Campground, vegetation treatments were considered within the site boundaries. Both of these developed recreation sites fall within the Profanity Inventoried Roadless Area. It was decided that
treatments in these areas would not be included in the proposed action because of concern about the controversial nature of proposing treatments in Inventoried Roadless Areas and the effectiveness of treating just the small areas within the recreation sites. Even if the Forest Service decided to treat the vegetation in the Jungle Hill developed recreation sites, it would not alter fire behavior to a degree that would protect the sites and recreating public from wildfire. The sites would still be surrounded by many acres of dead and dying lodgepole pine that fall within the Inventoried Roadless Area. Treatments around the developed recreation areas would need to extend beyond what is considered hazard tree mitigation to alter fire behavior within the sites.

Hazard tree falling is occurring at these recreation sites, as needed, and campers have been using the down trees for firewood. In an Inventoried Roadless Area, the Forest Service can fall hazard trees but they cannot be removed from the site. Hazard tree falling is permitted in recreation sites when it is considered necessary, even within Inventoried Roadless Areas.

**Private Property**
The Forest Service considered treating adjacent to the private property located in T 36N, R 35, S 33 as part of the proposed action. The Forest Service property adjacent to this private land is in the Huckleberry Inventoried Roadless Area. After consultation with the Fuels Specialist and Silviculturist, the District Ranger decided not to include treating this area in the proposed action, but to defer the action and make a separate decision. Harvest (both mechanical and non-mechanical) and removal of timber is permitted in Inventoried Roadless Areas with approval from the Regional Office. Proposing treatments that are consistent with current direction in an Inventoried Roadless Area would be controversial and add complexity, likely lengthening the planning process for the Sherman Pass Project. The intention is to pursue Regional Office approval to treat this area sometime in the future as a separate project.

**Prescribed Fire**
To meet the need of altering fire behavior, restoring the landscape structure mosaic, and increasing resilience to insect and disease impacts across the project area, prescribed fire ignition in the Profanity Potential Wilderness Area and Inventoried Roadless Area was considered but rejected primarily due to safety. The Fuels Specialist, Silviculturist, and District Ranger evaluated using prescribed fire ignition in the dense stands of older lodgepole pine as part of the proposed action for the Sherman Pass Project. After assessing the risks and potential benefits, they decided to not propose such an action because the amount of continuous canopy, heavy concentrations of fuel and a lack of potential control lines, makes this type of action extremely risky to fire personnel and adjoining resource values. The idea of prescribing fire that would limit the exposure to risk for personnel would require pinpoint accurate weather conditions and predicted weather forecasts. The decision maker did not feel that the potential for successful ignition was worth the risk associated with it. By not treating these areas in the Profanity Potential Wilderness Area and Profanity Inventoried Roadless Area with prescribed fire, fire behavior would not be altered nor would forest health and resilience be improved in these areas.
Regeneration Harvest and the BPA Power Line

The Forest Service considered regeneration harvest along the power line corridor but chose to propose other treatments instead to decrease the potential impacts to the power line. This request for a tree-free swath along the power line was raised by the BPA. Maintenance of the corridor is a primary concern for BPA officials. BPA has a network of roads used for maintenance of a current 100-foot wide corridor that is part of their right-of-way. However, there is a concern that trees outside the 100-foot swath may fall on and impact the power line, causing fires and/or breakage caused outages. Discussions with BPA officials point to two major concerns with power line maintenance and transmission. First, trees will fall on power lines creating fire starts and disrupting service, and second, that wildfire from adjacent forestland will impact the power line.

To lessen the possibility of falling trees, treatments in the proposed action emphasize reducing fuels and hazard trees immediately along the power line corridor. Treatments in areas infected with mountain pine beetle would reduce lodgepole pine and other trees of poor health and vigor. Overly dense stands would be thinned to reduce fuels to limit spread of crown fire and active surface fire. Large leaning trees in danger of hitting the power line would be removed. Prescriptions would consider wind-firmness in design. Treatments would occur within the immediate tree length distance of the power line (100 feet on either side of the 100-foot BPA maintained corridor for a total width of 300 feet). Proposed treatments along the power line corridor total approximately 288 acres or about 88% of the total corridor acres within the project area and 99 percent of the treatable acres.

It is because of feasibility issues that regeneration harvest along the whole power line corridor was dropped from consideration. The following are the primary reasons the Forest Service did not include regeneration harvest along the entire power line corridor:

- corridor crosses private land which is outside Forest Service jurisdiction;
- corridor falls within a Potential Wilderness Area which is being evaluated for administrative recommendation to Congress for wilderness designation;
- corridor falls within Forest Plan Management Area 11 (management goal is to protect the existing unroaded character);
- corridor is rocky; or
- corridor falls within a riparian area.

The BPA maintains the area directly under the power line in these areas where harvest is restricted and may remove vegetation for powerline safety.

Off-Highway Vehicle Trail Designation

To address the requests of user groups and the Ferry County Commissioners, the Forest Service considered enhancing opportunities for off-highway vehicle use in the project area. However, this will not be included in the proposed action because it does not fit the purpose and need of the project. The roads legally open to off-highway vehicles within the Sherman Pass Project area do not currently provide loop-riding opportunities. New road and/or trail designations for off-highway vehicle use are not actions that address the purpose and need of this project. Including those kinds of new opportunities in the proposed action would likely cause enough social controversy to slow the project planning process.
down. This proposed action will focus on treating the vegetation to protect the power line and Highway 20, addressing the purpose and need for this project.

Under both the no action and proposed action alternatives, all existing roads open to various types of motorized travel would remain open. No existing open system roads would be closed. The availability of legal off-highway vehicle riding opportunities (those identified on the 2013 Colville National Forest Motor Vehicle Use Map) would remain the same. In addition, those routes (including open and closed Forest System roads) identified by Ferry County in 2007 as potential future off-highway vehicle routes would continue to be available for future consideration as a designated off-highway vehicle trail system.

**No Action Alternative**
Under the no action alternative, current management plans would continue to guide management of the project area. No fuels management, tree removal, or prescribed burning would be implemented to address the purpose and need.

**Proposed Action Alternative**
This alternative includes thinning of small to intermediate trees and the treatment of surface fuels. The overall treatment objectives for the proposed action are to meet the purpose and need by providing for firefighter safety and reducing the potential for undesirable effects due to wildfire in areas identified in the Ferry County Community Wildfire Protection Plan. Specifically these areas are Washington State Highway 20, the BPA high-tension power line, other infrastructure, and private lands.

Treatment locations are based on landscape level features such as topography and roads, which were used to create strategic areas for treatment. Treatment types were assigned based on stand level conditions such as stand structure, biophysical environments, insect and disease occurrence and susceptibility, accessibility, and steepness. Note that more than one of the treatment types described below may occur on the same acreage footprint.
Figure 4. Sherman Pass Project Proposed Action West Side Map
Mechanical Vegetation Treatments
The proposed mechanical vegetation treatments provide for fuels reduction through harvest of trees that are 4” to 21” diameter with additional treatment of the remaining slash and understory. The objective is to attain a healthy and vigorous landscape mosaic; encourage fire resistant species; and reduce stand densities to increase health and vigor. Following treatment, stands should be able to withstand disturbance from fire and enable firefighters to safely fight fire if it were to occur. In stands with moderate-to-high levels of insect and disease activity, small group openings would be created in up to 50% of the stand to reduce future ground fuel accumulations and increase the stand’s ability to withstand disturbance. This treatment could result in openings up to 5 acres in size. In some cases, openings would be reforested with more fire resistant species such as western larch and ponderosa pine. Planting stock would be from U.S. Forest Service Region 6 Nurseries. Survival monitoring would occur following planting in years 1 and 3.

There are approximately 7,998 acres of proposed mechanical vegetation treatments.
**Mechanical Ladder Fuels Reduction**
Mechanical fuel treatments are also proposed to reduce ladder fuels using wheel/track based equipment. One method proposed is mastication, which rearranges the fuel load by chipping the material on site. Small trees, up to 15 feet in height, are cut and ground into small chips. These are typically left in place to decompose. The benefit of mastication is the manipulation of ladder fuels into compact surface fuels. The increase in surface fuel loading can have the effect of increased fire severity that diminishes as the chips decompose and break down.

Another method proposed is biomass removal, which removes ladder fuels from the stand to a landing where they may be utilized for firewood or ground and hauled to a co-generation plant for energy production. If biomass removal occurs in stands that are being mechanically thinned, it would be implemented simultaneously with the mechanical thinning. This method of dual treatment can be a more economical way to treat ladder fuels and decreases impacts to soils because a second mechanical equipment entry is not required to accomplish removal of biomass material.

There are approximately 7,366 acres of proposed mechanical ladder fuels reduction.

**Non-mechanical Vegetation Treatments**
Non-mechanical thinning is proposed in stands that are overly dense and are beginning to self-prune and lose vigor or in diseased stands where the majority of the trees are less than 7” in diameter. Treatments would leave the largest most vigorous disease free trees for the residual stand. Thinning overstocked stands reduces the time needed to attain old growth structure, increases vigor, which reduces the susceptibility to disease, and can reduce the long-term probability of fire damage. Overstory trees up to 21” in diameter that are spreading dwarf mistletoe may be girdled, felled, or pruned to reduce spread to the understory.

Non-mechanical thinning (ladder fuel reduction) is also proposed with the goal of removing small understory trees up to 10” in diameter. The objective of this treatment is to remove ladder fuels that could aid in the spread of a surface fire into the crowns of individual or groups of trees. This treatment is proposed following mechanical treatments or as the primary treatment in stands where no other treatments are proposed. The primary aim of this treatment is to remove the conduit for fire moving from the forest floor to the canopy.

There are approximately 7,322 acres of proposed non-mechanical vegetation treatments.

**Surface Fuel Treatments**

**Underburning**
The objective of the proposed underburning is to reduce surface fuel loading created by tree removal activities as well as reduce natural fuel loading and continuity while reintroducing fire into the ecosystem. A low intensity fire would be prescribed that limits the mortality of overstory trees to 10% across the landscape. Mortality caused by underburning would generally occur in “clumps” or “patches” with differing degrees of severity (Finney et al. 2005). Mixed severity patches may be up to 15 acres with mortality between 25% and 70%. High severity patches would be less than 2 acres in size with mortality over 70%. The mixture of low, mixed, and high severity patches would still meet the overall
overstory mortality limit of 10% across the landscape. Underburning may take place in areas that have received a vegetation treatment or in areas that have had no treatment. Areas that have no other treatment proposed are typically in areas with limited to no road access and in rocky and broken terrain. If ignited, the underburning treatment provides some surface and ladder fuel treatment in areas where no other fuel treatment is proposed.

These areas were included to allow for greater continuity and opportunity for reintroducing fire on a larger landscape block, as opposed to several smaller and fragmented units. Furthermore, burning in larger landscape blocks decreases the need for fireline construction, as there is a greater opportunity to use roads and natural features as firebreaks.

There are approximately 8,575 acres of proposed underburning.

**Piling 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 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. Piling may be done either with a machine, or by hand and would be ignited by hand. In most cases, 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.

There are approximately 3,984 acres of proposed mechanical piling and pile burning and approximately 3,256 acres of proposed hand piling and pile burning.

There are approximately 1,880 acres where the proposed surface fuel treatment would either be underburning or mechanical (approximately 1,098 acres) or hand (approximately 781 acres) piling and pile burning, depending on the post-harvest fuel loading. The need for piling would be based on a post-harvest exam of fuel loadings conducted by the fuels specialist or their designee.

**Lop and Scatter**

In units where piling is proposed, the fuels after canopy or ladder fuel treatment may be light enough where piling and burning is not necessary. In those instances, surface fuels would be lopped into smaller pieces and spread out to decompose. Lop and Scatter may be used in areas where fuels are too light to carry an underburn. In these areas lop and scatter would provide additional fuel to carry the fire. If not underburned, lop and scatter material would break down over time providing soil nutrients and retaining soil moisture similar to mastication. It would moderate fire behavior, though generally requires a few years to become flat enough on the ground for this to occur. There are approximately 311 acres of proposed lop and scatter.

**Leave Tops Attached**

Leave tops attached is a form of surface fuel treatment in which the smaller tops of the trees (tops < 3 inches in diameter), along with branch wood, are removed from the site with the whole trees and piled at a landing. The primary intent is to not increase the surface fuel loading with mechanical canopy treatments. The opportunity exists for the material to be ground and hauled away for biomass
utilization purposes. If biomass utilization is not feasible, the landing would be burned in the early winter when fire spread potential is very low, and after they have been made available for personal firewood removal. There are approximately 8,508 acres of proposed leave tops attached.

**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 units next to private land. The kind of fireline used depends on slope, access, and anticipated fire behavior. In areas where surface fuel treatments are proposed, hand or machine fireline may be constructed. The type of fireline used depends on slope, access, and anticipated fire behavior. Natural features such as creeks, ridgelines, rocky areas along with roads would be utilized as fire breaks where possible. Hand or machine fireline consists of removing vegetation down to mineral soil to a width of 18 to 36 inches. Water bars along with other drainage features would be installed to minimize run-off and erosion in firelines.

**Recreation Site Treatments**
Treatments are planned in and around developed and high value dispersed sites. The objective of these treatments is to reduce ladder, canopy, and surface fuels and the potential for wildfire spread by creating and implementing a plan for hazard tree removal and subsequent site restoration. The recreation treatments allow for mechanical treatment of hazard trees and potential hazard trees, fuels disposal, site preparation and planting of sites with the long term aim of sustaining campground vegetation, reducing hazards to recreationists, and reducing fire danger due to excess fuels accumulation.

**Late and Old Structure**
Treatments would encourage the attainment and maintenance of late and old structure as directed by the Eastside Screens Colville National Forest Plan amendment (1994). Treatments in late and old structure would reduce stand stress and increase growing space by clearing around large trees and remnant clumps. All trees with a diameter of 21” or greater would be retained. Small conifers would be removed from the canopy drip line and up to 50 feet from large trees. Clumps where smaller trees effectively form a clump with 21” diameter or bigger trees would be retained. The objective of treatments in late and old structure stands would be to reduce ladder and potential ground fuels to acceptable levels, increase stand vigor, and reduce susceptibility to insects and disease.

**Proposed Right-of-Way**
The Forest Service has proposed gaining permanent access from the Washington Department of Fish and Wildlife in order to secure access for future hazardous fuels reductions and potential recreational use. The route is part of an off-highway vehicle loop proposed by Ferry County. In the past, Washington Department of Fish and Wildlife has been unwilling to provide permanent access to the Forest Service over their lands. Should the Washington Department of Fish and Wildlife deny the request for permanent access; the Forest Service will pursue temporary access for the purpose of this project.
Temporary Roads

Project implementation would require an estimated 20 miles of temporary road. To the fullest extent possible, existing unauthorized roads, old skid trails, and other previously impacted areas would be reused during treatment implementation.

Temporary roads would not be maintained as part of the forest road system after project completion. They are intended for short-term access to a small portion of ground. As soon as possible after use, they would be rendered hydrologically stable (reconnecting the groundwater and surface water hydrology).

See maps below for the proposed location of temporary roads in the project area.
Figure 6. Sherman Pass Project Temporary Roads West Side Map
Figure 7. Sherman Pass Project Temporary Roads East Side Map
Road Reconstruction
About 90 miles of existing system road would require light to medium road reconstruction with approximately 1 mile requiring heavy road reconstruction, which includes upgrading stream crossings. The intent of all road reconstruction is to provide necessary access for safe and efficient haul while applying Best Management Practices to reduce soil erosion and sedimentation, the possibility of road failures, as well as other detrimental resource damage. Identified stream crossings will be upgraded to current standards (crossings will be able to handle the 100-year flood flow levels and will allow aquatic organism to move through them).

The following are the definitions for the levels of road reconstruction included in the Sherman Pass Project:

- **Light Reconstruction**: This includes minor work activities in the roadway, which may involve minor disturbances to existing cut and fill slopes and is normally performed by road maintenance equipment such as a motor grader or rubber-tired backhoe. Typical work activities may include: scarifying and shaping the roadbed or grading the surface to remove ruts and reestablish proper surface drainage; cleaning or reestablishing ditches, catch basins, culvert inlets and outlets; removing minor slumps or slides; placement of aggregate, riprap, or other erosion control features; or brushing or limbing existing vegetation to maintain required sight distances and clearances; and incorporation of Best Management Practices. There is approximately 31 miles of proposed light road reconstruction.

- **Medium Reconstruction**: This includes activities on an existing road that may involve localized disturbance to the existing cut or fill slopes and additional clearing and grubbing. Typical work activities include widening the existing roadbed and installation of drainage features such as culverts, cross drains, and roadside ditches. Medium reconstruction may include new disturbance occurring intermittently as needed and light reconstruction activities along the entire length of the road. There is approximately 58 miles of proposed medium road reconstruction.

- **Heavy Reconstruction**: This includes activities that would have impacts similar to new road construction and may involve widening and/or realignment along portions of, or the entire road; substantial additions to, or replacement of, drainage structures including live crossings; and/or new excavation, embankment, and surfacing. There is approximately 1 mile of proposed heavy road reconstruction.

Design Elements in the Proposed Action
The following Design Elements apply to all treated areas (or specific treatment areas listed) and are an integral part of the Sherman Pass Project. The effects analyses are based on implementation of these Design Elements and Best Management Practices.

Invasive Plants
The intent of the invasive plants design elements is to reduce the risk for invasive plant establishment and provide long-term soil cover.

1. Re-vegetate areas disturbed by road reconstruction or maintenance, temporary road construction, skid trails and landings. In addition, review areas after pile burning and underburning and seed bare
areas in excess of 100 square feet, particularly areas with a high potential for sediment delivery to streams. Locally collected native plant materials are the first choice in re-vegetation, but non-native, non-invasive plant species may also be used (USDA, Forest Service 2005).

2. Heavy equipment will be cleaned prior to move in and use off of roads and landings.

3. Noxious weeds that occur within the project area and on Forest Service routes used to access the project area would be treated at least a season prior to any harvest or ground disturbing activities. Post-disturbance noxious weed treatments need to occur where weeds exist or have been introduced. The assessment of where this needs to occur will take place 1 year prior to any road closures.

Special Uses and Minerals

4. To avoid conflicts with timber sale administration, during pre-sale activities including layout, timber personnel shall consult and coordinate with the Lands and Minerals program manager to ensure that mining claims and/or operations are identified on sale area maps and on the ground. Protect all mining claim monuments from disturbance from project activities. If trees are to be harvested within the boundary of the mining claim, coordinate pre-harvest activities with the Minerals Mineral Coordinator and the mining claimant. Known claims within vegetation treatment units will be made available to the project silviculturist for inclusion in the silviculture prescription.

5. In recognition that locatable mining claims may be staked between the writing of this report and implementation of the proposed project, any new, locatable mining claims (including all features that monument corners of those claims) located within areas proposed for temporary road construction, timber removal, prescribed burning or other vegetation management should be protected through avoidance. If avoidance is not possible, the owner of the affected claim should be notified so that he/she can re-monument the corner. Sale administrators and/or project leads should contact the Forest Minerals Coordinator to obtain mining claim ownership contact information.

6. Protect all authorized improvements (access roads, power transmission lines, fiber optic lines, spring developments, highway improvements, and water lines). To avoid conflicts with timber sale administration, during pre-sale activities including layout, timber personnel shall consult and coordinate with the Lands and Minerals program manager to ensure that lands special uses are identified on sale area maps and on the ground. Trees are to be felled away from improvements. Prescribed fire treatments proposed within the area should be planned and implemented to avoid impacts from fire or smoke on water system improvements and BPA power lines. Road maintenance work should be done in such a way as to avoid impacting private landowners who hold a Forest Road Easement for access.

Range

The intent of the range management design elements is to minimize impacts to livestock management and the range resource and to protect range infrastructure currently in place in the project area.

7. Existing, known range improvement projects will be protected from damage from harvest activities. Known range improvements are located in the following units: 1, 4, 6, 20, 30, 68, 77, 78, 82, 85, 87, and 91.
8. All rangeland improvements, such as developed springs, water troughs, corrals, and fences not previously identified during inventory and analysis will be delineated during layout and protected during harvest and burning activities. Should identified range improvements become damaged because of the proposed action, they will be repaired to their pre-implementation condition.

9. Grazing permittees will be notified prior to implementing any prescribed fire, or pile burning within the project area by district fire staff. This is to mitigate effects to livestock safety and grazing rotations from prescribed fire/pile burning operations. The District Fire Management Officer is responsible for ensuring this measure is met.

10. All gates located in fences and next to cattle guards within the project area will be left in the condition in which they are found. If the gate is found to be closed, it must be closed again immediately after use of the gate in order to keep permitted livestock in the appropriate pasture. If gates are found to be open, they should remain open.

11. Log landings should be placed on an area other than a grass/forage meadow to avoid project conflicts with livestock management and utilization of forage by livestock.

12. Protect and preserve natural barriers that act as allotment and pasture boundaries. This includes all treatment types. Specifically, the natural barrier in the Quartz allotment will retained. This natural barrier runs north from Mt. Washington to the Snow Peak/Sherman East Fence (Forest Service Road 2000-600). The natural barrier retained will be approximately 300 feet wide. Fence would be constructed if function of natural barrier is lost during project implementation. This applies to units 88, 91, and 91b.

13. To reduce the potential for livestock to negatively impact water quality or riparian areas, do not treat vegetation in Riparian Habitat Conservation Areas that would allow livestock to gain access to streams. This includes all treatment types.

14. To allow for permittee access with horse trailers, drain dips will be designed and constructed for low clearance vehicles. Specifically, this applies to Forest Service Roads 2053-000, 2050-100, 2050-167, 2050-110, and 2050-116.

15. Retain current motorized access for permittees to complete range improvement maintenance and salting activities. Motorized access should be left free of debris to allow permittee access to the key roads identified within the project area.

Wildlife
The intent of design elements 16 – 23 is to protect snags, which include live trees with heart rot (particularly western larch, grand fir, and western redcedar) and sapwood rot (particularly ponderosa pine) and dead trees, particularly those larger than 16” in diameter. These trees are uncommon on the landscape and provide habitat for a variety of species. Past and ongoing harvest has reduced the number of larger snags and continued loss has the potential to negatively affect viability of cavity-nesting species. In situations where down or standing fuels were a concern because of their proximity to private land or structures, or there are sufficient snag numbers, modifications would be dealt with on a case-by-case basis by the wildlife biologist or their representative. The remaining snags and down wood would not create a continuous fuel bed.
16. No snags larger than 30” in diameter will be felled. During layout, if snags are found near a landing, move the landing site to avoid the snag. *The intent is to protect very large snags, which are extremely rare on the landscape and require more than 150 years to develop. If they are in a harvest unit, buffers of 1 ½ tree lengths will be located around the snag to reduce removal for safety concerns.*

17. In prescribed fire units, prior to ignition, ensure fuel moistures are high enough to reduce consumption of large down woody material. *The intent is not to consume all large down woody debris. This applies to all prescribed fire areas unless discussed on a case-by-case basis with a fuels specialist and the wildlife biologist or a representative.*

18. Retain all standing live trees > 16” in diameter that exhibit signs of heartwood rot (often Indian Paint fungus is present) or sapwood rot (holes present in the tree bole), or broken tops, or that have injuries in the bole where new leaders formed a new trunk. In stands where the desired condition is to prevent the spread of pathogenic fungi, the silviculturist and wildlife biologist will determine the prescription to retain diseased trees. *The intent is to retain sizes and species of trees that are most used for nesting and denning by animals listed as management indicator or sensitive species.*

19. Retain in each unit all standing snags and down woody material greater than 16” in diameter (or 4 feet from butt end if down wood), unless the remaining volume is deemed as a fire hazard. This applies to areas outside of the power line corridor and units or portions of units not open for firewood harvest per the Colville National Forest firewood map. In those portions of units open for firewood harvest (as shown on the firewood map), during harvest operations, allow the purchaser to remove up to 80% of existing snags and down wood. *The intent is to allow the purchaser to remove firewood while leaving some dead wood for public firewood cutting.*

20. In units harvested with ground-based equipment, if a snag greater than 16” in diameter must be felled for safety reasons, high top it, when practical, to retain a portion of the snag. If a snag must be felled and cannot be high-topped, a similar sized live leave tree (up to 20.9” in diameter) must be high-topped above the first live whorl or as high as the equipment can safely reach. This applies to the following harvest units in areas closed to firewood harvest: 3, 4, 5, 16, 17, 18, 26, 27, 28, 29, 30, 33, 44, 47, 48, 49, 73, 74, 75, 76, 78, 82, 199, 200120, 2210025, 2210063, 2210074a, 2210076, 2210076a, 2210085, 2210089, 2210092, 2210092a, 2210104, 2210104a, 2260003, 2260004, 2260004a, 2260009, 2260011, 2260047a, 2260103, 2260104, 2260108, 2260133, 2260141b, 2260142, 2260171, 2260173, 2260174, 2260175, 2270006, 2270040, 2270044b, 2270048, 2270056, 2270061, 2270071, 2270072a, 2270073, 2270074, 2270078, 2270079, 2270081, 2270083b, 2260085, 2260173a, 2270089, 2270096, 2271200, 2280021, 2280021a, 2280049, 2280069, 2280075, 2280076, 2280077, 2280081, 2280148, 2280149, 2280150, 2280174, 2280175, 2280176, 2280183, 2280229, 2281098, 2281150, and 2290021.

21. In the above wildlife design elements relating to snags and down wood, where down or standing fuels are a concern close to private land or structures, or sufficient snag numbers remain to allow for some loss, the scenarios of maintaining all larger snags and down wood outside of areas open for firewood harvest (per the Colville National Forest firewood map) could be modified and would be dealt with on a case-by-case basis with the wildlife biologist or a representative.
22. If harvest-caused felling of snags results in levels fewer than 3 per acre overall, snag levels would be increased by creating them. This applies to all timber harvest units in areas closed to firewood harvest.

23. In cable logging units, when snags whose diameter exceeds 16” must be felled, the tops to 10” could be removed to prevent hang-ups of cabled timber. This applies to the following timber harvest units in areas closed to firewood harvest: 1, 2210060, 2210063a, 2210070, 2210070a, 2210071, 2210074, 2260039, 2260043, 2260049, 2260050, 2260051, 2260052, 2260054, 2260058, 2260064, 2260066, 2260078, 2260079, 2260082, 2260083, 2260087, 2260122a, 2260131, 2260140, 2260149, 2260153, 2270003, 2270020, 2270039, 2270041, 2270043, 2270049, 2270051, 2270060, 2280073, 2270077a, 2270076, 2270093, 2270097, and 2280164.

24. In lynx habitat, retain pockets of large down wood unless deemed excess by the fuels specialist, soils specialist, or district wildlife biologist or designee. The intent is to retain concentrations of down wood, which lynx require to den without creating a continuous fuel bed. This applies to the following units: 2210092a, 2260064, 2260066, 2260082, 2260087, 2260103, 2210060, 2260051, 2260052, 2210063, 2260039, 200120, 2210025, 2210089, 2260099, 226011, 2260104, 2260108, 2260122a, 82, 2260047a, 2210085, 2260011, 2260049, 2210061, 2260012, 2260053B, 2260055, 2260058, 2260073, 2260079, 2260102, 2260141b, 2260142, 2260153, 2260171, 2280021, 2280049, 2280148, 2280149, 2280183, 2280229, 2281098, 26, 48, 49, 76, 78, 2210060, 2260051, 2260052, and 2270048.) (CT - 200120, 2210025, 2210089, 2260099, 226011, 2260104, 2260108, 2260122a, 2260133, 2280176, 4, 75, 82, 2270078, 2270081, 2270098, 2270097, 2270096, 2280021a, and 2280077) (CT - O - 1, 2260085, 28, 29, 30, 73, 74, 199, and 33) (CT - S - 2210074, 2210074a, 2210076a, 2210092, 2260003, 2260004, 2260004a, 2260173, 2260173a, 2260174, 2260175, 27, 18, 2260050, 44, and 47) (Non-Commercial - 10, 11, 12, 15, 2210025b, 2210057, 2210058, 2210059, 2210071, 2210071c, 2210087, 2210087a, 2210088b, 2210093, 2210094, 2210096, 2210103, 2260007, 2260008, 2260009a, 2260005, 2260015, 2260019, 2260021, 2260022, 2260023, 2260024, 2260024a, 2260035, 2260061, 2260071, 2260073a, 2260074, 2260106, 2260106b, 2260118, 2260132, 2260155, 2260170, 2260172, 2260175a, 2260216, 2270018, 2270080, 2280178, 2280191, 2280219, 40, 41, 66, 68, 77, 79, 80, 81, 84, 85, 86, 87, 88, 89, 9a, 9b, MA11c, Profanity2, 100, 143, 20, 21, 22, 2260109, 2260209, 2270013, 2270042, 2270063, 2270094, 2280087, 2280094, 2280095, 2280223, 2280225, 2280999, 24, 43, 46, 50, 65, and 70) (SPT - 19, 2210061, 2210067, 2210071a, 2210072, 2260012, 2260053b, 2260055, 2260058, 2260073, 2260078, 2260079, 2260102, 2260140, 2260149, 2260162, 2260015, 2280019, 25, 2260053a, 2260112, 2260117, 2260163, 2260195, 2261209, 2263209, 2270003, 2270029, and 2270030)
26. In the following units, retain a minimum of 10% of each unit in an un-harvested condition. The intent is to retain un-treated patches to provide early successional habitat for species that depend on this condition. This applies to the following units: 21, 22, 23, 24, 84, 86, 87, 91, 91b, 2210064, 2210069, 2210071, 2210072, 2210085, 2210088b, 2210093a, 2260053, 2260054, 2260100, 2260109, 2260133, 2260162a, 2260195a, 2260209, 2260225, 2270004, 2270007, 2270013, 2270019, 2270031, 2270042, 2270057, 2270066, 2270069, 2270077, 2270083, 2270094, 2280015a, 2280024, and 2280081.

27. In all units in big game winter range, retain a minimum of 10% of each unit in an un-harvested condition. This can be waived if a review by the wildlife biologist determines that harvest of these areas would not affect big game or where the intent is to provide for human safety, particularly along escape routes. The specific areas that will make up the 10% will be identified by district wildlife personnel or their designee. The intent is to retain overstory and escape cover for big game. This applies to the following units: 2, 8, 16, 17, 59, 2270074, 2270075, 2270075, 2270076, 2270077, 2270077a, 2270078, 2270079, 2270081, 2270083, 2280075, 2280076, 2280077, 2280021a, 2280054, 2280056, 2280060, 2280064, 2280069, 2280069a, 2280073, 2280081, 2280081a, 2280082, 2280084, 2280084b, 2280084c, 2280087, 2280094, 2280095, 2280167, 2280223, 2280999, 2280164, 2280169, 2280172, 2280173, 2280174, 2280175, 2281215, and 2290065.

28. In big game winter range, when harvesting in the winter, start and stop harvest-related activities at about the same time each day, and restrict traffic to only those activities involved with the logging operation. Deer frequently acclimate to temporally consistent disturbance, and the intent is to minimize disturbance. This applies to the following units: 16, 17, 2270073, 2270074, 2270076, 2270077, 2280075, 2280076, 2280077, 2280077a, 2280078, 2280081, 2280069, 2280069a, 2280073, 2280081, 2280081a, 2280082, 2280084, 2280084b, 2280084c, 2280087, 2280094, 2280095, 2280167, 2280223, 2280999, 2280164, 2280169, 2280172, 2280173, 2280174, 2280175, 2281215, and 2290065.

29. In units in big game winter range along open roads that are not identified as strategic escape routes, retain vegetation to disrupt viewing into the entire unit. The intent is to provide big game some security cover while crossing open areas. This applies to the following units: 21, 22, 23, 24, 2260100, 2260109, 2260133, 2260209, 2270019, 2270031, 2270057, 2270057, 2270069, 2270077, 2270083, 2270094, 2280015a, 2280024, and 2260195a.

30. In big game winter range, harvest-related activities should be concentrated in adjacent units and implemented at the same time (done in blocks) rather than being spread out among disjointed units. The intent is to reduce the overall impact to big game habitat.

31. On roads opened or reconstructed for the project (includes temporary and system roads), restrict access on these roads to administrative use and logging operations. In all situations, install a barrier, which could be a gate, berm, or any other blockage. There are three time frames of concern:

   - From the onset of reconstruction to the start of logging operations;
   - After logging operations have ceased until post-harvest activities are completed; or
   - If logging operation are suspended.

The intent is to prevent vehicle use from becoming established on these roads.
32. The following table lists roads that have a high probability of requiring a gate closure to allow for post-harvest restoration projects. Roads may be added or removed from this list prior to implementation. The intent is to maintain administrative access to complete restoration activities while preventing vehicle use from becoming established.

Table 1. Currently Closed Roads Requiring Closure Post-Harvest

<table>
<thead>
<tr>
<th>Forest Service Road Number</th>
<th>Closure Junction/Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-112</td>
<td>2000-110</td>
</tr>
<tr>
<td>2000-140</td>
<td>2000-136/Bangs Mountain Road</td>
</tr>
<tr>
<td>2000-232</td>
<td>2020-222</td>
</tr>
<tr>
<td>2000-244</td>
<td>Both ends of currently closed segment</td>
</tr>
<tr>
<td>2000-264</td>
<td>2000-220/Lane Creek Road</td>
</tr>
<tr>
<td>2000-270</td>
<td>2000-220/Lane Creek Road</td>
</tr>
<tr>
<td>2000-295</td>
<td>2000-220/Lane Creek Road</td>
</tr>
<tr>
<td>2000-300</td>
<td>2000-220/Lane Creek Road</td>
</tr>
<tr>
<td>2000-329</td>
<td>2000-220/Lane Creek Road</td>
</tr>
<tr>
<td>2000-390</td>
<td>2000-398/Bonneville Power Administration access road</td>
</tr>
<tr>
<td>2000-400</td>
<td>2000-400 at start of reopened segment</td>
</tr>
<tr>
<td>2000-401</td>
<td>2000-400</td>
</tr>
<tr>
<td>2000-415</td>
<td>2000-410</td>
</tr>
<tr>
<td>2000-418</td>
<td>2000-400</td>
</tr>
<tr>
<td>2000-425</td>
<td>2000-425 at start of reopened segment</td>
</tr>
<tr>
<td>2000-428</td>
<td>2000-420</td>
</tr>
<tr>
<td>2000-457</td>
<td>2000-457 at start of reopened segment or just north of powerline</td>
</tr>
<tr>
<td>2000-460</td>
<td>2000-450</td>
</tr>
<tr>
<td>2000-470</td>
<td>2020-000/South Fork Sherman <strong>AND</strong> 2000-000/Sherman Highway</td>
</tr>
<tr>
<td>2000-475</td>
<td>2000-000/Sherman Highway</td>
</tr>
<tr>
<td>2020-001</td>
<td>2020-000/South Fork Sherman</td>
</tr>
<tr>
<td>2020-140</td>
<td>2020-050/Scalawag Ridge Rd</td>
</tr>
<tr>
<td>2020-400</td>
<td>2020-000/South Fork Sherman</td>
</tr>
<tr>
<td>2050-020</td>
<td>Hall Creek Road/C-99</td>
</tr>
<tr>
<td>2050-113</td>
<td>2050-110; other end closed by barrier on 2050-113</td>
</tr>
<tr>
<td>2050-115</td>
<td>2050-114</td>
</tr>
</tbody>
</table>
33. Management to retain aspen and cottonwood is detailed under the Silviculture design elements. In addition, enclose portions of four stands containing hardwood with fencing that creates two small enclosures, 1 to exclude cattle and 1 to exclude all ungulates. Planning and implementation of the enclosures will be the responsibility of the wildlife biologist or representative.

34. On the east side of the Kettle Crest, retain at least 10% of the following stands to maintain understory lateral cover. The intent is to retain sufficient cover for lynx to move through the north-south corridor, particularly during summer. This applies to units: 200120, 200129, 2210076, 2210076a, 2260003, 2260004, 2260009, 2260009a, 2260012, 2260015, 2260016, 2260019, 2260102, 2260103, 2260104, 2260106, 2260108, 2260118, 2260122a, and 2260216.

35. The following units lie in white-headed woodpecker habitat and contain larger trees. Avoid pockets of snags as well as live ponderosa pine affected by sapwood rot. The intent is to maintain habitat conditions for white-headed woodpeckers. These units have proposed thinning using ground-based methods: 1, 3, 4, 5, 16, 17, 29, 30, 33, 44, 47, 48, 49, 73, 74, 75, 78, 82, 199, 2260174, 22600175, 2270043, 2270048, 2270049, 2270056, 2270060, 2270061, 2270071, 2270076, 2280069, 2280073, 2280075, 2280076, 2270078, 2270079, 2270083b, 2270089, 2270096, 2270097, 2280021a, 2280081, 2280148, 2280150, 2280164, and 2281150.

36. These units are proposed for thinning using cable yarding, thus more care should be taken during layout and implementation to avoid snags, particularly large ponderosa pine snags: 1, 2270043, 2270049, 2270060, 2270076, 2270079, 2280073, 2280164, 2270097, and 2280073.

37. If a nest is found of great gray owls, white-headed woodpecker or bald eagles, protect it through the establishment of suitable activity buffers (generally a 1-tree-length buffer) and/or in accordance with existing Forest Service Timber Sale Contract Provisions G.2.4, GT.2.4 or BT 6.24 Protection Measures Needed for Plants, Animals, Cultural Resources, and Cave Resources.

38. Retain at least eight trees per acre (largest ponderosa pine or Douglas-fir, especially mistletoe-infested Douglas-fir) in dusky grouse existing roost habitat. The intent is to ensure that there are a sufficient number of roosting trees for dusky grouse in roost habitat. This applies to the following units in their entirety: 16, 17, 18, 33, 44, 47, 74, 199, 2210060, 2210063, 2210070a, 2270043, 2270044b, 2270048, 2270049, 2270056, 2270060, 2270061, 2270071, 2210085, 2270006, 2270039, and 2270089. This applies to pockets in openings in the following units: 2210025, 2210076a, 2210092, 2260047a, and 2260064.

39. If harvest occurs in pine marten or pileated woodpecker areas, buffer areas of snag concentrations to prevent the loss of snags. If felling of standing snags results in levels fewer than four per acre overall, snag levels would be increased by creating them. The intent is to minimize the loss of snags in Pine Marten and Pileated Woodpecker Management Requirement Areas. This applies to the following units: 2260140, 2260142, 2260149, 2260153, 2260159, 2260171, 2260173, 2260173a, 2260174, 2260175, 2280021, 2280049, 2280060, 2280069, 2280073, 2280150, 2280174, 2280183, and 2281150.

40. Post segments of open roads that pass through Pine Marten and Pileated Woodpecker Management Requirement Areas with signs indicating that these areas are closed to firewood cutting. This applies to the following roads displayed in the table below.
Table 2. Roads to post in pine marten and pileated woodpecker management requirement areas

<table>
<thead>
<tr>
<th>Forest Service Road Number</th>
<th>Length (in miles) to post</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020-050</td>
<td>0.43</td>
</tr>
<tr>
<td>2030-000</td>
<td>0.75</td>
</tr>
<tr>
<td>2050-010</td>
<td>0.15</td>
</tr>
<tr>
<td>2000-220</td>
<td>1.89</td>
</tr>
<tr>
<td>2000-240</td>
<td>0.53</td>
</tr>
<tr>
<td>2000-136</td>
<td>1.17</td>
</tr>
</tbody>
</table>

41. If a goshawk nest is found, implement the following three measures (in accordance with existing Forest Service Timber Sale Contract Provisions G.2.4, GT.2.4 or BT 6.24 Protection Measures Needed for Plants, Animals, Cultural Resources, and Cave Resources:

- Create a 30-acre no-harvest buffer around the nest;
- Identify the boundary of the post-fledgling area and within ¼ mile of the nest, minimize direct negative effects to goshawk. Activities that would cause negative effects include, but are not limited to, timber harvest, road location or building, road use, underburning, unit layout and marking, monitoring, planting, etc.;
- Initiate timing restrictions within the post-fledgling area from March 1 through August 15 of each year that extends to all activities that could disturb goshawks. Exceptions for specific activities that may be permitted during this period may be made by the district wildlife biologist or a designee on a case-by-case basis.
- If a nest is found of cooper’s or sharp-shinned hawks, protect it through the establishment of a 1-tree length buffer around nests.

_The intent is to retain each nest as a potential nesting site._

**Sensitive Plants**

The intent of the sensitive plants design elements is to protect sensitive plants that occur in the project area.

42. If sensitive plant species are found in the project area while project activities are occurring, the Forest Botanist or their designee would be consulted as to measures required to protect the species and its essential habitat. Layout would notify the Forest Botanist or their designee of up-coming or ongoing unit layout.

43. The sensitive plant sites in treatment units 78 and 82 will be buffered 100 to 150 feet or to the topographic break. When laying these units out, a botanist would be consulted and the sensitive plant GIS layer reviewed.

44. For the construction of temporary road segment #W1, the sensitive plant site would be buffered 100 to 150 feet or to the topographic break. When designing this temporary road construction, the Forest Botanist or their designee would be consulted and the sensitive plant GIS layer reviewed.
Heritage resources design elements are intended to protect heritage resources and comply with the National Historic Preservation Act. Design element implementation would protect heritage resources from proposed project activities by minimizing or eliminating impacts to heritage resources. Implementation of the following design elements would protect heritage resources in the project area of potential effect.

45. The Colville National Forest Archaeologist or other authorized Heritage Program personnel would provide cultural resource information only to certain designated implementation personnel to limit knowledge of cultural resource site locations.

46. All heritage resource sites would be avoided during project activities. A certified archaeologist will establish the required 100-foot area of protection around all sites. No equipment or machinery would be allowed within the buffered site boundaries. Trees would be felled away from buffered site boundaries to avoid site impacts.

47. In the event of an inadvertent discovery of heritage resources during project implementation, project activities would cease in the vicinity of the discovery and the Colville National Forest Archaeologist would be notified. The Colville National Forest Archaeologist or other authorized Heritage Program personnel would investigate, record, and provide mitigation measures for site protection. Work would not proceed until written clearance is provided by the Colville National Forest Archaeologist or appropriate Heritage Program personnel.

48. Removal of surrounding cover due to timber harvest and/or thinning could increase site visibility from access and open system roads. Screening vegetation would be left in place between sites and roads to obscure site locations.

49. Lop and scatter using hand tools would be allowed within the buffered site boundary for trees and brush less than six inches in diameter.

50. During prescribed fire operations, fire would be kept outside of buffered site boundaries by construction of a standard fire line around the site. In sites with flammable features such as cabins or other structures, additional protective measures would be implemented such as pretreatment of structures with foam or water or by wrapping structures in heat attenuating materials. Additional site protection methods may be implemented at the discretion of fire personnel to fit unique conditions of each site location, if the protection prevents damage to cultural resources. Chemical fire retardants can stain wood and other materials and corrode metal artifacts (Winthrop 2004); therefore, their use on cultural resources or artifacts would be prohibited.

51. In the event that an existing system road scheduled for reconstruction or maintenance passes through a cultural resource site, roadbed limits would be marked prior to reconstruction or maintenance. All reconstruction or maintenance activities would be confined to the marked roadbed limits.

52. Temporary roads created for the project that leads to treatment units containing cultural resources would be closed as soon as possible.

53. Planting or seeding meadows to increase forage for big game and livestock could increase damage to site features or artifacts by animal trampling or wallowing. Such planting or seeding would not be allowed in buffered site boundaries.
54. Noxious weed control agents applied to meadows could damage or kill vegetation planted by homesteaders such as lilacs, iris, or other domestic vegetation. Noxious weed control would not be applied in buffered site boundaries.

Soils
55. The total acreage of all detrimental soil conditions should not exceed 20% of the total acreage within the activity area including landings and system roads. The desired outcome is to limit detrimental soil conditions to preserve soil productivity and comply with Regional Soil Quality Guidelines and Forest Plan Standards. Applies to all management activities.

56. Skid trail spacing must be specified as follows:

- Skid Trail Spacing: 100 feet apart inside edge to inside edge except when converging at landings or avoiding obstacles.
- Forwarder Trails Spacing: 40 feet apart inside edge to inside edge except when converging at landings or avoiding obstacles. Four to eight inches of uncompacted slash should cover forwarder trails.
- Applies to timber harvest and fuel reduction activities

57. Skidding equipment must travel on designated trails. When feasible re-use old skid trails. Feller-bunchers should travel off skid trails in an efficient manner with limited passes. The desired outcome is to limit detrimental soil conditions to preserve soil productivity and comply with Regional Soil Quality Guidelines and Forest Plan Standards. Applies to timber harvest and fuel reduction activities

58. Slope limitations for ground based equipment as follows:

- Ground based yarding with rubber-tired skidders would be limited to slopes less than 35%. Short slope lengths may be steeper.
- Feller bunchers, harvester-forwarder systems, and other tracked heavy equipment would be limited to slopes less than 45%. Short slope lengths may be steeper.
- The desired outcome is to limit detrimental soil conditions to preserve soil productivity and reduce erosion potential.
- Applies to timber harvest and fuel reduction activities using mechanical equipment

59. Minimize compaction, rutting, and erosion by avoiding activities during periods of high soil moisture. Ground based equipment will operate on relatively dry soils of high soil strength. The Field Guide to Soil Moisture Conditions Relative to Operability of Logging Equipment (Rust, 2005) should be used to determine soil trafficability. The desired outcome is to limit detrimental soil conditions and comply with Forest Plan and Regional Soil Quality Standards and Guidelines and Forest Plan Standards. Applies to timber harvest and fuel reduction activities using mechanical equipment.

60. Logging with winter conditions requires that skid trails be buffered by at least 8 inches of compacted snow or frozen ground or a combination of the two that exceeds 8 inches. If cut to length
equipment is used, a combination of slash, compacted snow, and/or frozen ground that exceeds 8 inches is required to buffer forwarder trails. The desired outcome is to limit detrimental compaction and rutting to preserve soil productivity and comply with Regional Soil Quality Standards and Guidelines and Forest Plan Standards. Applies to timber harvest and fuel reduction activities using mechanical equipment.

61. Decompact landings and temporary roads to restore hydrologic function. Restore soil cover by seeding or mulching where mechanical treatments removed soil cover. The desired outcome is to restore infiltration, stabilize soils, and provide soil cover to prevent erosion and loss of soil productivity. Applies to timber harvest activities.

62. In units that have had commercial harvest, keep follow-up fuel treatment machinery to designated skid trails except for limited passes off trail. Fuel reduction machinery (i.e., masticators and piling equipment) should be tracked equipment having a ground pressure rating of 8 psi or less with an articulating arm capable of reaching 15 feet. The desired outcome to prevent detrimental soil conditions and prevent harvest/fuel treatment units from exceeding 20% detrimental soil conditions per Regional Soil Quality Standards, Guidelines, and Forest Plan Standards. Applies to fuel reduction and silvicultural activities.

63. Retain fine and coarse organic matter on top of the soil. Soil cover should exceed 35%, preferably 50%. The desired outcome is to maintain sufficient amounts of organic matter to prevent short or long-term nutrient and carbon cycle deficits and to avoid detrimental physical and biological soil conditions. Treatment units should be maintained with between 6 to 20 tons per acre of coarse woody material (defined as greater than three inches in diameter). Fuel break units are exempted from soil design elements regarding coarse woody material requirements. Applies to all timber harvest, fuel reduction, and silvicultural activities.

64. Target machine pile size to 15 feet in diameter and 10 feet in height outside of landings. The desired outcome is to maintain sufficient amounts of organic matter and to avoid detrimental physical and biological soil conditions. Smaller piles allow for re-colonization by soil organisms and prevent excess tracking from mechanical equipment as well as complying with Regional Soil Quality Standards and Guidelines and Forest Plan Standards. Applies to all fuel reduction and silvicultural activities.

65. Adequately drain fire lines including dozer and hand line. Waterbars will be installed during fire line construction and to Forest guidelines and will be described in Element 5 and Element 9 of the burn plan(s). If feasible and practical, pull back litter, duff, and topsoil back over fireline following completion of the prescribed burn. The desired outcome is to prevent soil erosion from fire lines, preserve soil organic matter, and allow for long-term recovery of fire lines. Applies to prescribed burn operations.

**Silviculture**

66. Removal of non-merchantable wood is allowed and encouraged for firewood. Strategies such as pulling pole size non-merchantable material to the road for gathering, making material in slash piles available, and designating post and pole areas will be considered on a unit-by-unit basis. No
standing material would be taken. The intent is to provide firewood-gathering opportunities to the public for material that would otherwise be burned.

67. Supplemental planting of 400-600 acres with tree stock grown according to Region 6 specifications is expected to occur in all or part of the following units: 1, 3, 18, 27, 28, 29, 30, 33, 44, 47, 73, 74, 199, 2210004a, 2210070, 2210074, 2210074a, 2210076, 22100092, 2260003, 2260004, 2260049, 2260050, 2260083, 2260085, 2260173, 2260173a, 2260174, and 2260175. Planting will be done as needed in the group openings 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. Prescribed burning or other site preparation will help to prepare the seed bed and reduce competing vegetation. Planting will be included in the project KV plan. The intent is to provide for adequate numbers of trees, and to restore fire and insect and disease resistant species within harvest units.

68. Canopy openings planned for planting and identified during presale marking will be tagged with GPS coordinates prior to harvest. The intent is to be able to easily locate planting spots following treatment for ease in implementing reforestation.

69. Treatment boundaries may be modified to retain aspen greater than 10” in diameter according to topographic features as identified by the silviculture prescription. The intent is to encourage aspen regeneration and restoration of aspen clones and to maintain hardwoods on the landscape. Large-diameter hardwoods provide nesting habitat for a large number of wildlife species.

70. The following applies to units that contain aspen clones greater than 1/8 of an acre as identified in silvicultural prescriptions. In units where the vegetation is being treated mechanically, remove conifers up to 20.9” in diameter within 30-200 feet of aspen clones. In non-mechanical units, conifers up to 7” in diameter would be removed within 20-50 feet of aspen clones. Follow-up treatments would include prescribed fire, mechanical disturbance of soil or partial cutting of the aspen overstory to stimulate suckering. In areas where the slope is less than 40%, slash or other barrier may be constructed to protect suckers from excessive browsing. The intent is to increase the vigor of aspen clones, especially in the Lane Creek area. Aspen are a species of interest on the Colville National Forest and valued for their unique scenic quality and for wildlife habitat. In addition, aspen typically does not burn with the same intensity as conifer forests so the placement of aspen clumps on the landscape may temporarily reduce wildfire intensity to levels within the natural range of variability.

71. Prescribed burn plan design should encourage passive burning through aspen stands located in burn areas. The intent is to encourage regeneration of aspen stands while maintaining existing structure and reduce the potential for undesired damage to aspen from prescribed fire.

72. In small diameter stands or stands of low stocking due to disease or other factors, clumps of 2-4 desirable trees will be left and counted as a single tree in terms of spacing. Other clumping will be considered in vegetation treatment units as the opportunity occurs. Untreated patches will be left in units that are in the moist and mesic biophysical environments to promote healthy multi-stored stands. The intent is to retain naturally occurring tree clumps to provide structure and wildlife habitat.
73. Protect all select trees from damage caused by project-related activities. Select trees are trees that are designated for cone and seed collection because they have favorable characteristics. One or more select trees may be in the units. *The intent is to maintain the health of these trees that are part of the Forest tree improvement program.*

74. In identified lynx habitat, thinning, and the associated piling and pile burning, would be limited to 500 feet from roads or other areas strategic for firefighting or public safety. Lodgepole pine would be the first species selected for retention followed by other conifer species of interest to maintain a mix considering the current mountain pine beetle outbreak. This applies to non-mechanical thinning units that were previously burned in the 1988 White Mountain fire. *The intent is to maintain as much lynx foraging habitat as possible (snowshoe hare habitat) while reducing tree densities.*

75. Winter logged Douglas-fir and Engelmann spruce logs should be removed from the area prior to April of the following spring, or at the earliest opportunity after the first of April if the area is inaccessible prior to April. *The intent is to reduce the spread of bark beetle infestation and flight within the area. This is especially important in areas with active beetle populations as identified in silviculture prescription.*

76. Mandatory removal of dead lodgepole pine would occur in areas where retention would cause unacceptable fuel loads.

77. Removal of non-merchantable wood is allowed and encouraged. However, award of green biomass or other non-merchantable material must be approved by the project silviculturist and fuels planner. The intent is to make sure implementation is consistent with the Decision Notice, treatment objectives, and fuels and silviculture prescriptions.

78. In areas where the overstory is heavily infected with dwarf mistletoe and the understory is in danger of infection, girdling may occur where no harvest is possible. The intent is to limit the transfer of mistletoe from the overstory to the understory and increase the vigor of the residual stand.

**Fuels**

79. Prescribed fire burn plans will be reviewed by resource specialists and approved prior to underburning per The Interagency Prescribed Fire Planning and Implementation Procedures Guide (McManus et al. 2008).

80. The silviculturist and the fire and fuels specialist may utilize fuel-clearing methods such as slash pullback, raking and mixing duff around large or desirable trees and snags, as well as removing smaller trees and shrubs as deemed necessary. *The intent is to minimize undesirable primary and/or secondary mortality to valuable large trees and snags, and stands including plantations.*

81. The risks of prescribed fire escape will be mitigated by using common firefighting tactics to limit fire spread. Safeguards to contain fire may include, but are not limited to fire lines, black lines, wet lines, natural barriers, and roads. Burning is done when weather and fuel moisture conditions make unmanageable fire behavior unlikely, such as during spring and fall. Burns are monitored until they are declared out.
82. Where machine line is used to contain underburning within the unit boundary, it will not enter or ring a late and old structural stage unit. Wherever possible, natural and existing fuel breaks (such as rocks and creeks) or roads would be used as a firebreak.

83. Homeowners and landowners with the potential to be impacted with smoke from planned prescribed fire activities would be notified prior to any prescribed burning that season. In addition, a prescribed fire notification of planned activities each fall and spring would be sent to local newspapers and other local media sources.

Aquatics

84. Three Zones of the Riparian Habitat Conservation Areas (RHCA) – the fisheries biologist, hydrologist, and soil scientist developed the following design elements listed by location in the RHCA. These apply to all treatment units. *The intent is to move vegetation toward the goals set forth in INFISH in the RHCA while protecting fish habitat and water quality.*

- **Zone 1** – Immediately around a stream, wetland, or other water body
  1. Apply a 15-foot no-harvest buffer on either side of the stream, creek, or waterbody. Management activities can occur within this zone, but only to enhance fisheries or make watershed improvements. *The intent is to protect stream banks and not allow stream bank trees to be removed.*

- **Zone 2** – around zone 1, as applies, the extent of the riparian vegetation or wet soils, whichever is greater.
  1. No mechanical treatment of vegetation would occur. *The intent is to limit soil impacts on sensitive wet soils.*
  2. Fuels reduction may include hand treatment of vegetation, but no pile burning of vegetation would occur. *The intent is to limit bare areas created by pile burning.*
  3. Prescribed fire would be allowed to creep into this zone, but no active ignitions would occur. *The intent is to avoid firelines and hose lays that run parallel to stream channels and to avoid using foam near stream channels. These activities are more harmful than letting the fire die out in the RHCA.*

- **Zone 3a** – Adjacent to Zone 2, the remainder of the RHCA containing upland vegetation where a road occurs within Zone 3.
  1. Upslope of Roads: Allow unit treatment as prescribed unless some other issue takes precedent (sensitive soils, shade issues, headwaters, sensitive plants, etc.) that resulted in a unit specific Design Element.
  2. Downslope of Road: Follow unit specific Design Elements.

    a) In units adjacent to streams, machinery would need to stay back 50 feet from the slope break or inner gorge. *The intent is to not destabilize the slope break or work on steep side slopes that directly input into streams.*
b) If a barrier to the riparian area is breached, windrows would be created between the riparian area and the treatment, or a fence would be installed to keep cattle out of riparian areas. *The intent is for treatments along streams and wetlands to not increase cattle access to riparian areas.*

c) If there are no outstanding unit specific issues the following applies:

i. Slope is relatively flat (less than 20% in any direction), and the area is beyond 50 feet of the inner gorge, canopy removal would be less than 25%. Harvest is allowed with consultation with the Fisheries Biologist, Hydrologist, or Soils Scientist. Preferred treatment is cable winching from the road. To prevent creating a fuel problem, log with tops attached if possible.

ii. If the slope is greater than 20% in any direction, no commercial harvest would occur. Apply treatments as per Zone 2 above.

   a) Harvest will protect all tree and large shrub hardwoods and favor western hemlock, Engelmann spruce, and western red cedar where present. Limit the removal of dominant and co-dominant conifers in the overstory canopy on the south side of streams. All RHCA units should be reviewed by the Hydrologist or Fisheries Biologist during presale activities.

       i. The intent is to protect the stream channel, enhance the large woody debris within the stream channels and RHCA, and prevent increases in water temperature by retaining shade.

   • Zone 3b – Adjacent to Zone 2, the remainder of the RHCA containing upland vegetation where no roads occur within Zone 3.

      1. Follow unit specific design elements. In units adjacent to streams, machinery would need to stay back 50 feet from the slope break or inner gorge. *The intent is to not destabilize the slope break or work on steep side slopes that directly input into streams.*

      2. If there are no other concerns identified, single passes of harvest machinery are allowed under the following conditions:

         a) Harvest under winter or summer dry condition or over a slash mat (to reduce bare soil);

         b) Slope towards stream is less than 20%;

         c) Soil is not erosion sensitive (units with soil sensitive to erosion are identified by the Soil Scientist);

         d) Mechanical piling and leave tops attached would be allowed with consultation with the Fisheries Biologist, Hydrologist, or Soil Scientist.

85. Ensure that adequate drainage control structures are established during road reconstruction. The intent is to improve the groundwater/surface water connectivity and to provide adequate drainage.

86. Ensure that stream crossings on reconstructed roads are adequately improved or upgraded. *The intent is to disconnect the road from the waterbody to avoid or minimize water and sediment from being channeled into surface waters and to dissipate concentrated flows.*
87. Temporary roads used for management activities will be decommissioned. Consult with the Hydrologist and engineer to ensure that these road templates are hydrologically stable. *The intent is to reconnect the area groundwater and surface water hydrology and floodplain, and to prevent vehicle use from becoming established.*

88. Temporary stream crossings will be constructed so as to minimally affect streamflow characteristics and for a short-term amount of time. *The intent is to prevent a negative impact to fish and water quality from the dust created from the haul trucks.*

89. All refueling and servicing sites will be located outside the Riparian Habitat Conservation Area. *The intent is to prevent fuel spills and to minimize activities within the Riparian Habitat Conservation Areas.*

90. Water will be used for dust abatement. If the use of chemicals for dust abatement is requested, a Hydrologist or Fisheries Biologist will be consulted. *The intent is to prevent a negative impact to fish and water quality from the dust created from the haul trucks.*

91. Allow low severity fire to back into the RHCA where preparation to keep fire out of the riparian areas would cause more damage than letting the fire creep in. *The intent is to avoid firelines and hose lays that run parallel to stream channels and to avoid using foam near stream channels. These activities are more harmful than letting the fire die out in the RHCA.* This would only be used where overstory mortality from prescribed fire would be less than 10%, loss of large woody debris (greater than 12 inches in diameter) less than 20%, and no detrimental impact to the riparian soil would occur. It is expected that there would be mortality of the shrubs and herbaceous plant material. However, these species typically regenerate from roots or seeds quickly after low intensity burning. During or prior to burn plan development, the Fuels Specialist would decide whether wood and/or brush in the RHCA needs hand piling in upland vegetation or other treatment or can withstand a creeping ground fire.

92. Prescribed fire will not be ignited within the RHCA. Piles in the RHCA would be outside of zones 1 and 2. Piles would be burned during late fall through early spring while fuel moisture levels are high enough to limit fire spread. Raking around large trees and shade tolerant species to prevent mortality is recommended. A minimum of 90% organic material (duff) would remain on the ground in the RHCA after pile burning in order to protect soil and minimize sediment delivery to streams. *The intent is to minimize the effects of prescribed fire on soil, water quality, and riparian resources.* This applies to all burning within the Riparian Habitat Conservation Areas.

93. In order to avoid fish entrainments into pumps and to prevent barriers to fish movement, non-emergency fire response and non-emergency pumping of water and construction of associated small sandbag or gravel berm dams with hand tools would include the following:

   a) The location, pumping rate, and duration of non-emergency water withdrawals will be designed to minimize aquatic impacts. Non-emergency pumping shall not reduce streamflow to the detriment of fish life. Consult the Fisheries Biologist if adequate streamflow levels are in question.

   b) Any pump used for withdrawing water from fish-bearing waterbodies shall be equipped with a fish guard to prevent passage of fish into the pump. The pump intake will be screened with 3/32 inch or smaller mesh. Screen maintenance shall be adequate to
prevent injury or entrapment to juvenile fish and shall remain in place whenever water is withdrawn from waterbodies through the pump intake.

c) Temporary gravel berm dams will be constructed of gravels available on-site within the bankfull channel, or of clean, round gravel transported to the site.

d) No dirt from outside the bankfull channel will be used to seal the dam and no logs or woody material within the bankfull channel shall be utilized for construction of the temporary dam.

e) Temporary sandbag or gravel berm dams will be completely dismantled and the streambed restored to its original condition following completion of withdrawal.

94. Delivery of foam to surface waters will be avoided. The intent is to minimize the effects of management activities on water quality.

95. The Silviculturist, Fisheries Biologist, and/or Hydrologist will be involved in developing treatment prescriptions in the RHCA. Harvest in RHCA units would protect all tree and large shrub hardwoods and favor western hemlock, Engelmann spruce, and western red cedar where present. Limit the removal of dominant and co-dominant conifers in the overstory canopy on the south side of streams. All RHCA units should be reviewed by the Hydrologist or Fisheries Biologist during presale activities. The intent is to protect the stream channel, move the stand toward desired conditions to enhance large woody debris within the stream channels and in RHCA as well as prevent increases in water temperature by retaining shade. Applicable to hardwoods and western hemlock, western red cedar, and Engelmann spruce. With fire exclusion, cedar and hemlock can be found in what typically would have been upland vegetation. Cedar and hemlock can survive outside of the riparian area. Follow the Three Zones of the RHCA strategy. The intent is to offer enhanced protection to the more sensitive aquatic areas.

96. Parking, staging areas, and landings will be located outside the RHCA unless there is no other suitable location. In that case, a Hydrologist or Fisheries Biologist will be consulted on all proposed landing locations within RHCA. The intent is to minimize the effects of management activities on soils, water quality, and riparian resources.

97. Wetlands, springs, seeps, and streams not previously identified during the inventory and analysis will be delineated during unit layout with assistance from the Hydrologist, Fisheries Biologist, or Soil Scientist when needed. The intent is to minimize effects of management activities on wet areas, and get an accurate database of the water systems in the area.

98. When removing hazardous trees within the RHCA, retain the tree on site and drop it towards the stream. The intent is to protect the stream channel and enhance the large woody debris within the stream channels and RHCA. This applies to all hazardous tree removal within the RHCA. During project activities, do not create by removing or killing trees, openings larger than ½ acre or opening large enough for camping or parking in RHCA. This includes keeping fire severity low when underburning to reduce the potential of killing large patches of trees because firewood gatherers often remove the dead trees and leave openings. The intent is to reduce recreational cumulative impacts to RHCA.

99. Wood will not be removed from the stream channels. At least 35 feet of all existing downed trees of 12 inches or greater in diameter, within or overhanging the stream channel would be left in
place to meet INFISH large woody debris requirements. *The intent is to enhance the large woody debris within the stream channels and RHCAs.* This applies to all RHCAs.

**Visual Quality**

The following objectives are developed to meet the intent of Moderate to High Scenic Integrity levels for Retention and Partial Retention Visual Quality Objectives’ foreground and middleground area as allocated for the following areas: Sherman Pass National Scenic Byway (State Highway 20); Bangs Mountain Forest Service Road 2000-136; South Sherman Forest Service Road 2020-000; North Sherman Forest Service Road 2030-000; Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 travel routes and the Kettle Crest National Recreation Trail, all developed recreation sites and significant dispersed campsites. There are county roads that provide access to private land in the roaded canyons that intersect State Highway 20 where residences are located, primarily in the lower elevations at the east and west ends of the highway corridor. These roads transition to Forest Service roads in the higher elevations or loop into the wildland urban interface that surrounds the project area. The travel routes have scenic value for people who live in the area and for dispersed recreation users. Keep the impacts of harvest and other activities in the foreground and middleground of the Sherman Pass National Scenic Byway (State Highway 20), Kettle Crest National Recreation Trail and all developed recreation sites to a minimum to maintain high scenic quality where possible in accordance with fuels and forest health objectives. It would also be important to enhance landscape character by increasing vegetation variety by promoting different age classes of tree species and thinning to expose large Ponderosa pine, Western larch boles and quaking aspen stands for viewing along the designated scenic travel routes. Maintain a landscape composed of a variety of textures and patterns. Maintain the highly textured skyline, ridgelines and dominating patterns of the swales. Maintain diversity and variety in sizes of leave trees in clumps and masses on a landscape scale. Minimize mechanical damage to existing leave trees.

101. The Forest Landscape Architect or designee will work with the district personnel on treatment prescriptions and marking guides, specifically in areas where proposed treatments fall within foreground areas that are sensitive for scenic objectives. The Forest Landscape Architect or designee will participate in unit layout in foreground units, marking of leave tree selection and, or, small clusters of leave trees where roads, trails, or developed recreation sites and significant dispersed campsites are within the unit boundary. This is to be determined at implementation.

102. When using cable-logging systems, keep cabled corridors as narrow as possible to reduce contrasting line effects. Orient the corridors away from viewing locations when possible. This applies to the following cable units: 1, 2210060, 2210063a, 2210070, 2210071a, 2210074, 2210077, 2260039, 2260043, 2260050, 2260051, 2260052, 2260058, 2260078, 2260122a, 2260131, 2260140, 2260153, and 2270097.

103. Maintain existing screening of the BPA power line running along Sherman Pass National Scenic Byway (State Highway 20) where a healthy canopy exists in coordination with reducing hazardous fuels. The intent is to retain screening clumps in areas where healthy vegetation is currently located.
breaking up the view of the power line. Treatment of vegetation within this area may occur to reduce hazardous fuels and maintain vegetation vigor.

104. Leave clumps of varying sizes of overstory and understory along the foreground travel routes of Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 and Kettle Crest National Recreation Trail, all developed recreation sites and significant dispersed campsites.

105. Leave low stumps (8” or less) and cleanup woody debris in the immediate foreground area (up to 500’ of seen area) from Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 and Kettle Crest National Recreation Trail, all developed recreation sites and significant dispersed campsites. Stumps and woody debris left would be subordinate to the landscape.

106. In created openings, use irregular shaped openings (no straight lines or corners) with grouped leave tree islands to reduce visual contrasts by feathering the edges. Also, limit the size of created openings to 3-5 acres in the foreground to limit soil color contrasts. Minimize skid trails or roads that create linear openings perpendicular to the normal line of sight. Mimic natural density changes around created openings and retain the natural variances within the stand rather than “evening out” the spacing of trees. Use irregular clumping and feathering of unit edges to avoid introducing dominating lines that could result from creating small patch openings. The intent is to reduce the obvious character changes occurring in the overall landscape.

107. Preserve the existing vegetation below constructed and temporary roads as much as possible for screening. Temporary roads occurring in foreground and, or, on slopes greater than 40% should have all vegetation left below the temporary road for ½ to one tree length as needed to screen roads from Highway 20 and distant viewpoints. Any changes during implementation in the temporary road locations from the mapped proposed action would need to be verified to ensure that scenic integrity is maintained. This applies to all temporary roads.

108. Methods used to control prescribed burns should not dominate naturally established form, line, color and texture of the area in the Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 and Kettle Crest National Recreation Trail travel routes viewsheds, all developed recreation sites and significant dispersed campsites. Avoid dozer line construction in the immediate foreground of developed recreation sites; utilize natural features as fire breaks.

109. Develop marking guidelines to minimize the amount of paint and boundary marking devices seen from areas of scenic concern. Complete removal of ribbons, tags, and stakes where visible from the Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road
2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 travel routes and Kettle Crest National Recreation Trail, all developed recreation sites and significant dispersed campsites after the contract is completed. Paint trees using “Individual Tree Marking” so that paint will be removed from the unit when trees are harvested. Paint ¾ of circumference of the tree bole, making sure paint can be seen from all angles. These marking techniques would be used along immediate foreground of the Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 and Kettle Crest National Recreation Trail travel routes, all developed recreation sites and significant dispersed recreation sites. The following units would require special scenic marking guidelines: 1, 2, 3, 4, 16, 17, 50, 82, 200120, 200129, 2210025, 2210074, 2210076, 2210076a, 2210085, 2210089, 2210092, 2210095, 2210104, 2260003, 2260004, 2260004a, 2260009, 2260011, 2260012, 2260039, 2260043, 2260102, 2260103, 2260104, 2260122a, 2260131, 2260133, 2260140, 2260173a, 2260175, 2270029, 2270030, 2270078, 2270079, 2270096, 2270097, 2280021a, 2280149, 2280169, 2280175, 2280176, 2280177, 2280181, 2280182, 2280183, 2280191, and Canyon Creek and Sherman Pass REC. In addition, this applies to units where roads, trails, developed recreation sites and significant dispersed campsites are determined to be in the unit boundary during implementation. If orange paint must be used, brown out once harvest is complete.

110. Locate landings out of seen area of Sherman Pass National Scenic Byway and where possible, locate landings out of the immediate foreground (or seen area) in Retention and Partial Retention Visual Quality Objective allocation areas; or screen as much as possible where vegetation is available and consistent with fuels treatment objectives; or use existing landings where they exist and seed after project is complete, leave wood on site and scatter. Areas of scenic concern are the foreground of the Sherman Pass National Scenic Byway (State Highway 20), Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 and Kettle Crest National Recreation Trail travel routes, all developed recreation sites and significant dispersed campsites. Where feasible, landings could occur on National Forest System roads but should stay within the existing prism as much as feasible. Landings should not be placed on or near sensitive viewing areas where they may impact the scenic integrity. Significant dispersed campsites proposed to be used as landings or equipment staging areas must be cleared by the District Recreation Specialist prior to their use. This applies to all treatment types. The intent is to ensure significant dispersed campsites remain available to recreationists throughout the life of the project; or, if a site must be used, that it is not degraded through loss of vegetation or expansion beyond the current condition.

111. Plant larger native trees and shrubs to help the area recover more quickly visually after removal of diseased overstory in developed recreation sites along Sherman Pass National Scenic Byway and Canyon Creek dispersed recreation area.
Recreation

The intent of the recreation design elements is to minimize disruption of the existing recreation use patterns within the project area, especially those associated with existing winter recreation opportunities, and limit the impacts of unauthorized off-highway vehicle use after the project is implemented. For this project area, there is year-round recreation use that needs to be considered.

The following elements would be implemented to minimize the effects of the proposed action on forest visitors.

112. No harvesting, hauling of timber, or moving of equipment would occur on the following holiday weekends: Memorial Day, Fourth of July, and Labor Day. The Fourth of July holiday includes, at a minimum, July 3 through July 5. This applies to all treatment types. The intent is to avoid conflicts between industrial and recreation vehicle traffic on known weekends of high recreation use.

113. Scenic quality would need to be maintained around developed recreation sites, significant dispersed campsites, developed trails and other routes used for year round recreation. The immediate foreground (up to 500') is the sensitive zone. Leave or maintain moderate to heavy vegetative screening around significant dispersed campsites. Ensure that “Immediate foreground areas (approximately 500 feet) around significant dispersed campsites will be managed to meet the retention visual quality objective” (Colville National Forest Land and Resource Management Plan, 1988). Marking (paint) of trees within the immediate foreground areas of significant dispersed campsites would not be visible from the significant dispersed campsites after harvest activities are completed. Significant dispersed campsites would be identified by the District Recreation Specialist and mapped using GPS coordinates. This applies to all treatment types. The intent is to provide screening between significant dispersed campsites, provide screening between significant dispersed campsites and the road, and to discourage off-highway vehicles from leaving the significant dispersed campsite and travelling into the forest.

114. For the Kettle Crest Trail #13 North, Kettle Crest Trail #13 South, Sherman Pass Trail #82, Canyon Creek Trail #93, Sherman Tie Trail #96, and Sherman Overlook Trail #96, a “passing through treatment units” sign will need to be posted on both ends of active units to warn recreationists of potential safety hazards during project implementation. Project created hazards (i.e. partially burnt snags, damaged trees) within a tree length of a system trail will be felled immediately. Single-track trails will not be used to skid material. Damage caused by felling, burning, or skidding operations to listed trails will be corrected immediately upon completion of a unit. This applies to all treatment types. The intent is to protect recreationists from potential injury or harm and to ensure that the affected trail system is in the same condition post treatment as it was prior to treatment.

115. If winter harvest or haul operations are required along the Albian Hill, South Fork Sherman Creek, or Quartz Mountain Roads (Forest Service Roads 2030-000, 2020-000 and 2053-000 respectively), access will be limited to a single winter season. If winter logging conditions deteriorate prior to all units being completed, a second winter season could be authorized. In addition, harvest activities will only be allowed on one of the three roads at any given time. Shade retention objectives would be important for maintaining the use on these winter trails. This applies to all treatment types. The intent is to make sure that winter recreationists have access to quality opportunities along the Sherman Pass Scenic Byway while allowing the required winter harvest to
occur. Shade retention along the listed routes is important to ensure a quality snow pack can be maintained throughout the winter and does not burn off due to exposure to the sun.

116. Thinning in Management Area 3A within the immediate foreground (500 feet) along the Kettle Crest Trail #13 North and South, Sherman Pass Trail #82, Canyon Creek Trail #93, Sherman Tie Trail #96, and Sherman Overlook Trail #96 needs to meet the visual quality objective of retention and provide for a variety of stands in which “alterations to the environment appear subordinate to the surrounding areas” (Colville National Forest Land and Resource Management Plan 4-77, 1988). Uneven-age management systems in this area would require careful implementation to meet the retention standard so that the stands appear natural. In addition, thinning along Trails #82 and #96 must retain their current level of screening from State Highway 20, especially where the trail comes into close proximity with the Highway. This applies to all treatment types. The intent is to protect the visual corridor associated with these trail systems while retaining the feeling of a natural or “unaltered” environment. This design element is also intended to minimize the audio and visual impact of State Highway 20 on Trails #82 and #96.

117. Meet the Retention Visual Quality Objective within the immediate foreground areas (approximately 500 feet) of the Sherman Pass Interpretive Site, Kettle Crest Trailhead, Sherman Overlook Campground, Sherman Overlook, Sherman Creek Trailhead, Growden Heritage Site, Canyon Creek Campground, Log Flume Heritage Site, and Albion Hill Sno-park. Management actions adjacent to campgrounds and scenic overlooks would not occur between July 1 and Labor Day. The use of trailheads as landings will need to be cleared through the District Recreation Specialist. Project created hazards (i.e. partially burnt snags, damaged trees) within two tree lengths of a recreation site will be felled immediately. This applies to all treatment types. The intent is to retain the visual setting within which these developed recreation sites are located and to provide continued, safe access to these developed recreation sites during the peak summer recreation period and following treatment.

118. Minimize post-harvest slash accumulation within significant dispersed campsites. After harvest and fuel treatments are complete, perform basic cleanup to any significant dispersed campsites located within the harvest units. Basic cleanup means restore the access route to the general pre-project conditions, restore the integrity of the fire ring, and remove slash from the core (fire ring, parking area, and tent area) of the campsite. Only those access routes leading to dispersed campsites (both significant and non-significant) located within 300 feet of a road open to motorized use on the Motor Vehicle Use Map needs to be cleaned-up. Routes leading to dispersed campsites greater than 300 feet from a road open to motorized use on the Motor Vehicle Use Map can be closed per Forest Plan direction to close all user-created, non-system roads. This applies to all treatment types. The intent is to provide the public with quality dispersed camping.

119. Ensure vegetation treatment unit boundaries remain outside the Potential Wilderness Areas and Inventoried Roadless Areas. This applies to all vegetative treatment types. The intent is to ensure our Potential Wilderness Areas and Inventoried Roadless Areas are not reduced in size as a result of inadvertent road construction or unit cutting that would make the affected acres ineligible as part of a Potential Wilderness Area or conflict with direction in the 2001 Roadless Rule.
120. Burn plans will include public notification (at a minimum, this includes press releases and posted notices at the District offices, trailheads, local businesses, and significant dispersed campsites) of upcoming burn operations to educate hunters, trail users, and dispersed campers of the potential for smoke and active burning. This applies to all burn treatments. *The intent is to ensure the safety of fall campers, trail users, and hunters and to educate these users so they can make informed decisions when choosing an area to recreate. This is especially important for hunters that may arrive late and head out early in the morning prior to the arrival of fire crews.*

121. If a timber sale operator wants to use a dispersed campsite for more than 14 days during project implementation, the District Recreation Specialist will be consulted and approve the proposed site(s) prior to selection. A camping permit and/or timber sale agreement will spell out the conditions for the commercial use of a dispersed campsite. The permit/timber sale agreement will also list the restoration activities that would be required to return the occupied campsite(s) to the condition they were in immediately prior to occupancy. Restoration activities may include decompacktion, seeding, tree planting, and barrier rockwork depending on the level of disturbance caused by the occupancy of the campsite(s). This applies to all treatment types. *The intent is to provide the public with the best possible dispersed camping setting and dispersed campsites. This would prevent resource and visual damage at dispersed campsites that can be caused by long-term camps.*

122. All roads that are re-opened, any created temporary roads, and any unauthorized roads used during operations should be closed immediately after the completion of management actions to minimize the probability of new unauthorized off-highway vehicle routes being established. The exception would be routes that access dispersed campsites (both significant and non-significant) that are located within 300 feet of a road open to motorized use on the Motor Vehicle Use Map. These routes would be retained for access to dispersed campsites. Closure treatments would use the most effective practicable barriers available on-site. Though it is preferred that closure of these roads would occur within one year of commencing work, it is recognized that in some cases the need to seed or construct closure devices may have to be delayed due to weather or other unforeseeable conditions. In this instance, closure activities would occur as soon as restricting conditions allow and resource impacts due to closure operations could be avoided. This applies to all treatment types. *The intent is to limit or stop illegal off-highway vehicle use within treatment areas before it becomes established.*

**Transportation**

123. All Maintenance Level 1 roads to be used for the project shall be brought up to a Maintenance Level 2 standard and returned to a Maintenance Level 1 after commercial haul on the road is completed. Return roads to Maintenance Level 1 status by disconnecting from the hydrologic systems in the following manner:

- The storage condition for each Maintenance Level 1 road will be agreed to by engineering, fisheries, and hydrology representatives.
- Culverts are to be removed or stabilized.
  
  a) If the culverts are removed, provide channel bed-level grade control if necessary.
b) If culverts are not removed, provide armored overflow and outflow channels and rocked crossings (300 feet from stream) to reduce resource damage.

- Shape road prism to a stable condition.
- Replace culvert cross drains with rolling dips at roads or place rolling dips below cross drains in roads as a means of self-maintenance.
- Where grades of more than 4% are sustained, at a minimum, Waterbars will be placed 1) at every 10 vertical foot change in grade 2) at a minimum of one waterbar every 200 feet and 3) prior to stream crossings to prevent road drainage from directly entering the stream channel.

124. Prior to commercial haul, all bridges that would be used for the Sherman Project road shall be inspected, and upon inspection, any deficiencies shall be corrected by repair or replacement of the bridge. Additionally, prior to haul on all bridges, appropriate overload permits must be submitted and approved.

Monitoring Recommendations

Wildlife
1. For at least 5 years post-closure, periodically monitor all roads closed in conjunction with this project, for closure effectiveness. Promptly report and repair road closure violations.
2. For at least 5 years post-construction, periodically monitor the hardwood enclosures for effectiveness and condition.

Invasive Plants
3. Follow-up monitoring and retreatment of areas behind road closures must be conducted, at a minimum, once a year for the first two years after the treatment or until it can be verified that the weed infestation has been effectively treated (USDA Forest Service 1999 Colville National Forest Weed Prevention Guidelines).
4. Disturbed ground and roads would be monitored by the Forest invasive plant program following prescribed fire to assess for the presence of invasive plants and plan for treatment as necessary.
5. Re-vegetation efforts would be monitored to insure successful site re-vegetation has occurred and reseed if necessary. Success is considered if after the first growing season the average number of plants in a randomly located 20 centimeter by 20-centimeter frame is 6 or more. Sample size will exceed five frames per 100-foot stretch.

Range
6. Any new structures installed to manage livestock to the pre-condition of project implementation would be checked at least once within one year of installation and would be recorded in the INFRA database.
7. The Rangeland Management Specialist that administers the grazing permits affected by the Sherman Pass Project would be responsible for monitoring natural boundaries identified as at risk due to implementation of the Sherman Pass Project. The Rangeland Management Specialist would determine what would be needed to create effective allotment and pasture boundaries.

Recreation
8. Monitor for hazard trees within 300 feet of Canyon Creek and Sherman Overlook Campgrounds; Kettle Crest and Albian Hill Sno-parks; Kettle Crest, Jungle Hill, and Sherman Creek Trailheads; Log Flume and Growden Heritage sites; Kettle Crest Interpretive Site; Sherman Overlook; and along the wheelchair accessible Canyon Creek Trail #93 and Sherman Overlook Trail #96A. Monitor for hazard trees within a tree length of all trail corridors that are adjacent to mechanical treatments or were included in an underburn/optional burn unit for two years following the completion of management activities. Monitoring should occur each spring and after each major wind event. If necessary, additional felling of hazard trees within two tree lengths of recreational facilities, access roads, trails, and occupied areas would occur as part of the Forest’s hazard tree abatement program.

Hydrology
These monitoring recommendations address the main concerns for watershed hydrology affected by the Sherman Pass Project. The proposed monitoring also addresses several key indicators: sediment yield, channel morphology, and water quality.

9. **Channel Stability**: Several permanent stream survey sites have been established. Stream morphology surveys would continue to be conducted every 5 years to establish trends at these monitoring sites. This would include, but is not limited to, full cross-section measurements, photo points, bank pins where needed, Bank Erosion Hazard Index etc. The measurements would record channel responses (changes in bank widths, depths, bedload, floodplains, entrenchment, etc.) to management activities, specifically road improvements. Measurements have been taken pre-implementation by the Forest Service.

**Chapter 3 - Environmental Consequences**

**Introduction**
This chapter presents information about current resource conditions in the Sherman Pass Project area, and the direct, indirect, and cumulative effects of implementing the no action and the proposed action alternatives. The information presented in this chapter and in the specialists’ reports is based on the best available science. These effects along with the entire project file, which is incorporated by reference, are the scientific and analytic basis for the Deciding Officer.

**Fire, Fuels, and Forests**
This section is excerpted from the Sherman Pass Project Fire, Fuels, and Vegetation Existing Condition Report (Payne and Corvino, 2014) and the Sherman Pass Project Fuels and Vegetation Effects Report (Rourke and Corvino, 2015). The full reports are available in the project file.
Existing Conditions, Direct and Indirect Effects

This section will discuss the existing condition along with the expected changes in fire behavior, fuels, and ecosystem resilience within the project area under each alternative. Effects in the Sherman Pass Project area will be categorized into impacts on social, life, developed and undeveloped property values, and natural resources. Social, life, and property value effects would include expected impacts to the Bonneville Power Administration (BPA) power line, State Highway 20, private land, and recreation areas. Natural resource and restoration effects consider resiliency of the landscape to large-scale disturbances such as wildfire and insect and disease outbreaks.

Analysis of fuels and fire behavior in the Sherman project area lead to the identification of strategic roads and corresponding strategic areas. These are areas where fuel reduction treatments would be prioritized based on associated values at risk to uncharacteristic fire. Out of this analysis a strategy of “compartmentalization” was developed in conjunction with strategic areas and roads. Essentially the strategy is to identify logical locations where fire can be contained to smaller compartments within the project area to minimize the scale of effects from a particular wildfire. The analysis for the Sherman project lead to the identification of 12 fire “compartments”. These “compartments” would be potential planning areas for future fire suppression decision analysis. The identification of fire “compartments” allows for a closer analysis of the values at risk and the effects within each area. There is an understanding that not all work would be completed for each fire compartment with this project, but rather that this project could complete a significant portion of the work to provide clear opportunities in the management of large fires. Strategically located fuel treatments are often used as defensible space or can offer safe access/egress, but can also be located to be used as control lines or as advanced preparation for offensive strategies including backfire and burnout operations. See Figure 1 below for a display of areas of strategic importance for fuel treatments and fire suppression.

Figure 8. Sherman Pass Project Strategic Areas and Compartments as derived from the Ferry County Community Wildfire Protection Plan
Existing Condition
Surveys showed three conditions affecting the project area in the context of fuels and fire management. There are an abundance of ladder fuels, high surface fuel loadings, and dense overstocked stands. Increased surface fuel loading generally causes a more intense fire with greater flame lengths. Ladder fuels aid in fire spread from the surface of the forest floor up into the crowns of large trees initiating crown fire. This combined with overstocked stands that have intertwined or closely spaced crowns can perpetuate a crown fire. Portions of the project area are currently experiencing an outbreak of Mountain Pine Bark Beetle, which primarily attacks mature lodgepole pine. This is causing tree mortality adding to the already high surface fuel loading.
Dense stand conditions are undesirable on a large-scale because they are not sustainable in the long term. The stress on trees from competition for light and moisture places forests at increasing risk of widespread insect and disease mortality. Slow tree growth and tree mortality reduces the ability to meet various objectives set forth in the Forest Plan. Much of the areas identified as moderate to high fire danger are a reflection of dense early and middle structure stands. Over half of the project area (not including non-forested areas) has stand densities at or above the point where competition reduces stand growth and vigor. In addition, over half the project area has an average of 200 or more trees per acre (this equates to an average spacing of roughly 15 feet or less between trees) and an average tree diameter of 12” or less.

Endemic levels of tree mortality (from fire, pathogens, or other disturbances) serve a very important role in forest ecosystems. However, extensive or large-scale mortality arising from unnaturally dense stands is not desirable and does not meet Forest Plan management objectives for the project area.

There are a number of forest pathogens active in the Sherman Pass project area. These are dwarf mistletoe, bark beetles, and defoliators. Currently over half of forested stands contain 200 trees per acre or more, and most of these have 120 or more square feet of basal area and dense interlocking ladder and canopy fuels. As stands grow increasingly dense over time, they become increasingly susceptible to mortality from insects and disease. These forest conditions lead to increasing risk of
undesirable high severity fire across much of the project area, well beyond what would be historically expected.

Treating fuels, including removing understory trees (ladder fuels) and thinning overstory trees (crown fuels) in dense stands can reduce the risk of high severity fire as well as the risk of insect and disease mortality. Healthy stands that are not crowded and stressed for resources generally have a higher chance of persisting long-term and developing late seral characteristics. This trend would move forest conditions into a distribution of seral stages more aligned with the historical range of variability.

Douglas-fir and western larch dwarf mistletoe are common pathogens within the project area. Dwarf mistletoes are parasitic plants that attach themselves to host trees and draw nutrients and water from the trees vascular tissue. Dwarf mistletoe reduces the growth and vigor of infected trees and eventually may lead to tree mortality. When infected, the tree responds by forming “brooms” where the infection stimulates growth. These brooms tend to fall off and can cause build-ups of ground fuels. Brooms that do not fall off increase crown bulk density in the canopy layer and provide further means for spreading of crown fires. Spot fires have been observed to increase dramatically where brooms are present (Alexander, 1975).

While the mountain pine beetle is endemic to the area, dense stands of larger lodgepole pine (8” diameter and greater) and other pine species, combined with consecutive years of drought conditions, support the buildup of beetle populations that lead to tree mortality outbreaks such as what is occurring at Sherman Pass. Successful beetle attacks usually start out in small patches and may move on to cover many acres, as seen at Sherman Pass.

Damage and defoliation due to western spruce budworm was observed near Sherman Pass during aerial flights in 2012 and monitoring is ongoing.

**No Action Alternative**

This alternative would not reduce fuels nor begin to convert multi-storied stands to single storied stands in accordance with Ecosystem Screening Direction (USFS, 1994). There would be no reduction in hazardous fuels to improve the fire resilience of the analysis area. The distance between tree canopies would not be increased and crowns would still touch, making crown fire spread likely. The potential for damage due to uncharacteristic wildfire would not be reduced. The highway, power line, and private land would not be protected by treating the surrounding Wildland Urban Interface.

There would be no treatments to increase tree and stand vigor, or resistance to insect and disease outbreaks. Vigor would continue to decline across the landscape and the resulting mortality would add to the already high fuel loading. Initial attack actions would likely be unsuccessful on over 70% of the project area. The high fire severity associated with this type of fire behavior would lead to large areas of the project being susceptible to a stand replacing fire in one event. This would further propagate the current homogeneous fuel conditions that are less resilient to large disturbances such as wildfire and insect and disease outbreaks. Smoke production would not occur from prescribed fire. However, smoke from wildfire would have the potential to cause air quality concerns. Objectives of the Ferry County Community Wildfire Protection Plan would not be met. The purpose and need of the Sherman Pass Project to minimize impacts to the State Highway 20 and BPA power line would not be met.
Social, life, and property values

**Direct Effects (short term 0-1 years)**
Within the Sherman project area, all fire “compartments” have the potential to impact State Highway 20, and 6 have the potential to impact the Bonneville Power Administration power lines. The current condition of fuels and related fire behavior potential are such that the amount of time required to implement a compartmentalization strategy may not allow for keeping fire in one or two compartments (Sherman Pass Fire, Fuels, and Vegetation Existing Condition Report, 2014). A wildfire incident of this magnitude would involve multiple compartments and increase the exposure to values at risk leading to long delays and closures of State Highway 20. Long disruptions in service of the Bonneville Power Administration power lines and damage to that critical infrastructure are expected. Critical support to the community of Republic and surrounding areas would be needed due to the closure of State Highway 20 and the loss of power in Ferry County. There are numerous developed recreation sites within the Sherman project area including building facilities that could be damaged or destroyed during a large wildland fire incident. This type of potential fire behavior has a high resistance to control and would increase firefighter risk and exposure due to the higher number of personnel that would be required. This contributes to fire size and the management organization needed to deal with potential long-term fire incidents, thus incurring high costs to manage the incident.

**Indirect Effects (long term 1-10 years)**
Social values/life and property effects can linger long after the wildland fire incident is controlled and out. High vegetation burn severity conditions that cause high levels of mortality in the canopy vegetation create a situation where dead trees become hazardous to Bonneville Power Administration power lines, developed recreation trails, and roads. These conditions can cause extended closures of trails and roads as well as developed recreation sites. This condition can persist for up to 10 years or longer, creating large amounts of dead and down material blocking trails and roads. High soil burn severity has the potential to deliver sediment and debris across developed trails and roads, as well as creating slope stability concerns that can cause large closures of fire areas due to unsafe and hazardous conditions.

**Ecosystem Resilience**

**Direct Effects (short term 0-5 years)**
High vegetation burn severity typically occurs as a result of crown fire where all or a majority of the needles in the canopy of trees are consumed. It is common for crown fire to occur in conjunction with surface fire that consumes vegetation from the forest floor. High vegetation burn severity does not only correlate to active crown fire but in some cases, surface fire behavior is intense enough to cause mortality of forest stands without consumption of canopy fuels. The immediate effect of this type of scenario would be a loss of up to 70% of the vegetative cover in the Sherman Pass Project area.

**Indirect Effects (Long term 5 years +)**
The current condition of high fuel loadings and homogeneous stand conditions leads to a high potential for large areas of the Sherman project to be susceptible to high severity fire. Within the area (70% of
the project area) that is expected to have high stand mortality, stands would continue to decay and fall onto the ground and contribute to future surface fuel loading. This type of homogeneous fire severity promotes continued homogeneity in the future as large areas of the landscape regrow. High vegetation burn severity can affect seed bank availability, which can further delay vegetative regrowth in an area. High soil burn severity can further delay vegetative regrowth in areas where there is a loss of soil organic matter and structure.

Stand densities and resulting tree competition would continue to increase throughout the area. As densities increase, growth and vigor would decline and mortality would occur as trees become stressed (Drew and Flewelling, 1979, Reineke, L.H., 1933). In addition, stress caused by excessive density would make the stands prone to injury and mortality caused by insect and disease (Powell, et al., 2001; Evans, et al., 2011). Stands would continue to move toward a multi-story old growth condition in the drier biophysical environments. As mortality of the overstory occurs, regeneration of Douglas-fir, a species prone to forest pathogens and fire damage when young, would establish in openings, increasing the amount of multi-storied stands, which increases ladder fuels.

Stands with mountain pine beetle, spruce budworm and other forest insects and diseases would continue to move toward multi-story structure as tree gaps caused by mortality fill in with shade tolerant seedlings. This alternative would not remove diseased or insect infested trees nor modify conditions that are favorable to the spread of pathogens. In general, increased multi-storied conditions and excessive densities would reduce stand vigor, encourage stagnation, and weaken trees making them more susceptible to pathogen colonization. As pathogen levels increase, mortality of the infected trees would occur and add to the dead wood or fuel component of stands. In some cases, old growth multi-storied stands currently infected with bark beetles or other pathogens have /would revert to middle or early structure. The future structures would be well out of the Historic Range of Variability. Because the largest most vigorous trees, often the better genotypes, are more likely to be attacked by pathogens, the genetic base of the stand may decrease with mortality.

The fire resistant old growth ponderosa pine and larch would continue to die out due to beetles or uncharacteristic fire. Currently the project area is composed of approximately 50% Douglas-fir. This percentage would continue to increase while the percentage of desirable species like ponderosa pine and western larch (currently at 26% and 18% respectively) would decrease as mortality kills the overstory and they are replaced by Douglas-fir seedlings in the canopy gaps. Global Climate change would encourage this trend.

No prescribed burns or mechanical fuels treatments would occur. By not treating the understories, the already high stand densities would increase and density related mortality would occur. Ladder fuels would not be removed, increasing the potential for fire to reach the tree crowns. No treatment of overstory trees would cause crown bulk densities to increase especially where dwarf mistletoe infection of Douglas-fir is present. Additionally, there would be no treatments to break up canopy continuity. The stands of large trees would be increasingly at risk to undesirable fire damage.

As discussed in Betcha et al. (2001), stands at the highest risk to uncharacteristic wildfire are those in biophysical environments that had low to moderate severity fire historically. That describes approximately half of the project area. District lightening records show the risk of fire starts is high in
those areas. Without vegetation management, wildfires can be expected to be increasingly severe, even in biophysical environments that historically had moderate to high severity wildfires. If a wildfire started, it would be increasingly difficult to put out and intensities would be much greater than were found historically.

Assuming no wildfire or other disturbance occurs, the single story old growth stands would continue to decline as fire suppression and encroachment by Douglas-fir continues. Natural meadows would fill in with conifers.

**Proposed Action Alternative**

The overall treatment objective of the Sherman Pass Project is to provide for firefighter safety and reduce the potential for undesirable effects due to wildfire in areas identified in the Ferry County Community Wildfire Protection Plan. Specifically, these areas are Washington State Highway 20 (a scenic byway); the Bonneville Power Administration power line; other infrastructure; and private lands. In addition, treatments are designed to restore and maintain stand resiliency to insect and disease, climate change and fire disturbance.

Treatment locations are based on landscape level features such as topography and roads used to create strategic areas and compartments, insect and disease occurrence, bringing the landscape closer to the Historical Range of Variability, and the condition and location of past harvest treatments.

Other parameters considered important in unit design are stand level conditions, such as stand structure, insect and disease occurrence and susceptibility, accessibility, steepness and location of natural or created openings. Additional consideration was given to recreation and visuals concerns, areas considered potential lynx habitat, and riparian habitat conservation areas.

Project effects and success would be measured in terms of acres treated directly adjacent to the power line, Highway 20, and recreation areas to reduce fuels, tree mortality, and the potential for fire spread and falling trees. In addition, effects to social, life and property values will be discussed in the ecosystem resilience effects section below in terms of the probability of a landscape level wildfire.

**Social, life, and property values**

*Bonneville Power Administration Power Line*

Proposed treatments emphasize reducing fuels and hazard trees immediately along the power line corridor. Treatments in areas infected with mountain pine beetle would reduce lodgepole pine (the target species for mountain pine beetle), and other trees of poor health and vigor. Overly dense stands would be thinned to reduce fuels, which would limit the spread of a crown fire and active surface fire. Large leaning trees in danger of hitting the power line would be removed.

Planned treatment along the power line corridor totals 288 acres, 88% of the total corridor acres within the project area, and 99% of the treatable acres.

*Highway 20 Travel Corridor*

To lessen the possibility of falling hazard trees, treatments proposed would emphasize reducing fuels and hazard trees adjacent to and within 300 feet of Highway 20. Treatments would be similar to those...
in the power line corridor. In areas infected with mountain pine beetle or other forest health problems, treatments would reduce affected species. Overly dense stands would be thinned to reduce fuels and to limit spread of crown fire and active surface fire, which increases the potential for safe and effective firefighting. Highway hazard trees would be removed.

Mountain pine beetles kill trees. These trees fall into the road prism or become fuel concentrations within the corridor. Research conclusions regarding rates of fire spread in dead stands of lodgepole pine versus green stands has been mixed. However, fire managers believe that fires tend to be hotter with more convective embers and spotting potential following a beetle outbreak (Battaglia, 2012).

**Recreation Areas**
Treatments within and adjacent to recreation areas would include hazard tree removal for trees expected to become a hazard within the next 10 years. In addition, strategic management of the understory, including planting of desired and fire resistant species in resulting open areas and thinning of dense trees to increase vigor, would occur.

In somewhat fragile areas like the Sherman Pass Overlook Campground, understory, non-mechanized treatment should help reduce risk. The other recreation areas have planned mechanized treatment (Canyon Creek Campground, Log Flume Heritage Site and adjacent area).

**Ecosystem Resilience**
Treatments were modeled within the project area to measure how well they restored and maintained stand and landscape resiliency to fire and other disturbances; specifically how treatments altered fire parameters and behavior, changed the landscape structure mosaic, and increased resilience to insect and disease, and climate change impacts.

**Fire Behavior**
The strategy of compartmentalization is not singularly designed to limit fire size, cost, and exposure to firefighters. Proposed treatments would modify fire behavior and promote heterogeneity amongst individual compartments, as well as between compartments into the future. As wildfire is managed to limit the amount of area that is burned in any single fire event, a broader scale mosaic is encouraged.

The current condition of fuels and related fire behavior show that large areas of the Sherman project are susceptible to high severity fire with crown fire and flame lengths in excess of 12 feet. This type of fire behavior can be difficult to suppress and would be likely to affect large areas in a single fire event.

In general, prescribed burning coupled with mechanical vegetation treatments aid in the resilience to other disturbances. Introducing fire into the stands where it has traditionally been present may help with nutrient release, balancing soil micro fauna and restoring other ecological processes. Because fire has been absent from parts of the analysis area for several fire return intervals, some damage to the residual stand is expected as fire burns off layers of accumulated needle duff, seedlings, saplings, and mistletoe brooms.

Under the proposed action alternative, post treatment initial attack response would have a higher probability of success on over 50% of the project area. The table below shows a dramatic increase in the amount of low fire danger, with significant decreases in both the high and moderate fire danger.
The effect of the proposed compartmentalization strategy would provide wildfire suppression and management options that would limit the amount of the project area that would be involved in a single wildfire event. This, combined with individual treatments within compartments, would create a broad scale mosaic. The individual treatments within each compartment would promote a diversity of fire effects, while the compartmentalization strategy can create and promote a larger scale mosaic by minimizing the amount of area that is involved in a single wildfire incident.

Table 3. Sherman Pass Project Area Fire Danger

<table>
<thead>
<tr>
<th>Fire Danger</th>
<th>Flame Length (feet)</th>
<th>Rate of Spread (chains/hour)</th>
<th>Crown Fire Activity</th>
<th>% Existing Condition</th>
<th>% Proposed Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Low</td>
<td>&lt; 0.3</td>
<td>&lt; 1</td>
<td>Surface Fire</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Low</td>
<td>0.3 to 4</td>
<td>1 to 5</td>
<td>Surface Fire</td>
<td>1%</td>
<td>41%</td>
</tr>
<tr>
<td>Moderate</td>
<td>4 to 12</td>
<td>5 to 50</td>
<td>Passive Crown Fire</td>
<td>26%</td>
<td>9%</td>
</tr>
<tr>
<td>High</td>
<td>&gt; 12</td>
<td>&gt; 50</td>
<td>Active Crown Fire</td>
<td>72%</td>
<td>49%</td>
</tr>
</tbody>
</table>

The table below shows the difference in fire severity and corresponding effects from fire, by percent of each fire compartment, within the Sherman Pass Project area.

Table 4. Moderate and High Severity Fire Pre- and Post-Treatment by Compartment

<table>
<thead>
<tr>
<th>Compartment</th>
<th>Size (Acres)</th>
<th>% in Moderate Severity</th>
<th>% in High Severity</th>
<th>Values at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hall Creek</td>
<td>1200</td>
<td>31%</td>
<td>63%</td>
<td>Highway 20</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>3%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>O’Brien</td>
<td>3360</td>
<td>29%</td>
<td>68%</td>
<td>Highway 20</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>11%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Crest South</td>
<td>2910</td>
<td>27%</td>
<td>67%</td>
<td>Highway 20</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>1%</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>Crest North</td>
<td>4320</td>
<td>14%</td>
<td>81%</td>
<td>Highway 20, BPA Power Line, Developed Recreation Sites</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>4%</td>
<td>81%</td>
<td></td>
</tr>
<tr>
<td>Hoodoo</td>
<td>2840</td>
<td>22%</td>
<td>74%</td>
<td>Highway 20, BPA Power Line</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>1%</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Graves</td>
<td>5850</td>
<td>39%</td>
<td>57%</td>
<td>Highway 20, BPA Power Line</td>
</tr>
<tr>
<td>Post Treatment</td>
<td></td>
<td>1%</td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>
Landscape Structure Mosaic
Prior to fire exclusion, the landscape was a patchwork of various structures and ages. Across all biophysical environments in the project area, there is a general lack of late structure, especially the single story late and old structure. There is also an abundance of very dense early and middle structure. The proposed treatments would increase resilience across the landscape. Treatments are not expected to change much in terms of acres moved from one structure to another. However, resilience and the movement of the early structure to middle and late are expected to increase.

Late Structure Stands
The number of acres of single story late structure in dry and dry mesic Biophysical Environments is well below the historical range of variability for the project area. This structural stage, especially the large remnant trees in these stands, has been identified by the public as a priority for restoration efforts (Brown, 2002). Many acres of late structure in the project area have had fuels reduction projects that removed ladder fuels and dense understories in previous treatments. Additional fuels reduction treatments would continue the past work to maintain these stands, specifically where the Coyote Creek and North Sherman projects were implemented.

The late multi-story structure in the north part of Lane creek is at high risk due to high densities, surface fuel loading, and impacts from insects and disease. Here treatment would reduce densities and remove hazardous fuels, including trees currently affected by forest pests. Following treatment, the unit would still be late multi-story structure, however in a far more sustainable condition.
Stand Density
Most stands in the Sherman Pass Project area are overly dense. This has led to a condition that is ripe for insect and disease problems creating hazardous fuel loads that put the area at risk for undesirable fire behavior that could threaten the highway, power line and other developments.

These overly dense stands occur across all structural stages, but are especially prevalent in the early to middle structure stands of pole size trees. Because of past wildfire, there is an abundance of these 80-90 year old stands that originated after the Dollar Mountain Fire. These stands generally have a species mix heavy to lodgepole and western larch. Such densities make the area at risk to epidemic bark beetle populations. Currently, beetle attacks and subsequent mortality can be seen throughout the project area. Treatments in these stands would remove most lodgepole pine and reduce densities. Proposed treatments would decrease interlocking crowns and standing and down fuels as well as reduce densities and release vigorous trees in early structure stands.

Insect and Disease
The project area has high endemic and epidemic levels of several forest pests. The contiguous dense multi-story stand conditions provide excellent habitat for those pests as well as others, to become epidemic. Even without epidemic insect and disease levels, there is a danger of pathogen caused mortality which creates dangerous fuel levels and kills the large (> 21 inch diameter) trees that make up the late structure stands. Treating for mistletoe and spruce budworm susceptibility by reducing dense understory and ladder fuels has an immediate effect on the pathogen and future infection rates. In general, treatments would reduce overstocking, remove infected individuals, and generally reduce conditions favorable to forest pathogen damage.

Mountain pine beetle populations are at epidemic levels across the west. Mountain pine beetles often move into middle and early structural stands of dense lodgepole and ponderosa pine in this area. The stands most at risk are characterized as having greater than fifty lodgepole or ponderosa pine per acre of 8 inches in diameter or greater, and densities of at least 300 trees per acre. High densities (basal areas greater than 60-80 square feet per acre) stress the trees, encouraging successful bark beetle attacks.

Lodgepole pine is the preferred species for the beetle and is at high risk of attack and mortality. Harvest treatments at this time are probably too late and too small to reduce the region wide epidemic and would not be able to make a difference in beetle spread or lessen mortality to most lodgepole. Therefore, treatment of mountain pine beetle in lodgepole stands is a fuels reduction treatment to remove future fuels rather than an insect reduction strategy.

Ponderosa pine is a secondary species for mountain pine beetle attacks, although in outbreak conditions, ponderosa will be attacked and killed. In ponderosa stands that are at risk, thinning trees to basal areas of 40-60 square feet can help reduce beetle caused mortality. Modeling shows that stands with ponderosa pine are currently at moderate to high risk (average rating of 7-8 on a scale of 12). If left untreated, mortality increases dramatically over the next few years. If a simulated basal area cut occurs and modeled stands are reduced to 60 square foot per acre basal area, the hazard rating drops by at
least 17-25 percent. Approximately 1,150 acres would be treated to remove ponderosa pine and dead, infected, and susceptible lodgepole in the Sherman pass area.

Treatment units are proposed across the landscape to correspond to the areas where fuels and insect and disease problems are considered outside the natural range of variation in the watershed and where the location of fuels could cause undesired consequences. Careful implementation of the treatments should help increase forest resilience to disturbance in the Sherman project area.

**Climate Change**
Climate change is expected to result in more extreme weather events including wind events and lightning storms. In addition, changes in snow/rain patterns and summer drying are expected to cause a drying trend where species shift up in elevation. For the Sherman Pass Project area, this means less water during the growing season, more summer storms, and higher potential for wildfire. Actions that promote resilience to wildfire, reduce tree densities, encourage fire resistant tree species, and reduce hazardous fuels should help increase resilience to climate change effects.

**Cumulative Effects**
Several fuel reduction treatments have occurred in the project area. The Coyote Creek Project is in the eastern part of the project area and was completed, in phases, from 1999 to 2009 treating over 2,000 acres with prescribed fire. These treatments are currently in need of maintenance to keep hazardous fuel conditions low. In addition, the Paradise Peak Big Game Improvement Project lies just south of project area by Paradise Peak and includes prescribed fire and understory thinning treatments with approximately 1,500 acres completed and more on-going.

Recent Forest Service timber sales include the Walker Stewardship Sale to the Northwest of the project area. This was a Hazardous Fuels Reduction Act project. Treatments targeted Highway 20 and Wildland Urban Interface lands. Other past treatments that overlap with the Sherman project area include the Fritz Timber Sale, North Sherman Timber Sale, and the North Kettle sale. The Fritz sale targeted overly dense stands of mixed conifer that established following the Dollar Mountain fire. While the treatments helped gain vigor, the treated stands have grown back to excessive densities and are becoming infested with bark beetles. The North Kettle sale has some units that could benefit from a maintenance treatment. Older sales in the area were mainly regeneration cuts planned with an expected follow-up treatment of pre-commercial thinning. Growth has slowed in these stands and pre-commercial thinning and small pole thins are needed to keep stands vigorous.

The Washington State Fish and Wildlife Department is in the process of completing a series of fuel reduction timber harvest and prescribed fire projects on their lands near the east side of the project area. Fuel reduction treatments have occurred on private land within the project area in the past 10 years or so. Planned treatments in the Sherman area would complement these efforts.

**No Action Alternative**
If the No-Action Alternative is selected, fire danger in the project area will continue to worsen. The project would not implement treatments that would tie into treatments in the Walker Fuels Reduction Project, and would not tie into potential treatments in future projects including the Sanpoil project.
Large areas of the project would continue to be at risk to large-scale disturbances due to the homogeneity of fuel and stand conditions. This would keep areas along the State Route 20 and the Bonneville Power Administration transmission line corridors at an elevated risk to wildfire that will have a high resistance to control that can lead to long disruptions in services and closures of the highway.

**Proposed Action Alternative**
The effect of reducing fire danger across the Sherman Pass Project area combined with the previously mentioned fuel reduction treatments as well as future potential treatments in the Sanpoil, Bulldog, and Dollar projects, would have the effect of strategically creating diversity across a broader area of the forest. This would have the effect of creating stands that are more resilient to large wildfire disturbances. The altered fuel conditions would create fire behavior that is consistent with creating a mosaic burn pattern, which would allow areas to respond differently to wildfire and promote heterogeneity within a stand level scale as well as at a broader project level scale. These treatments also are strategically linked to complete compartments that tie into planned “compartments” within the Sherman Pass Project to aid in future fire suppression and management opportunities.

**Soil**
The section is excerpted from the Sherman Pass Project Soil Report (Jimenez, 2014). The full report is available in the project file.

**Existing Conditions, Direct and Indirect Effects**

**Data Collection**
The project area was evaluated using current soil maps, geology maps, and topographical maps as well as historical and current aerial imagery. Geographic Information System analysis was also completed for slopes, erosion hazards, and erosion modeling. Soil scientists visited treatment units to confirm existing soil mapping, assess for potential issues during treatment, and do reconnaissance level evaluation of the existing soil condition. In the summer of 2011 and 2012, field crews also collected 63 National Soil Disturbance Monitoring Protocol. An additional 80 surveys were completed in 2013 for potential high priority timber harvest units. In a majority of units with potential mechanical ground-based treatments, soil data transects were completed. Surveys were targeted at stands with a high likelihood for ground based timber harvest treatment. Sampling with National Soil Disturbance Monitoring Protocol surveys as well as additional reconnaissance level evaluation by the soil scientists and soil technicians provides a representative sampling of the project area for the understanding of the landscape, potential effects, and cumulative effects.

**Existing Condition**
Past timber harvest, and to a much smaller extent, grazing and recreation, have all contributed to the existing detrimental soil conditions in the project area. Stumps and old roads, indicative of past timber harvest, are found widely throughout the project area. Forest Service records and aerial photos indicate that a significant portion of the National Forest land in the project area has had timber harvest since 1930 and before. Logging prior to the 1930s most likely occurred in conjunction with homesteading and settlement of the area. Harvested areas have often been logged more than once. Repeated entries,
especially where new roads, skid trails, and landings are constructed instead of re-using existing ones, can create extensive compacted areas and soil disturbance. The length of time required for compacted soil to de-compact and recover its full function ranges from 20 to over 60 years depending on the type of soil, the degree of compaction, and a number of other factors (Miller et al., 2004).

No Action Alternative
The selection of the no action alternative would not directly increase detrimental soil conditions. Natural recovery of existing detrimental soil conditions would continue. Areas of detrimental soil conditions related to roads would not be corrected but would not exceed 20% of the project area. Treatment units that would have decreased wildland fuels connectivity, structure, and loadings would not have occurred and areas would be at risk for high severity wildfire. The no action perpetuates the current high fire hazard and low forest resilience to insect and disease outbreaks. The no action alternative would not minimize the risk of detrimental soil degradation by reducing the fire hazard. This hazard represents a much higher risk of degradation to soil quality and soil productivity than management activities that prevent or minimize large, damaging high severity wildfires.

Proposed Action Alternative
With the selection of the proposed action, there would be increases in soil compaction and potential increases in soil erosion as well as areas with decreases in soil cover. There would also be improvements of several soil management objectives across the project area in soil organic matter content and soil cover, recovery of soil hydrologic function, and protection/amelioration of unnatural soil erosion patterns. Prescribed fire and other treatments would increase cycling of organic matter and protect soil from detrimental effects of high severity stand replacing wildfires. Using the design elements, Best Management Practices, and following guidance from the Regional Soil Quality Standards and Guidelines and the Colville National Forest Land and Resource Management Plan, overall soil productivity and soil quality would not be detrimentally impacted by the proposed action. Treatment units with mechanical treatment would have an increase in detrimental soil conditions but not exceed standards and guidelines.

Effects on Farmland, Rangeland and Forestland
Prime farmlands do not need to be currently under cultivation or have a history of cultivation. Prime farmland is defined by a criterion of nine different soil characteristics including soil moisture regime, soil temperature regime, soil texture, and soil chemistry. The Sherman Pass project contains approximately 34 acres of prime farmland if irrigated. There are 16 acres located in treatment unit 2280169 (USDA National Resource Conservation Service, 1992). The soil is mapped as a Goddard silt loam. Best management practices and soil design elements would limit detrimental soil conditions below standards and guidelines and protect the qualities of prime farmland.

The project also includes approximately 7,500 acres of farmland of statewide importance, typically productive timber stands. Best management practices and soil design elements would limit detrimental soil conditions below standards and guidelines and protect the qualities of farmland of statewide importance.
Effects to rangelands and forestlands are discussed in the resource reports for Range and Fire, Fuels, and Forest. No “prime” rangelands occur in the project area as defined in Forest Service Handbook 1909.15, section 65.21.

Cumulative Effects
In general, effects on soil productivity are site specific and not spatially mobile over the analysis area. The analysis area for cumulative effects to soils is the treatment unit or activity area. The activity area is defined in the Region 6 Soil Quality Standards as “The total area of ground impacting activity, and is a feasible unit for sampling and evaluating.” The effects of past, present, and reasonably foreseeable future actions to soils typically involve the area of disturbance itself and does not move outside the area disturbed. The development and movement of soils occurs on a geologic time scale and this area bounding reflects cumulative effects to soils.

The time bounding for cumulative effects encompasses previous disturbances from prior wildfire, timber harvest, and grazing. Disturbance to soil can last for decades and even centuries (Amundson and Jenny, 1997) (Jenny, 1941). For reasonably foreseeable future actions, the bounding is five years in the future. No additional projects and treatments in addition to the proposed action are anticipated within the activity areas. Continued cattle grazing, road maintenance, and recreational activities are anticipated to be the reasonably foreseeable future events.

No Action Alternative
Under the no action alternative, there are no potential cumulative effects to the soil resource due to the spatial and temporal bounding of the cumulative effects analysis area and the characteristics of the soil resource.

Proposed Action Alternative
There are no other activities in the reasonable foreseeable future that are expected to substantially increase the detrimental soil condition in the project area. Additional road stabilization work potentially made possible through additional funding, would result in increased benefits to soil quality and soil productivity as well as slope stability that would add to the beneficial effects of the proposed action. The cumulative effects of the proposed action when combined with past actions and reasonable foreseeable future actions would not be substantial with the implementation of the design elements described in Chapter 2.

Hydrology
This section is excerpted from the Sherman Pass Project Hydrology Specialist Report (Hickenbottom, 2015). The full report is available in the project file.

The effects of the project on stream channels and watershed functionality are the main concern for watershed resources. Upland conditions are often reflected in stream channels. The analysis of direct and indirect effects is based on how the various components of the project are expected to affect the Upper Sherman, Lower Sherman, and O’Brien Creek watersheds.

The Sherman Pass Project area occupies portions of the Sherman Creek and Upper Sanpoil River 10th code watersheds; two of the nine 12th code watersheds (HUCs) within Sherman Creek Watershed; and
one of the eight 12th code watersheds within the Upper Sanpoil River Watershed. The streams in these watersheds drain into the main channel systems and then into the Sanpoil River and Columbia River (Lake Roosevelt).

The Upper Sherman Creek, Lower Sherman Creek, and O’Brien Creek watersheds mainly contain moderate to high gradient streams. The watersheds have a range of disturbance conditions as indexed by existing road densities ranging from 2.0 to 3.1 miles per square mile. Stream channels have been mostly affected by sediment deposition and road encroachment.

**Clean Water Act**
The principle regulatory framework governing management of watershed resources on the Colville National Forest for this analysis includes the Federal Water Pollution Act (Clean Water Act) as amended. The Clean Water Act is a federal action passed in 1972 that contains provisions to restore and maintain the quality of the nation’s waters. Section 303(d) of the Clean Water Act establishes requirements for states and tribes to identify and prioritize water bodies that do not meet water quality standards.

In Washington State, the categories are administered by the Department of Ecology. Once a water body is labeled a Category 5, a total maximum daily load study is required to address identified water quality problems. The Colville National Forest currently has an approved total maximum daily load for temperature and bacteria. A total maximum daily load for streams listed for pH and dissolved oxygen is still needed. Streams within the Sherman Pass Project Area currently have listings that fall under both scenarios.

**Existing Condition, Direct and Indirect Effects**
The watershed key issue indicators used for this project are:

1. Watershed Condition
2. Water Yield
3. Channel Morphology
4. Water Quality
5. Sediment Yield

Watershed condition helps gauge the effects of past disturbances in a watershed, such as road construction. Water yield reviews the amount of water coming off a location since it affects the peak flows in a channel and could affect the water discharge. Channel morphology is a means of measuring the “function” status of a channel based on its physical dimensions, patterns, and profile. Water quality addresses the chemical characteristics that could affect the quality of municipal water and secondary source waters, as per the Safe Drinking Water Act. Sediment Yield addresses sediment content as it affects water quality.

The streamflow regime for the watersheds in the Sherman Pass Project is ‘snowpack dominated’. Flows are the highest in the spring and are generated by spring snowmelt. Flows are the lowest in the late summer and early fall when precipitation is very low.
**Indicator 1 - Watershed Condition**

**Existing Condition**

Various watershed road density criteria have been used to assess watershed condition and the risk of potential hydrologic change. For the Sherman Pass Project, 1 mile/square mile is an indicator of a low risk watershed condition, 1-3 miles/square mile is a moderate risk watershed condition, and greater than 3 miles/square mile is a high-risk watershed condition (NOAA Fisheries et al, 1998).

Highway 20, along Sherman Creek, is a major road that has had impacts to the watershed condition. The road is within the RHCA of Sherman Creek for a majority of its length. The density and distribution of roads, as well as field observations of ditchline and road conditions within most of the watersheds, indicate there is a moderate to high probability that the hydrologic regime (i.e. timing, magnitude, duration, and spatial distribution of runoff) is altered. Surface erosion is the dominant erosion process on roads in the Lower Sherman, Upper Sherman, and O’Brien Creek Watersheds. The following table displays the road density in the project area. Field inventories have identified problem areas.

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Total Road Density (miles per square mile)</th>
<th>Forest Service Road Density (miles per square mile)</th>
<th>Watershed Condition Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>2.0</td>
<td>1.8</td>
<td>Moderate</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>2.9</td>
<td>2.8</td>
<td>Moderate</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>3.1</td>
<td>2.5</td>
<td>High</td>
</tr>
</tbody>
</table>

Structures that are used on roads to cross streams have a limited life span and capacity. There is always some period of time or flood or landslide event that will exceed the capacity of the crossing to safely pass water and debris. The timing and size of this risk is site specific. When stream crossings fail, large amounts of road fill can be directly delivered to streams, detrimentally affecting water quality and habitat for aquatic organisms. The following table displays the current number of road stream crossings in the project area.

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Total Road Stream Crossings</th>
<th>Forest Service Road Stream Crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>~40</td>
<td>36</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>~101</td>
<td>100</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>~186</td>
<td>165</td>
</tr>
</tbody>
</table>
No Action Alternative
Under the no action alternative, watershed condition would not be directly affected, because no system or temporary roads would be constructed, no road reconstruction would take place, and road management changes would not occur.

Under this alternative, none of the at-risk road drainage crossings or road issues analyzed in this document would be improved. Without the proposed improvements, the risk of sediment delivery increases. The failure of crossings would likely happen.

Culvert failures could occur. When debris plugs culverts and the capacity of the culvert is exceeded, water then is either concentrated over the top of road fills or is diverted down the road or ditch and onto cut or fill slopes unaccustomed to concentrated overland flow. Additional sediment pulse could result in adverse effects to the channel. This is an indirect effect related to past management activities.

Although road density would not increase on National Forest System Lands, it would not decrease either, and the current effects to the system would continue, as no improvements would be implemented. Under the no action alternative, risk to beneficial uses would increase. Beneficial uses may be impacted to a greater extent and the recovery would be slower under the no action alternative than with the proposed action.

Proposed Action Alternative
Under the proposed action alternative, no new system roads would be built and no roads would be decommissioned. The system road density would neither increase nor decrease. Therefore, there would be no direct effects to watershed condition. The existing road system alters water yield, drainage patterns, floodplain functionality, and erosion characteristics. Although the condition of the roads would improve, the actual miles of roads would not change.

Indicator 2 – Water Yield
Past timber harvest, fire, and road construction have affected portions of each watershed. This has affected water yield and timing through reductions in forest canopy and soil compaction from skid trails, landings, and vehicular use. Water yield timing and peak flow levels may change as road systems intercept ground water or act as a conduit for rapid runoff during high intensity rainstorms or rapid snowmelt periods. Roads can intercept and divert water into stream channels and increase the rate that water leaves the site.

Although Highway 20 has impacted the watershed by interrupting the groundwater/surface water interaction and altered peak flows, the analysis of the other watershed condition indicators suggests the Upper Sherman, Lower Sherman, and O’Brien Creek watersheds currently support stable water yields.

No Action Alternative
Water yield or peak flows would not be affected because no fuel reduction activities, road reconstruction, or temporary road construction would occur. Under the no action alternative the risks of a severe wildfire increases. If a stand-replacing wildfire were to occur, the water yield and peak flows would greatly increase until the surrounding vegetation reestablishes.
Proposed Action Alternative
Since evapotranspiration rapidly recovers in partially thinned areas with vegetative regrowth, any increase in runoff due to thinning operations is likely to persist for no more than 5 to 10 years.

In snow-dominated environments, as in Upper Sherman, Lower Sherman, and O’Brien Creek watersheds, forest harvest reduces summer evapotranspiration and increases the amount of soil moisture carryover. Less snowmelt is needed for soil moisture recharge, so more of the early season melt is converted into runoff. The reduction in forest canopy also increases the amount of solar radiation that reaches the surface of the snowpack, and these changes increase the rate of snowmelt and may slightly accelerate the timing of peak runoff (for example, MacDonald and Stednick 2003; Troendle and King 1985).

Both the available data and our understanding of hydrologic processes indicate that thinning generally should have little effect on the size of peak flows. In general, the changes in the size of peak flows due to forest management are small relative to the inter-annual variability in the size of the largest runoff events.

Road reconstruction would include installation of additional relief culverts. This would reduce the amount of water carried by and eroded from ditchlines. This would allow the ditchwater to re-infiltrate the forest floor and deposit sediment before reaching stream networks, and would help prevent culvert failure. The dispersion of surface runoff would help “normalize” the flow regime of a basin by recharging the groundwater that would slowly release into the live streams. There would be less opportunity for water to concentrate and be delivered to the naturally unstable stream breaklands. The volume of water delivered to stream channels (especially during peak flow conditions) would be reduced, as more water would be cross-drained before reaching the channel.

Planting would reduce the amount of time needed for vegetative and hydrologic recovery following harvesting, which would reduce potential for runoff.

Although peak flows would increase during the winter and spring peak runoff season in the Sherman Pass Project area, the effects would be minimal. Increases have been shown to be short-term, dropping back to pre-harvest rates less than 10 years after a partial cutting and proportionally sooner in the light/select thinning (Lull and Reinhart 1967).

There are also design criteria, Best Management Practices, and standards and guidelines that would be implemented. This, in combination with the climatic regime of the Upper Sherman Creek watershed supports a conclusion that the watershed may not exceed the threshold and would not create statistically measurable alterations of the water yield. The amount of harvest treatment in the lower Sherman and O’Brien Creek Watersheds is not great enough to meaningfully increase the water yields.

Due to the historical management and recovery of the Upper Sherman Creek watershed, the watershed should be able to withstand the increase in water yield. Any affects to channel morphology and sedimentation, due to increased peak flows, would most likely be measurable in the streams that are not-properly-functioning. These include South Branch Fritz Creek, Hart Creek East Tributary 2, Jungle Hill Creek Tributary 2, McGahee Creek, Milk Creek, and parts of Sherman Creek mainstem. However, with the implementation of Best Management Practices, INFISH Riparian Habitat Conservation Area
guidelines, and design criteria, the morphology of the streams should be protected and the effects to the channels should be minimal.

**Indicator 3 - Channel Morphology**
Channel morphology in project subwatersheds has been altered through two primary processes: sediment deposition and channel encroachment. Sediment deposition has occurred in areas subjected to road construction, timber harvesting, recreation use, cattle use, and natural processes. Channel encroachment has occurred where roads and timber harvesting have taken place adjacent to streams and their floodplains.

**Table 7. Summary of Stream Function Calls**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Number of Streams Surveyed</th>
<th>Stream Function Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>7</td>
<td>PFC=1; FAR=4; NPF=2</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>31</td>
<td>PFC=4; FAR=21; NPF=6</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>17</td>
<td>PFC=4; FAR=10; NPF=3</td>
</tr>
</tbody>
</table>

**PFC = Properly Functioning Condition; FAR = Functioning at Risk; NPF = Not Properly Functioning**

The majority of the 31 streams surveyed in the Upper Sherman Creek Watershed are functioning-at-risk. This is the same for the majority of streams in the Lower Sherman Creek, and O’Brien Creek Watersheds. The functioning-at-risk status indicates that there have been management effects on the reach and the potential for degradation is higher than that of a properly functioning reach. A functioning-at-risk reach may or may not be stable; and may or may not support its designated beneficial uses.

The streams that are functioning-at-risk are in fair to poor condition and are not stable. Several of the streams have riparian roads near the channels, thus causing increased entrencheds and road influences. There has been damage to the banks of the channels, causing over-widening, bank failures, and increased sediment loads; thus unstable. The instability of the channels makes them much more susceptible to morphological change; thus affecting sediment load, water quantity and water quality.

Highway 20 has altered the morphology of Sherman Creek along the highway. The channel has since stabilized itself somewhat. Growden Dam was removed, and the portion of Sherman Creek in that drainage area was reconstructed in 2010. This improved the channel morphology of Sherman Creek and reconnected a large section of its floodplain.

**No Action Alternative**
Sediment deposition has occurred in areas subjected to development activity, including road construction. Channel encroachment has occurred where roads and other activities have taken place adjacent to streams and their floodplains. Implementation of the no action alternative would leave these conditions unchanged.

Channel morphology would be indirectly affected if a stand replacing wildfire were to occur. The extreme removal of vegetative cover, combined with the current road network would create landslides and road failures. The sediment would be delivered to the channels, and the water yield and peak flows
would increase; thus altering the function of the streams. This would change the channel morphology, and alter the function status.

The risk for morphological change due to no action is low in Upper and Lower Sherman Creek Watersheds and moderate in O’Brien Creek Watershed.

**Proposed Action Alternative**

This action alternative is expected to have relatively minor negative effects on channel morphology. Several stream crossing improvements should improve channel morphology conditions in their immediate vicinity. In the case of culvert replacements, the improvements often result from less backwatering upstream of the site and less scour downstream. Similarly, improvements occur where culverts are removed, with the additional benefit of enhanced floodplain function through the crossing site. Channel morphology would be most improved by the upgrading of culverts, or the reconstruction of roads. Although there would be short-term sediment spikes and water quality issues, in the long-term these activities would help bring the functioning-at-risk status of the reaches into a positive trend towards properly functioning condition.

**Indicator 4 – Water Quality**

The table below lists the TMDL Streams in the Sherman Pass Project Area. Category 1 streams were not listed because they are considered to be attaining all standards tested for.

**Table 8. Total Maximum Daily Load Streams**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Stream</th>
<th>Number of listings</th>
<th>Pollutant of Concern</th>
<th>2012 Listing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>Sherman Creek</td>
<td>1</td>
<td>Temperature</td>
<td>Cat 5</td>
</tr>
<tr>
<td></td>
<td>Trout Creek</td>
<td>1</td>
<td>Temperature</td>
<td>Cat 5</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>McGahee Creek</td>
<td>1</td>
<td>Dissolved Oxygen</td>
<td>Cat 5</td>
</tr>
<tr>
<td></td>
<td>North Fork Sherman Creek</td>
<td>1</td>
<td>Temperature</td>
<td>Cat 5</td>
</tr>
<tr>
<td></td>
<td>Sherman Creek</td>
<td>1</td>
<td>Fecal Coliform</td>
<td>Cat 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Dissolved Oxygen</td>
<td>Cat 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Temperature</td>
<td>Cat 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Temperature</td>
<td>Cat 4a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Temperature</td>
<td>Cat 4a</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>North Fork O’Brien Creek</td>
<td>1</td>
<td>pH</td>
<td>Cat 2</td>
</tr>
<tr>
<td></td>
<td>South Fork O’Brien Creek</td>
<td>1</td>
<td>pH</td>
<td>Cat 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Fecal Coliform</td>
<td>Cat 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Dissolved Oxygen</td>
<td>Cat 2</td>
</tr>
</tbody>
</table>
1 Temperature Cat 2

**Category 2 = Waters of Concern; Category 4a = indicates water bodies with completed and approved Total Maximum Daily Loads that are being implemented; Category 5 = Total Maximum Daily Load needed (This is the 303(d) list)**

**No Action Alternative**

Water quality would not be directly affected because no fuels reduction activities, road reconstruction, or temporary road construction would occur. Currently roads are contributing chronic sediment into the stream. Under this alternative, none of the at-risk road drainage crossings or road issues would be improved, which could affect water quality if a failure were to occur. In the event of a wildfire, there may be increases in sediment delivery, increases in peak flows, and a reduction in shade along the streams, which would increase water temperature negatively affecting water quality.

**Proposed Action Alternative**

Riparian areas cover a relatively small area, yet they are disproportionately important for maintenance of water quality and quantity (water storage and aquifer recharge), habitat for aquatic and terrestrial biota, sediment retention, stream bank building and maintenance and provision of services of economic and social value, such as livestock grazing and recreation (Gregory and others 1991; Naiman and Decamps 1997; Prichard and others 1998; Naiman and others 2005).

Maintaining shade in riparian zones can be used to avoid most temperature increases in small streams. The maintenance of streamside vegetation as a thermal cover is key to maintaining stream temperatures at existing levels. The proposed action is designed to minimize effects on streamside temperature. There may be some incidental shade reductions at stream crossings improvement sites. An example would be if some roadside vegetation was removed during replacement of an existing culvert. This approach is expected to comply with the temperature and sediment TMDLs.

Under the Proposed Action Alternative, the Colville National Forest would be treating some of the chronic sediment sources that currently exist due to the road network. They would be working towards meeting standards not only by improving the road conditions, but by protecting or enhancing the RHCA, thus maintaining stream shade so that vegetative cover can increase.

**Indicator 5 – Sediment Yield**

By altering infiltration rates, evapotranspiration rates, and disturbing the soil, forest management activities—including road construction, timber harvesting, site preparation, cattle grazing and fuel reduction—can greatly increase overland flow rates and sediment yields.

**Table 9. Fifty-year average of annual sediment**

<table>
<thead>
<tr>
<th>Watershed (Key Drainage Area)*</th>
<th>Sediment from Watershed (tons/acre/year)</th>
<th>Sediment from Roads (tons/acre/year)</th>
<th>Total Sediment (tons/acre/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek (Coyote Creek Drainage Area)</td>
<td>0.1</td>
<td>0.9 – 2.3</td>
<td>1.0 – 2.4</td>
</tr>
</tbody>
</table>
The modeling and field data reveals that road erosion and sediment delivery is substantial in some areas, with a majority of all delivered road sediment coming from native surfaced roads.

Sediment production and delivery, as used in this analysis, refers to landslide potential and surface erosion. Numerous research studies have documented that forest roads are usually the leading contributor of sediment to stream channels (Gucinski et al. 2001, Bilby et al. 1989, Duncan et al. 1987). The indicator used for sediment yield is tons per year, expressed as a percent over “natural” baseline sediment yield. Base, or natural yield, represents the tons of sediment that are produced and subsequently transported out of the subwatershed each year under natural conditions.

The erosion processes that are dominant in the watershed are surface erosion and mass wasting. The miles and location of roads has, is, and will cause accelerated sediment to enter the stream system. The influence of the road system keeps a substantial area of soil in and adjacent to riparian areas in an exposed condition.

Highway 20, along Sherman Creek, is within the RHCA of Sherman Creek for a majority of its length. It has, and continues to contribute sediment from the highway. Without an adequate buffer, chronic sediment will be introduced to the channel for the life of the road. Bangs Mountain Road (Forest Service Road 2000-136) has mass wasting issues and is contributing sediment into Canyon Creek. Lane Creek Road (Forest Service Road 2000-220) is within the floodplain of Lane Creek and contributes sediment to the stream. Fritz Creek Road (Forest Service Road 2000-400) is also within the floodplain of Fritz Creek and contributes sediment to the creek.

**No Action Alternative**

There would be no short-term, direct effect to sediment yield because no fuels reduction activities, road reconstruction, or temporary road construction would occur. There would be a long-term indirect effect to sediment yield because the density and distribution of roads within most of the watersheds indicate there is a high probability that the hydrologic regime (i.e., timing, magnitude, duration, and spatial distribution of runoff) is altered. Existing sediment yields in the Upper Sherman, Lower Sherman, and O’Brien Creek Watersheds are over base line conditions. Under this alternative, none of the at-risk road drainage crossings or road issues would be improved. The risk of sediment delivery would increase over time.

The no action alternative results in the greatest long-term effects to the values-at-risk because many of the culverts are currently at or near the end of their expected design life. Untreated dry sites would

---

### Upper Sherman Creek
(Lane Creek Drainage Area)

<table>
<thead>
<tr>
<th>Area</th>
<th>Sed. Tons</th>
<th>Base Yield</th>
<th>Long Term Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Sherman Creek</td>
<td>0.1</td>
<td>1.2 – 3.2</td>
<td>1.3 – 3.3</td>
</tr>
</tbody>
</table>

### O’Brien Creek
(Middle Fork O’Brien Creek Drainage Area)

<table>
<thead>
<tr>
<th>Area</th>
<th>Sed. Tons</th>
<th>Base Yield</th>
<th>Long Term Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>O’Brien Creek</td>
<td>0.9</td>
<td>1.4 – 3.6</td>
<td>2.3 – 4.5</td>
</tr>
</tbody>
</table>

*Drainage area is within the project boundary only
continue towards conditions that favor severe stand replacing fires. A severe wildfire would remove vegetation, which would increase sediment erosion from the cut and fill slopes.

Table 10. Fifty-year Average Annual Sediment with Wildfire

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Existing Total Sediment (tons/acre/year)</th>
<th>Sediment from Wildfire (tons/acre/year)</th>
<th>Total Sediment with Wildfire (tons/acre/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>1.0 – 2.4</td>
<td>3.8</td>
<td>4.8 – 6.2</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>1.3 – 3.3</td>
<td>3.8</td>
<td>5.1 – 7.1</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>2.3 – 4.5</td>
<td>3.8</td>
<td>6.1 – 8.3</td>
</tr>
</tbody>
</table>

Proposed Action Alternative

The spatial pattern and location of the thinning activities relative to the stream network, influences the amount of sediment that is delivered from disturbed areas. Forest management activities often generate a mosaic of severely disturbed areas (large openings, skid trails, and landings) and relatively undisturbed areas (streamside management zones). The former usually are considered sediment source areas and the latter usually serve as sediment sinks. If the runoff and sediment yields from the source areas are less than the absorption capacity of the downslope sediment sinks, it follows that there would be little or no change in runoff or sediment yields at the watershed scale. It is important to recognize that watershed-scale changes in sediment yields tend to be correlated with the amount of disturbance in a watershed, but a high level of disturbance does not always mean that there will be a detectable change in sediment yields at the watershed scale (Haupt and Kidd 1965).

The felling, harvesting, and transport of timber, as proposed in the Sherman Pass Project, would not detrimentally affect sediment yield within the project area. The majority of the proposed units for the alternative are proposed on land types with low sediment delivery potential.

Research studies and monitoring results conducted in National Forests verify that when RHCA or adequate buffer strips are incorporated into timber sales, sediment delivery to stream channels is “not measurable” or “is negligible” (Belt et al 1992, Reid and Hilton 1998). Sediment mobilized by harvest activities would likely be filtered and captured by vegetation remaining in the RHCA buffers before reaching streams. Studies have shown that buffer strips are effective at trapping sediment (INFS, 1995).

Stream crossing risk and sediment production and delivery would be reduced by the proposed road reconstruction activities by minimizing potential mass erosion, existing surface erosion near stream crossings and the improved dispersion of water.

The RHCA’s could receive some underburning along their edges and could lose some ground cover and small brush in the affected areas, but would not be subject to prescribed burning with enough intensity to impact large brush or trees. These areas would function as filter zones for any upslope runoff. However, runoff from overland flow would not likely occur. The prescribed burning activities would not negatively affect stream crossing risk or sediment production and delivery. Reducing existing and post-harvest fuel loadings would decrease the potential for stand-replacing wildfire on the dry sites.
In some cases, burning of slash piles would create small patches of hydrophobic soils for as much as one to two years, but the areas would not be large or extensive enough to alter the slope hydrologic response or slope stability. Some localized erosion from these treatments is anticipated, however, untreated forest and RHCA between the mechanical piling activity and the stream networks would hinder sediment delivery to stream channels.

The proposed action includes approximately 20 miles of temporary road construction. These roads would be rendered hydrologically stable after use. This would restore slope stability, reduce or eliminate surface erosion, remove all crossings from the channel and floodplain, and stabilize. Upon rendering these temporary roads hydrologically stable, these sites would need no future maintenance.

The following table is based on the assumption that the proposed management actions decrease the risk of a severe wildfire. In addition, the table assumes a 15-year prescribed fire and thinning return period as well as a 300-foot RHCA buffer. If the RHCA buffer is 150 feet or less, the amount of sediment yield more than doubles its rate per year.

**Table 11. Fifty-year Average Annual Sediment for the Proposed Action**

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Existing Total Sediment (tons/acre/year)</th>
<th>Sediment from Thinning (tons/acre/year)</th>
<th>Total Sediment after Treatment (tons/acre/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Sherman Creek</td>
<td>1.0 – 2.4</td>
<td>0.9</td>
<td>1.9 – 3.3</td>
</tr>
<tr>
<td>Upper Sherman Creek</td>
<td>1.3 – 3.3</td>
<td>0.9</td>
<td>2.2 – 4.2</td>
</tr>
<tr>
<td>O’Brien Creek</td>
<td>2.3 – 4.5</td>
<td>0.9</td>
<td>3.2 – 5.4</td>
</tr>
</tbody>
</table>

**Cumulative Effects**

The cumulative effects analysis area encompasses the Upper Sherman, Lower Sherman, and O’Brien Creek Watersheds. The boundaries of the cumulative effects analysis area are along natural topographic features and are largely comprised of watershed delineations. Approximately 20% of the cumulative effects area is on private lands or other governmental agency lands outside of the Colville National Forest Administrative boundary. Streams within the project area often flow onto private land or are tributaries of streams that flow onto private land.

The proposed activities have been designed to reduce existing risks to water quality, spawning, and aquatic organisms while minimizing new effects. No physical response from the Sherman Pass Project would extend to or be measurable in the Columbia River.

The cumulative effects analysis includes effects from past, present, and reasonably foreseeable activities. The following table shows the activities that were considered as part of the hydrology cumulative effects analysis.

**Table 12. Past, Present, and Reasonably Foreseeable Activities**
<table>
<thead>
<tr>
<th>Activity</th>
<th>Past</th>
<th>Present</th>
<th>Reasonably Foreseeable Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recreation Use (motorized and non-motorized)</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Permitted Grazing</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forest Noxious Weed Program</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forest Road Maintenance Program</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>State and Private Land Vegetation Treatments</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Personal Use Firewood Permits</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Hazard Tree Removal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Fire Suppression Activities</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forest Prescribed Burn Program</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Walker Fuels Reduction Project</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>BPA powerline management</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>State Highway 20 Maintenance</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**No Action Alternative**

There are no cumulative effects under the no action alternative. The proposed road reconstruction and fuels reduction activities would not occur. Areas that are currently deteriorating would continue to do so.

**Proposed Action Alternative**

The project area has been influenced by past timber harvest activities since the 1930s. Records indicate that timber harvest started on National Forest System lands in the project area in the 1950s and continued into the 2000s with some of the earlier records being incomplete. Due to stream habitat degradation associated with past activities on private land within the cumulative effects area, the portions of the streams located on National Forest Lands are vital for the continued existence of beneficial uses.
These projects are now completed. There is little remaining excess sediment, stream temperature, or water yield effects due to the implementation of mitigation measures and design criteria and natural recovery. Therefore, there would be no cumulative effects for the Sherman Pass Project.

Cattle grazing has occurred historically in the project area, mainly in the O’Brien Creek Watershed. The project area contains parts of four Forest Service administered grazing allotments within its boundary. Two of these allotments are vacant. There are range improvement projects throughout the watersheds, consisting mainly of water developments and fencing. The effects of grazing on the watershed indicators is minimal. When grazing is combined with the proposed action, there would be no cumulative effects to any of the watershed indicators.

The project area has had one large fire in the last 40 years; the White Mountain Fire which occurred in 1988. When the effects of the White Mountain Fire are added to the effects from the 1998 floods (in which it is estimated that this area received 4 inches of rain in a 24 hour period), this area experienced major erosion events. Numerous slides, debris torrents, large bank erosion, aggradation, and degradation occurred in the 1998 floods. Many of these sites are still actively eroding. The White Mountain Fire occurred in the headwaters of the streams in the project area. Trees in the headwaters were killed by the fire. The lack of live trees reduced the infiltration of water. The effects compounded downstream as the moving water picked up bedload. The narrow outwash terrace canyons quickly undercut and slid into the channels. When considering past fires in combination with the proposed action, equilibrium has been established within most of the watersheds. Therefore, there would be no cumulative effects from the Sherman Pass Project.

There has been a history of fire suppression within the analysis area over the past 90 years. Fire suppression will continue. Fire exclusion has dramatically altered the composition and structure of the vegetation. This has increased the risk of a catastrophic wildfire, which has the potential to negatively impact stream habitat. Since changes in water yield are associated with vegetation conditions, effects from disturbances such as fire would have an effect on water yield.

Activities on private, State, and National Forest System land that cause sediment delivery to streams, contribute to the cumulative effects. The effects of past activities, specifically road construction, were used in the sediment models to determine the current baseline condition and to look at historic ranges of variability. Roads are and have been the main contributor to sediment erosion in these watersheds.

Vegetation treatments on State and private lands within the analysis area that have occurred and may occur is minor. There would be no effects to the Upper Sherman Creek Watershed from these treatments because 99% of the land in the watershed is National Forest System Land. The Lower Sherman Creek and O’Brien Creek Watersheds do have some State and private land within their boundaries. With the use of Best Management Practices along with State and Federal regulations, effects to water resources would be mitigated. Vegetation treatments on State and private land combined with the proposed action would have no cumulative effects on any of the watershed indicators.

Old road templates often have been left on the landscape after they were used for past project implementation. Although these roads are no longer being used, they still have an effect on the
landscape. The existing road density would continue to have an effect on the watersheds due to the chronic sediment they generate, and the continued interruption of surface water/ground water interaction. When the effects of the proposed action are added to the effects from the Forest Service system roads, the proposed action would have a cumulative effect on the water yield in these watersheds. This is because timber removal effects would be added to the already altered water yield function. Trees would be removed, roads would be reconditioned, and there would be an increase in heavy use. All of these activities would affect the peak flows and water yield, but not detrimentally. The watersheds would be able to withstand the altered peak flows and water yield and sustain conditions.

The Forest road maintenance program would continue to maintain Forest Service System Roads. This road maintenance will help to alleviate some of the ongoing erosion concerns. There would be no cumulative effect from ongoing road maintenance because the overall road density after the implementation of the Sherman Pass Project would be the same. There may be an overlap in the timing of the road maintenance activities with ground disturbing activities in the proposed action. Any minor suspended sediment would not be measurable due to the implementation of the design elements and Best Management Practices.

The hydrological stabilization of temporary roads after use would be implemented over multiple years in a number of different sub-watersheds. The short-term effects from one may be complete by the time another temporary road is stabilized. There will be no effects to channel morphology. The proposed action would maintain the riparian shade so there would be no increase in stream temperature. There would be no measurable water yield effects from road maintenance or the hydrological stabilization of temporary roads.

There are trailheads in the project area that are used by hikers and horse packers. There are a few dispersed campsites in the area, mostly along roads and on old landings or closed roads. There is some illegal off-highway vehicle use occurring in the project area. Generally, illegal use is occurring on closed existing roads. Both motorized and non-motorized use is minimal in these watersheds. The effects of the use are also minimal. When combining the effects of recreation use with the proposed action, there would be no cumulative effects to any of the watershed condition indicators within these watersheds.

Ongoing invasive plant treatments restore native plants that provide streamside shade. The proposed action would maintain riparian shade so cumulatively these activities may decrease stream temperature.

Personal use firewood permits within the project area would continue. These permits allow the removal of standing dead and down trees within 200 feet of open roads. With the minor amount of wood removed and the small area impacted, this activity has very little effect on the water resources. Firewood cutting is not allowed in RHCAs. Therefore, effects to water resources are not expected. Personal use firewood cutting in combination with the proposed action would have no cumulative effects to any of the watershed indicators.

The management of the BPA power line will continue. This includes ongoing road reconstruction and vegetation management around the power lines. State Highway 20 will also continue to be maintained. This will include sanding and salting of the road in the winter as well as hazard tree removal along the
Highway. The effects of these activities, when combined with those of the proposed action, would be minimal. There would be cumulative effects, although the effects would not be detrimental.

There may be an overlap in the timing of the implementation of the proposed action and the implementation of the Walker Fuels Reduction Project. The Walker project only affects the O’Brien Creek watershed. When the Walker Fuels Reduction Project is combined with the proposed action, there would be a cumulative effect on water yield within the O’Brien Creek Watershed in the form of altered increased water yield and altered peak flows. However, there would be no cumulative effects to any of the other watershed indicators.

**Recreation**

The following section is excerpted from the Sherman Pass Project Recreation Affected Environment report and the Sherman Pass Project Recreation Effects report (McQuay, 2014). The full reports are available in the project file.

**Existing Condition, Direct and Indirect Effects**

**Existing Condition**

The Sherman Pass Project area consists of National Forest System lands located along the eastern and western slopes of the Kettle Crest both north and south of State Highway 20. Elevations range from approximately 2,080 feet along Sherman Creek on the far eastern boundary of the project area to over 7,000 feet along the high points of the Kettle Crest. A system of Forest roads and trails provides visitors with easy access throughout the project area. The Sherman Pass Scenic Byway (State Highway 20) offers travelers the best panoramic views of the project area. Likewise, the Kettle Crest National Recreation Trail, part of the Pacific Northwest National Scenic Trail corridor, offers excellent views of the planning area both north and south of State Highway 20. The heaviest recreational use occurs primarily during the summer and fall, although a considerable amount of winter recreation occurs on the designated trails within the project area. Types of recreation use within the project area include: developed and dispersed camping, visiting developed scenic overlooks and historic sites, scenic driving, hiking, mountain biking, pack and saddle stock use, hunting, berry picking, firewood gathering, fishing, picnicking, Nordic skiing, backcountry skiing, snowshoeing, snowmobiling, and off-highway vehicle use.

In general, vegetation in and around developed recreation sites and trailheads is diverse. However, much of the overstory is comprised of mature lodgepole pine and larch. The lodgepole pine has been recently infected with the mountain pine beetle and heavy mortality has already occurred in some areas and is expected to occur over the next 3-5 years. Extensive hazard tree removal has been occurring.

**Inventoried Roadless Areas**

Small portions of the Profanity, Bald-Snow, Hoodoo, South Huckleberry, and Bangs Inventoried Roadless Areas, as identified in Appendix C of the 1988 Final Environmental Impact Statement for the Colville National Forest Land and Resource Management Plan and confirmed under the 2001 Roadless Rule, are located within the Sherman Pass Project area.
Potential Wilderness Areas
The Sherman Pass Project area includes portions of the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas. These Potential Wilderness Areas are within the Okanogan Highlands ecoregion on the Colville National Forest.

Kettle Crest National Recreation Trail (Pacific Northwest National Scenic Trail)
The Kettle Crest Trail # 13 North and the Kettle Crest Trail #13 South are both classified as a National Recreation Trail and are also part of the newly designated (2009) Pacific Northwest National Scenic Trail corridor. Over one mile of each of these trails is located within the project area. Approximately 0.1 miles of the Kettle Crest 13 North and approximately 0.5 miles of the Kettle Crest 13 South Trails are outside of the Profanity and Bald-Snow Potential Wilderness Areas (respectively). The trails are used consistently throughout the year by hikers, equestrian riders, mountain bikers, hunters, Nordic skiers, backcountry skiers, snowshoers, and nature enthusiasts. The section of trail located within the project area receives heavy use during the summer and fall. Winter use is somewhat less, but consistent, as snowshoers and Nordic and backcountry skiers use the trail to access the Columbia Mountain lookout, Snow Peak Cabin, and quality backcountry ski terrain. The Kettle Crest National Recreation Trail and its feeder trails provide a multi-season, multi-user recreation experience that is regionally significant and nationally recognized. Its inclusion as part of the Pacific Northwest National Scenic Trail corridor simply added to its appeal as a trail destination for non-local backcountry trail enthusiasts.

No Action Alternative
Inventoried Roadless Areas
Under the no action alternative, no immediate change would occur in the quality or quantity of acres associated with the Profanity, Bald-Snow, Hoodoo, South Huckleberry, or Bangs Mountain Inventoried Roadless Areas. The existing vegetative conditions would remain unaltered and no roads would be constructed or timber removed. Over time, however, the likelihood of a large fire event would increase as dead fuels continue to build-up on the forest floor and ladder fuels continue to grow in the understory. Regardless of whether a future fire event occurs or not, no road construction or timber removal would occur in any of the Inventoried Roadless Areas. Therefore, the Profanity, Bald-Snow, Hoodoo, South Huckleberry, and Bangs Mountain Inventoried Roadless Areas would continue to meet the criteria in the 2001 Roadless Rule (Federal Register) for designation.

Potential Wilderness Areas
No immediate change would occur in the quality of the Profanity, Bald-Snow, Hoodoo or South Huckleberry Potential Wilderness Areas located within the Sherman Pass Project area if the no action alternative is implemented. Under this alternative, the existing vegetative conditions would remain unaltered within the Potential Wilderness Areas. Over time, however, the likelihood of a large fire event within the project area would increase as dead fuels continue to build-up on the forest floor and ladder fuels continue to grow in the understory. Regardless of whether a future fire event occurs in the Profanity, Bald-Snow, Hoodoo or South Huckleberry Potential Wilderness Areas or not, each of the Potential Wilderness Areas would still be greater than 5,000 acres, would not contain forest roads (36 CFR 212.1) or other permanently authorized roads, would not contain evidence (stumps, skid trails) of
timber harvest, and would have no evidence (cut limbs, stumps, cut logs, fire line, retardant) of prescribed burning projects. Therefore, the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas would continue to meet the criteria for being evaluated and recommended for wilderness designation during the forest plan revision process (FSH 1909.12 Sec 71.1). As a result, there would be no change in the quantity of potential wilderness within the project area if the no action alternative is implemented.

If a large fire event never occurs, there would be no change to the wilderness capability of the four Potential Wilderness Areas associated with: 1) the level of natural and undeveloped environment, 2) the level of outstanding opportunities for solitude or primitive and unconfined recreation, 3) the special features, and 4) the manageability of the Potential Wilderness Area boundaries. Therefore, there would be no change to the quality of the physical and biological resources in the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas that make them eligible for consideration as a wilderness area.

If a large fire event occurs within the project area, changes to the physical and biological resources that comprise the wilderness capability of the four Potential Wilderness Areas would be likely. The degree of change would be dependent on the severity and location of the potential burn. The integrity of the natural and undeveloped environment could decline resulting from a reduction in water quality caused by post-fire erosion and the potential for noxious weed spread. The level of outstanding opportunities for solitude or primitive and unconfined recreation may also decline as the sounds and sights of nearby timber management activities and highways could be more obvious with the potential loss of some of the area’s dense timber stands. The quality and number of special features associated with each Potential Wilderness Area may also decline as habitat for sensitive plants and animals could be eliminated or heavily altered. Finally, the manageability of each Potential Wilderness Area boundary may be reduced if a stand replacing fire were to remove vegetation along the Potential Wilderness Area boundaries, increasing the likelihood of motorized intrusions by snowmobiles and off-highway vehicles. Given the above, it is possible that a severe wildfire event could result in some areas within the Profanity, Bald-Snow, Hoodoo or South Huckleberry Potential Wilderness Areas no longer meeting the same standard for wilderness capability described in each Potential Wilderness Area’s Wilderness Evaluation, which could, in a worst case fire scenario, result in the affected parts of these Potential Wilderness Areas being considered for removal from further consideration as potential wilderness prior to their designation as preliminary administratively recommended wilderness in the Colville National Forest’s ongoing forest plan revision process.

Kettle Crest National Recreation Trail (Pacific Northwest National Scenic Trail)
Under the no action alternative, no immediate change would occur in the quality of the recreation experience associated with all types of trail use (hiking, mountain biking, equestrian, snow shoeing, and skiing) located within the Sherman Pass Project area including the Kettle Crest National Recreation Trail (part of the Pacific Northwest National Scenic Trail corridor).

Over time, however, the likelihood of a large fire event within the project area would increase. Should a large fire event occur within the project area, access to trail opportunities would be unavailable to the public during the fire event and potentially for several years afterward until the hazards (standing dead
trees, downed trees, slumps, washouts, tread deterioration, etc.) remaining after the fire could be mitigated. The potential to disrupt trail users could continue to exist for ten to twenty years or longer following the fire event as fire killed trees regularly fall across the trail. The potential for weed spread and the need for treatment along trail routes could also increase following a severe fire event. Depending on the severity of the fire, the removal of hazard trees and the reconstruction of trail features (bridges, puncheons, turnpike, signs, water bars, and culverts) could take years to implement depending on the availability of funding. A large fire event could also cause a short-term (2-10 years) visual impairment to the quality of the trail setting because of lost shade from the forest canopy, lost vegetation, and the potential for landslides, negatively affecting the experience of many trail users.

In the long-term, the setting and the trail experience could be enhanced as recreationists experience the rebirth of the forest (wildflowers, shrubs, and trees) and enjoy better views through fire created openings in the forest canopy for many years to decades after the fire event.

**Proposed Action Alternative**

**Inventoried Roadless Areas**

Under the proposed action, there would be no change in the quality or quantity of acres associated with the Profanity, Bald-Snow, Hoodoo, South Huckleberry, or Bangs Inventoried Roadless Areas. The existing vegetative conditions would remain unaltered and no roads would be constructed within the Inventoried Roadless Areas. The Profanity, Bald-Snow, Hoodoo, South Huckleberry, and Bangs Inventoried Roadless Areas would continue to meet the criteria in the 2001 Roadless Rule (Federal Register) for designation as an Inventoried Roadless Area.

**Potential Wilderness Areas**

Under the proposed action, management actions would not result in the loss of acreage from the Profanity, Bald-Snow, Hoodoo, or South Huckleberry Potential Wilderness Areas. Each of the Potential Wilderness Areas would remain greater than 5,000 acres, would not contain forest roads (36 CFR 212.1) or other permanently authorized roads, would not contain evidence (stumps, skid trails) of timber harvest, and would contain no evidence (cut limbs, stumps, cut logs, fire line, retardant) of prescribed burning projects. There would be no change in the quantity of potential wilderness under the proposed action. Each of the Potential Wilderness Areas would continue to meet the criteria for being evaluated and recommended for placement on the potential wilderness inventory during the forest plan revision process (FSH 1909.12 Chapters 71.1 and 71.11). The proposed action may, however, result in changes to the physical and biological resources that are considered in the capability for wilderness analysis for each Potential Wilderness Area during the forest plan revision process. Specific effects are listed below.

**Level of natural and undeveloped environment**

The integrity of the natural and undeveloped environment would decline as the sense of naturalness associated with each Potential Wilderness Area is impeded by: 1) views of new timber harvest units and temporary road construction; 2) noise and dust from additional commercial traffic adjacent to the Potential Wilderness Areas; 3) human activity and smoke associated with prescribed burning; and 4) the potential for noxious weeds to spread from commercial vehicles working on adjacent vegetation and fuel treatment units into the Potential Wilderness Areas. The detrimental impacts resulting from noise,
dust, and prescribed burning would be relatively short in duration, occurring only during active harvest and burning operations. The impact to the natural environment resulting from views of timber harvest and temporary road construction activities, as well as the potential spread of noxious weeds, could take several decades or more to fully dissipate.

Additional indicator measurements associated with light pollution, water quality, and human developments would remain unchanged for the four Potential Wilderness Areas.

**Level of outstanding opportunities for solitude or primitive and unconfined recreation**

A decline in the existing opportunities for solitude would result from the increase in sounds from timber and fuel management activities adjacent to the Potential Wilderness Areas. This impact should be of short duration and last only during the implementation of vegetation and fuel treatments. An additional decline in existing opportunities for solitude could result from the potential for continued illegal motorized use on road systems adjacent to the four Potential Wilderness Areas that are reconstructed and used during implementation of the vegetation and fuel treatments. The opportunities for primitive and unconfined recreation would remain unchanged in all Potential Wilderness Areas.

**Special features**

The availability of special features (high peaks, quality backcountry skiing, sensitive and rare plants, and habitat for Canada lynx, wolverine, and American marten) associated with the Okanogan Highland ecoregion in which the four Potential Wilderness Areas are located (Profanity, Bald-Snow, Hoodoo, and South Huckleberry Wilderness Evaluations May-June 2009) would remain stable.

**Manageability of the Potential Wilderness Area boundaries**

Most of the southern boundary of the Profanity Potential Wilderness Area and the northern boundary of the Bald-Snow Potential Wilderness Area consist of “points on the mid-slope where past management activities cease to be noticeable.” (Profanity Wilderness Evaluation May-June 2009 and Bald-Snow Wilderness Evaluation May-June 2009). These mid-slope boundaries adjacent to the Sherman Pass Project area would make the Potential Wilderness Area boundaries more difficult to manage and locate on the ground while implementing vegetation and fuel treatments along the boundaries.

The western boundary of the Hoodoo Potential Wilderness Area follows the easily identifiable Albian Hill Road. The southern boundary, however, follows irregular lines that likely skirt around old harvest units. (Hoodoo Wilderness Evaluation May-June 2009). This boundary is adjacent to the Sherman Pass Project area making it more difficult to manage and locate the boundary on the ground while implementing vegetation and fuel treatments.

The majority of the South Huckleberry Potential Wilderness Area boundary is located along good geographic features including Cedar Ridge on the south, South Fork Sherman Creek on the West, and the Bangs Mountain Scenic Loop and Lake Ellen roads on the East (South Huckleberry Wilderness Evaluation May-June 2009). The northern boundary is less defined, following private ground and mid-slope contours which makes the boundary more difficult to manage and locate on the ground while implementing vegetation and fuel treatments along this boundary.
Manageability of the four Potential Wilderness Areas would decline as additional segments of Potential Wilderness Area boundaries are complicated through the implementation of new vegetation and fuel treatments and the reconstruction of the supporting road system. Treatments may also lead to an increase in snowmobile and off-highway vehicle intrusions along the Potential Wilderness Area boundaries, leading to a further decline in the manageability of the Potential Wilderness Areas.

**Kettle Crest National Recreation Trail (Pacific Northwest National Scenic Trail)**

Access to the Kettle Crest National Recreation Trail (part of the Pacific Northwest National Scenic Trail corridor) may likely be restricted for several weeks to months while the proposed treatments are being implemented in order to provide for public safety. If the treatment units around the Kettle Crest Trail are harvested during the summer, trail users would not be able to access the Kettle Crest National Recreation Trail from the Kettle Crest Trailhead on Sherman Pass. This would be a substantial negative impact to those recreationists desiring to travel the entire length of the Kettle Crest National Recreation Trail or the Pacific Northwest National Scenic Trail.

If the area adjacent to the Kettle Crest Trail is harvested in the winter, access to prime winter recreation opportunities would be restricted, resulting in a short-term negative impact to the backcountry alpine skiing, cross-country skiing, and snowshoeing opportunities within the project area. Over the long-term, thinning could improve overall snow conditions along the trail by reducing snow intercept from trees adjacent to the trail. This could improve the snow base, resulting in a better skiing opportunity for most users.

In addition to the loss of trail access, harvesting along the Kettle Crest Trail may also require skidding trees across the trail prism. This could lead to substantial tread damage and the potential for increased erosion of the trail prism if vertical skid trails intercept summer or winter storm runoff. Many users of the Kettle Crest National Recreation Trail may also be offended by the presence of thinning activities within the trail corridor. While thinning is permitted, and may even improve the vistas enjoyed by users of the trail over the long-term, many users have indicated that they would be angry over a reduction in the scenic beauty of the trail corridor as a result of the presence of stumps, slash, skid trails, and obvious signs of mechanical harvest that would likely exist immediately following and for several years after the proposed harvest activities are completed. Damage to the trail tread and scenic quality associated with the immediate foreground of the Kettle Crest National Recreation Trail could decrease user satisfaction with the trail system until repairs could be made and the short-term (5-10 years) visual impairments recover.

**Cumulative Effects**

The cumulative effects area associated with the Sherman Pass Project for recreation resources other than the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas includes National Forest System lands north of the border with the Colville Indian Reservation, west of US Highway 395, south of County Road 602, and east of State Highway 21. This area represents the area of potential impact to recreation resources associated with the Sherman Pass Project. Outside of this area, the effects to recreation experiences becomes stable as the opportunities for camping, trail use,
motorized off-highway vehicle recreation, firewood gathering, winter recreation and various forms of dispersed recreation become readily available.

The cumulative effects area associated with the Sherman Pass Project for the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas includes lands north of the Colville National Forest boundary with the Colville Indian Reservation, east of State Highway 21, south of the Colville National Forest boundary with the Canadian Border, and west of US Highway 395. This area was selected as it contains all of the primary Potential Wilderness Areas within the Okanogan Highlands ecoregion on the Colville National Forest between the Columbia River and the western border of the Colville National Forest. The Okanogan Highlands has been identified as an ecoregion in which designated wilderness is under-represented (Profanity, Bald-Snow, Hoodoo, and South Huckleberry Wilderness Evaluations, May-June 2009).

Cumulative effects to the recreation opportunities associated with the Proposed Action within the Sherman Pass Project area may result from the implementation of the Kettle Face Fuels Reduction Project, the Walker Fuels Reduction Project, and the planned Deer Jasper Restoration Project. Implementation of the Kettle Face, Walker, and Deer Jasper projects are expected to overlap in time with the Sherman Pass Project by approximately two, three, and four years respectively, starting in 2016. If the proposed Orient and Sanpoil projects stay on schedule during their planning phases, implementation of these two projects is expected to overlap in time with the Sherman Pass Project for five and four years respectively. This overlap would occur starting in 2016 for the Orient project and in 2017 for the Sanpoil Project.

**No Action Alternative**

There would be no cumulative effects to the recreation opportunities within the Sherman Pass Project area associated with the no action alternative. The potential effects associated with the Kettle Face Fuels Reduction Project, the Walker Fuels Reduction Project, the planned Deer Jasper Project, and the proposed Orient and Sanpoil projects on recreation opportunities within the Sherman Pass Project area would all be part of the existing condition. For example, displaced dispersed campers from any of the listed project areas could end up in the Sherman Pass Project area and lead to potential crowding. However, since there would be no management actions in the Sherman Pass Project area that would restrict dispersed camping opportunities, there would be no cumulative effect. Only the direct effect of displacement from those other project areas into the Sherman Pass Project area would be evident. This same logic holds true for all of the recreation opportunities within the Sherman Pass Project area.

**Proposed Action Alternative**

**Inventoried Roadless Areas**

No projects were identified that would have a cumulative effect on the Inventoried Roadless Areas located in the Sherman Pass Project Area.

**Potential Wilderness Areas**

Implementation of the Walker, Deer Jasper, and Sanpoil projects would result in a cumulative decline in the level of natural and undeveloped environment, outstanding opportunities for solitude, and primitive
and unconfined recreation associated with the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Areas as well as the manageability of the Profanity, Bald-Snow, Hoodoo, and South Huckleberry Potential Wilderness Area boundaries. The sense of naturalness and opportunities for solitude associated with the Potential Wilderness Areas would be impeded by: 1) views of new timber harvest units and road construction/reconstruction activities, 2) noise and dust from additional commercial traffic adjacent to the Potential Wilderness Areas, 3) human activity and smoke associated with prescribed burning, and 4) the potential for noxious weeds to spread from commercial vehicles working on adjacent vegetation and fuel treatment units into the Potential Wilderness Areas. The detrimental impacts resulting from noise, dust, and prescribed burning will be relatively short in duration, occurring only during active harvest and burning operations. The impacts to the natural environment, opportunities for solitude, and boundary management resulting from adjacent timber harvest and road construction activities, as well as the potential spread of noxious weeds, could take several decades or more to fully dissipate. When each of these projects are fully implemented, management actions will have been implemented on four sides of the Profanity Potential Wilderness Area, three sides of the Bald-Snow Potential Wilderness Area, and the southwest portion of the Hoodoo Potential Wilderness Area.

Kettle Crest National Recreation Trail (Pacific Northwest National Scenic Trail)

Implementation of the Walker, Deer Jasper, and Sanpoil projects may reduce access to the Kettle Crest National Recreation Trail (part of the Pacific Northwest National Scenic Trail) corridor between 2016 and 2020. If these projects are implemented concurrently, access could be limited by temporary road and trailhead closures. This could result in displaced trail users attempting to access trailheads within the Sherman Pass Project area, resulting in the perception of crowding and decreasing user satisfaction with the trail opportunities associated with the Sherman Pass Project area.

Special Uses and Minerals

The following section is excerpted from the Specialist Report for the Sherman Pass Project – Special Uses & Minerals (Nooney, 2014). The full report is available in the project file.

**Existing Condition**

There are several special use authorizations for improvements located within the Sherman Pass Project area. The improvements include a Forest Road Easement for Forest Service Road 2000-136; Special Use permits issued to BPA for high voltage power transmission lines and road access to those power lines; a buried fiber optic cable; and a private spring development and waterline. In addition, there is one active mining claim in the project area, which has operated in the past under an approved Plan of Operation.

There are currently no leasable minerals within the Sherman Pass Project area. A review of the Bureau of Land Management Legacy database (on 02/22/2014) found there is one active locatable mining claim listed within the project area.

**Direct, Indirect, and Cumulative Effects**

There are no adverse impacts (direct, indirect, or cumulative) anticipated to improvements authorized under special use permits or easements if the recommended project design elements are implemented.
Effectiveness and the level of success of the design elements in avoiding impacts to improvements are expected to be very high.

**Range**
The following section is excerpted from the Sherman Pass Range Report (Weinmann, 2014). The full report is available in the project file.

**Existing Condition, Direct and Indirect Effects**

**Existing Condition**
The Sherman Pass Project area includes portions of four grazing allotments. The Quartz and Jungle Hill allotments have active grazing permits, which authorize permittees to graze livestock. Both the Graves and Bangs allotments are vacant and will remain vacant until they are assessed sometime in the future. While the Jungle Hill allotment is active, no treatments are being proposed within the allotment boundary, which would affect livestock management or the range resource.

The grazing season for active allotments generally begins on June 1 of each year and extends into the fall with seasons ending between October 15th and October 31st.

<table>
<thead>
<tr>
<th>Allotment</th>
<th>Total Allotment Acres</th>
<th>Acres of the allotment in the project area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jungle Hill</td>
<td>7,839</td>
<td>935</td>
</tr>
<tr>
<td>Quartz</td>
<td>59,224</td>
<td>3,366</td>
</tr>
<tr>
<td>Graves Mountain (vacant)</td>
<td>60,900</td>
<td>26,235</td>
</tr>
<tr>
<td>Bangs (vacant)</td>
<td>5,749</td>
<td>466</td>
</tr>
</tbody>
</table>

Water developments and fencing have been constructed within these grazing allotments in order to facilitate improved grazing and livestock management. Physical allotment and pasture boundaries consist of a combination of fencing and natural barriers. Natural barriers are features present on the landscape that act to limit livestock movement. When natural barriers are connected with fencing, livestock can be contained in desired locations. Examples of natural barriers are rock outcroppings, cliffs, talus slopes, steep slopes, dense timber or excessive down timber. Effective natural barriers are extremely valuable to range management and the grazing permittees because they reduce the need to construct fencing, eliminate costs associated with fence construction and require no maintenance.

Within the project area, there are natural barriers that consist of vegetation which are of concern to range management. These natural barriers play a key role in keeping livestock off of Sherman Pass National Scenic Byway (Highway 20).

**No Action Alternative**
In the short-term, there would be little or no change in the range resource compared to the existing condition. Livestock would continue to graze on the two active allotments. The other two allotments
would remain vacant. Range improvements (such as fences and water developments) would exist on the landscape and continue to be used to manage livestock grazing.

From a vegetative perspective, the no-action alternative has the potential to adversely affect range management because forage production would decrease as tree densities continue to increase. As there is less forage for livestock in the upland areas of pastures, it is likely that grazing pressure would increase on lower elevation rangelands and riparian areas.

However, dense stands can provide a benefit to livestock management by creating natural barriers, which restrict livestock movement. Livestock will not utilize areas that do not provide adequate foraging conditions such as areas of dense timber. By having intact natural barriers, which limit livestock movement, the need for fencing to manage livestock movement is less.

In the long-term, the no-action alternative would result in a forest condition that has a large amount of natural fuels. High levels of fuels could result in large high severity fires, which could in turn have a dramatic impact on rangeland forage. Once rangelands have burned with a high severity, the vegetation must be rested from livestock grazing to allow surviving plants to recover, desirable plant species to regenerate, and allow litter accumulation to cover the soil. As a result of a rest period, livestock producers would not be able to occupy active grazing allotments for which they have a term grazing permits and would be forced to find adequate rangeland forage in another location while the vegetation in the affected area was recovering.

This in combination with the removal of critical natural barriers, which form allotment and pasture boundaries, could cause areas of over-utilization in some pastures and under-utilization in others. There would be no practical means of controlling livestock distribution due to the loss of the natural barrier infrastructure. On this particular landscape, livestock could move north off the Quartz allotment and end up on the Sherman Pass National Scenic Byway (Highway 20).

Fences, natural vegetation barriers, water developments, and access by means of roads/trails all play a key role in the success of livestock management. All of these range improvements are at risk when a high severity fire occurs on the landscape. If a high-severity fire destroyed the water development infrastructure on an allotment and created open riparian areas, than there could be increased rates of use, trailing, bank-alteration, and loafing of livestock in riparian areas.

**Proposed Action Alternative**

The proposed action would result in a more open timber stand where there is likely to be increased forage in the understory. Converting dense forested areas to more open stands is beneficial to range management. Implementation of the proposed action is not expected to require grazing deferral or adjustment of grazing rotation systems.

The vegetation and fuels treatments in the proposed action alternative have the potential to compromise some natural barriers. The implementation of the design elements should protect the natural barriers. In addition, proposed temporary road construction and road reconstruction are not expected to have any effect on livestock grazing in the project area.
Cumulative Effects
This cumulative effects analysis considers the effects of the proposed action on livestock grazing when considered with past, ongoing and reasonably foreseeable future actions. The geographic cumulative effects area for the range resource is limited to the grazing allotments within the project area. The cumulative effects of past timber harvest, road building activities, wildfire, and increased recreational use and development have all complicated the management of grazing within the analysis area.

Between approximately 1975 and 1995, there was a dramatic increase in the amount of road building and timber harvesting which provided livestock access to riparian areas. In the past, many of these activities also prescribed the use of palatable forage species when seeding for erosion control in all areas including riparian areas. This created an environment that encouraged livestock to stay in the riparian areas rather than moving on to the upland foraging areas. However, past timber harvest activities have resulted in a positive effect on the forage base for these allotments. Timber harvest created openings in the forest provide temporary additional forage for livestock and reduce the grazing pressure on other rangelands.

Past road construction activities have generally been beneficial to range management by providing access to construct water developments and fences and manage livestock. Roads that are near range improvements aid in maintenance activities by providing an easy way to get supplies and personnel to the site. Having roads within grazing allotments also allows permittees to distribute salt to livestock, check on the location of livestock, and bring livestock onto and off allotments with greater efficiency. Roads can also act as routes to trail livestock while moving from one pasture to another. Both open and closed roads aid permittees in the management of their allotments.

No Action Alternative
The no action alternative would have no cumulative effects on the range resource.

Proposed Action Alternative
Ongoing and future noxious weed treatments under the existing Integrated Noxious Weed Treatment Decision are helping to reduce noxious weed populations that may be spread by livestock. The mitigation measures specific to the Sherman Pass Project should limit the spread of noxious weeds within and around the project area.

The scheduled Sanpoil project, if implemented, would be adjacent to the Sherman Pass Project area and could affect the range resources on the Quartz allotment. Vegetation treatments in both projects would create transitory range. The Sanpoil project, when added to the Sherman Pass Project, could produce changes in livestock management, habituation of livestock on the landscape, changes in natural barriers, and changes to the available forage base. These changes, caused by different projects but located on the same allotment, would have a cumulative effect on the overall allotment management and range resource within the Quartz allotment. On a broad scale, the overall amount of transitory range would be increased due to the treatments proposed within both projects. This in turn would change how livestock distribute across the landscape and are habituated to using the available forage. These activities between the two vegetation treatment projects would have an effect on the range resources for approximately 10 years.
The activities in the proposed action combined with past, ongoing and reasonably foreseeable future actions would not cumulatively negatively affect range management within the affected Forest Service grazing allotments.

Invasive Plants
The following section is excerpted from the Sherman Pass Project Invasive Plants Report (Fletcher, 2014). The full report is available in the project file.

Existing Conditions, Direct and Indirect Effects

Existing Condition
Several invasive plant species are present within the project area. Invasive plants have occurred within the project area for many decades and the Forest Service has been treating invasive plant populations in the area since approximately 1992. The Forest Service continues to treat these areas based on priority. Invasive plant infestations fluctuate annually based on new plant recruitment and treatment efforts. The 2012 surveys of the project area revealed that there were approximately 297 acres infested with invasive plants. Most of the infestations do not occupy large areas and are often just a few plants at scattered locations within the project area. Invasive plant species in the project area grow along forest roads, in forest openings and timber stands with sparse canopy cover. They occur in these locations because they require abundant sunlight to establish and grow. Most densely forested areas do not provide adequate growing conditions for invasive plants to become established. Diffuse knapweed and St. Johnswort have been observed near portions of the project area since the 1950s and represent many of the infested acres.

No Action Alternative
Given that several different species of invasive plants occur within the project area and that some of the non-federal property bordering the Forest Service land is infested with invasive plants, it is likely that they would continue to occur within the project area. Given similar abilities and funding to treat invasive plants in the future, it is expected that the overall number of acres infested with invasive plants would continue to increase above current levels.

Proposed Action Alternative
All proposed activities meet the Colville National Forest Land and Resource Management Plan Standards for integrated pest management and the Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants Record of Decision, which amended the Forest Plan.

In addition, the proposed action would comply with the Colville National Forest Noxious Weed Prevention Guidelines, the Colville National Forest Seeding and Planting Guide, the Pacific Northwest Invasive Plants Program Final Environmental Impact Statement and Record of Decision, and the Colville National Forest Integrated Noxious Weed Treatment Environmental Assessment. The overall risk of the proposed action substantially increasing invasive plant distribution and creating long lasting invasive plant related impacts is low. Though there will be ground disturbance produced by the project, the anticipated increase in invasive plant populations would be adequately managed by following the
standards and guidelines in the above-mentioned documents, monitoring recommendations, and design elements.

The result of the proposed action would be a timber stand that is more open with less biomass in the understory. Creating more open stands where sunlight could reach the ground would provide a more favorable environment for invasive plants to become established and spread. Many invasive plants are out-competed by native vegetation in shaded environments, but it is anticipated that the thinning treatments would not provide enough shade in most areas to deter invasive plant establishment and spread. Disturbed areas would likely be at moderate risk for invasive plant infestation if seed sources are present and readily available. Timely implementation of the design elements would likely reduce this risk to acceptable levels.

Mechanical thinning, road reconstruction, temporary road construction, and machine fireline construction have the most elevated risk for invasive plant establishment due to ground disturbance caused by equipment or concentrated use. The types of activities associated with harvesting trees, conveying them to a landing, and decking them creates areas where mineral soil could be exposed. Within harvested units, invasive plant establishment first occurs on skid trails and log landing sites because of the exposed mineral soil and adequate sunlight. If left untreated, infestations that began in these locations can soon spread throughout the harvest unit given that timber spacing would be greater and more sunlight would reach the forest floor.

Road reconstruction and temporary road construction activities produce areas that have the greatest risk for invasive plant establishment. These activities create substantial and often continuous areas of disturbance where nearly all desirable vegetation is removed and mineral soil is left exposed without desirable vegetation to colonize the area. Disturbed areas create a seedbed readily susceptible to invasive plant establishment.

Prescribed fire poses a slight risk for invasive plant establishment. Given the types of prescribed fire proposed for this project, it is expected that exposure of mineral soil due to fire would be widely scattered, the areas of bare soil would be small, and that re-colonization of native vegetation would occur within one growing season in areas that are underburned. Because of the greater localized heat involved with burning piled vegetation, recovery of native vegetation is expected to be slower than in areas that are underburned. Timing of prescribed fire would also affect invasive plant spread. If areas are burnt after invasive plants with windblown seeds have reached maturity, greater spread of invasive plants can be expected. If stands are treated with prescribed fire in the spring prior to plants producing mature seed, risk of invasive plant transport would be reduced. Burning in the fall would favor desirable cool season plants, such as deep-rooted bunch grasses and would be desirable for vegetative recovery (Wright 1974). Quick recovery of native species in burnt units would be beneficial, as it would reduce the available areas for invasive plants to establish.

Treatment Methods
Invasive plant treatment methods employed because of the proposed action would include a host of practices. The size of the infestation, the location of the infestation, and the species of invasive plant would dictate the approach taken to treat the population and the specific herbicide used.
Given the size of the project and the amount of acres infested with invasive plants, herbicides would be used to treat invasive plants within the project area. Most of these applications would occur along Forest roads. Herbicide selection would be made to best suit the location and the species being treated. Herbicides anticipated to be used in implementing the proposed action would likely include Picloram, Metsulfuron Methyl, Triclopyr, and Clopyralid. All of these herbicides are selective which means that they are only effective on broadleaf plants and they do not affect grasses. The Colville National Forest uses glyphosate in very limited instances to treat very specific populations of invasive plants, none of which occur in the project area. Glyphosate is not planned to be used for this project.

Following the treatment of invasive plants within the project area, there would be a reduced risk of these plants establishing and spreading because of the activities in the proposed action.

**Cumulative Effects**
The cumulative effects analysis considers all lands, regardless of ownership within Northern Ferry County over the next ten years.

There have been and will continue to be harvest activities, recreational use, livestock grazing, prescribed burning, wildfire, invasive plant treatments, road maintenance, and firewood gathering in the foreseeable future. Invasive plant seeds are transported by vehicles, equipment, and livestock to disturbed soils.

Routine road maintenance occurs on all County and Forest Service roads. Road maintenance consists primarily of spot surface blading, ditch, and culvert cleaning which produces areas of bare soil that could become infested with invasive plants.

Non-federal lands near the project area appear to have a greater area infested with invasive plants and a higher density of invasive plants.

A high level of motorized recreational use is anticipated to continue in the power line corridor in the eastern portion of the project area. These south facing slopes, which have well drained soils, are prone to invasive plant infestation. Motorized vehicles produce bare soil and transport seeds.

**No Action Alternative**
The no action alternative would not cause a cumulative negative effect to invasive plant populations within or outside the Forest Boundary. The acres of invasive plant infestations are not likely to increase substantially because of this alternative, but there is a risk of invasive plant establishment and/or spread for roads that are not authorized for travel, though use is occurring.

Known populations of invasive plants that exist on access routes would continue to be spread by existing and on-going activities. Past vegetation treatments, recreational use and driving forest roads has spread invasive plants and introduced new invasive plants within the project area. Invasive plants that are new invaders are likely to establish within the project area through several vectors of spread, some of which include vehicles, wildlife, livestock, wind, and the recreating public.

Future activities associated with repair and maintenance of power lines within the project area would further spread invasive plants since these populations would not be required to be treated in this project.
Given that most roads within this project area enter onto State Route 20, there is a risk of invasive plants that exist within the project area being spread to other areas within and outside of Ferry County since invasive plant treatments would not be a priority based on a need to conduct pre-activity treatment efforts.

The history and nature of the invasive plant situation on the Colville National Forest suggests that invasive plants would continue to exist on the landscape within the Sherman Pass Project area. Invasive plants would be treated and monitored within the project area, though at a reduced interval. Invasive plants would not likely be eliminated by the continued Forest invasive plant treatment program.

**Proposed Action Alternative**
The activities in the proposed action would not cause a cumulative negative effect to invasive plant populations within or outside the Forest Boundary. The acres of invasive plant infestations are not likely to increase substantially because of the project, but there is a risk of invasive plant establishment for roads that will be closed following treatment if road closure devices are compromised and/or breached thereby allowing motorized access.

There have been and will continue to be harvest activities, recreational use, livestock grazing, prescribed burning, wildfire, invasive plant treatments, road decommissioning, road maintenance and firewood gathering in the foreseeable future. These activities equate to a constant threat of invasive plants becoming established within the project area due to invasive plant seeds being transported by vehicles, equipment, and livestock to disturbed soils. The Sherman Pass project would not increase this threat.

Past and on-going invasive plant treatments on Forest Service lands have had a substantial impact of reducing the extent of invasive plant populations in the area compared to private property adjacent to the project area.

**Wildlife**
The following section is excerpted from the Sherman Pass Project Effects to Management Indicator Species Report and the Sherman Pass Project Effects to Threatened and Endangered Species Report (Loggers, 2015). The full reports are available in the project file.

Habitat does not exist in the project area for the following species. This project will have either no effect or no impact to them or their habitat, and they will not be discussed further:

- **Woodland caribou:** the nearest recovery area is over two mountain ranges and two rivers from the project area.
- **Mountain goats:** inhabit relatively high elevation areas including cliffs. Though some cliffs occur in the project area, they are isolated and do not provide habitat for mountain goats, and none have been reported from the project area.
- **Great blue herons:** forage in wetlands and nest, generally colonially, along waterways in valley bottoms. Nesting habitat for them does not occur in or within 2 miles of the project area.
- **Common loons, bald eagles, and eared grebes:** nest on large bodies of water, which do not occur in or within 2 miles of the project area.
• Sandhill cranes occupy open, wetland habitat, which does not occur in the project area.
• Harlequin ducks reproduce on cold, high-gradient streams, which do not occur in the area. Harlequin ducks do migrate through the area, the most recent record coming from northeast of the project area (Pierre Lake) on April 25, 2008, and others dating from the early 2000s on Sherman Creek, in the project area.
• Red-tailed chipmunks and pygmy shrews occupy dense, more mesic coniferous forests east of the Columbia River and do not occur in the project area.
• American peregrine falcon nests have been documented only in the Pend Oreille Valley. The project area does not contain suitable nesting or foraging habitat.
• Delicate emerald (Somatochlora franklini), Whitehouse emerald (Somatochlora whitehousei), Subarctic darner (Aeshna subarctica), Zigzag darner (Aeshna sitchensis), and Subarctic bluet (Coenagrion interrogatum) occupy high-elevation wetlands, and none occurs in the project area.
• Great Basin fritillary (Argynnis (Speyeria) egleis) occupies dry, open environments. A single specimen was purportedly caught just south of the Colville National Forest boundary. That specimen subsequently was declared misidentified (J. Pelham, pers. comm.). The nearest population to the Colville National Forest exists more than 100 miles south of the Colville National Forest boundary (http://www.butterfliesandmoths.org/species/Speyeria-egleis, accessed 2014).

Existing Condition, Direct, Indirect and Cumulative Effects by Species

Grizzly Bear (Status: Threatened – Federal)
The project area lies within an area that is not managed primarily as grizzly bear habitat. The following are components of grizzly bear habitat for which we analyze. These include forage and those parameters that could threaten bears via human conflict or a reduction in secure habitat.

• Secluded Habitats: areas further than 500 meters from an open, motorized route;
• Travel corridors and hiding cover: allows bears to move across landscapes; and
• Forage: big game, eaten mainly as carrion, and berry fields.

Transient grizzly bears have not been recorded from the area. The Natural Heritage Program Database lists no verified grizzly sightings in or near the watershed. The closest documented recent sightings are in the Wedge, about 25 miles northeast of the project boundary, in spring of 2012.

The no action alternative and the proposed action alternative would not contribute to negative effects in either the project area or the cumulative effects area.

No Action Alternative
The No Action alternative does not propose any road construction, thinning, or prescribed fire so would not affect travel corridors or hiding cover. In the long term, lack of prescribed fire and thinning would increase the potential for a landscape level fire, which could dramatically decrease or eliminate cover over a large area but probably would not prevent a grizzly bear from moving through parts of the project area.
Proposed Action Alternative
There are four temporary roads proposed in seclusion habitat. The proposed temporary road segments do not eliminate much cover, are not located on ridges or along riparian areas, and sufficient cover would remain in the areas so the movement of bears within the project area wouldn’t be restricted. Several roads that are currently closed are proposed to be opened during project implementation and then effectively closed after project activities are completed. All currently closed roads that would be re-opened for project activities would be blocked from vehicle traffic not associated with management activities. This would maintain most of the integrity of the core seclusion areas.

Thinning would not reduce vegetation in riparian corridors to where the areas would be too open for bears. Sufficient vegetation would remain in unthinned areas in the uplands as well as harvested areas to allow grizzly bears to move across the project area. All thinning would stimulate forage production and prescribed fire might improve berry fields and would improve spring emergence habitat. Proposed thinning and prescribed fire would also improve long-term winter cover and improve summer forage conditions for big game, on which bears prey.

Cumulative Effects
The area considered for cumulative effects analysis consists of the mid and upper elevations of the Kettle Crest. More than 95% of this area is Forest Service land. Little private land or land managed by other agencies lies in the cumulative effects area and that which does primarily lies east of the Kettle Crest. Grizzly bears have not been documented in the cumulative effects area within the last 50 years though they have recently occurred within about 10 miles of the northeastern edge of the cumulative effects area.

Past, current and proposed projects in the cumulative effects analysis area have not eliminated cover to the level that would preclude bears from using the area. The entire cumulative effects area supports considerably more cover than when bears inhabited it in the 1940s and 1950s. Hiding cover throughout the Kettle Crest will probably not decrease dramatically because recent Forest Service projects have created pockets of smaller openings instead of large regeneration units.

Neither the no action nor proposed action alternative would contribute to a decrease in travel corridors in the cumulative effects area. More than 95% of the potential grizzly bear habitat in the cumulative effects area is managed by the Forest Service. The Forest Plan lists guidelines to maintain travel corridors on lands it manages and all projects on Forest Service lands since then have retained cover on the landscape that would allow grizzly bear to move through an area.

The proposed action has a low likelihood of causing adverse effects because bears have not been documented from the project area or the cumulative effects area for more than 50 years. The proposed action would have low consequences because the project has been designed to prevent adverse effects to grizzly bears. The proposed action “may affect but is not likely to adversely affect” grizzly bears or grizzly bear habitat.
Big Game - Deer, Elk, and Moose (Forest Plan Management Indicator Species)

The Sherman Pass Project area provides year-around habitat for mule deer, white-tailed deer, elk, and moose. Within this area, mule and white-tailed deer are the most abundant ungulates. Under the Forest Plan, management within winter range areas emphasizes mule deer west of the Columbia River.

The entire project area supports summer range. In general, forage has decreased across the project area and probably results in a mule deer population lower than when the area was more open and under the influence of natural disturbance processes (primarily fire). Distribution of cover and forage is relatively poor. The current forage conditions of summer and autumn habitat in the project area could improve by opening some of the more closed canopy areas in the higher elevations and stimulating forbs and browse through mechanical treatment of smaller trees, by fire, and by managing noxious weeds. The condition of cover could be improved over the long term by reducing stress in existing overstory trees by removing the smaller conifers that compete with the larger trees for moisture and nutrients.

Habitat security in winter range is managed by regulation of open road densities during winter months. To decrease road densities in winter range, the Forest Service coordinates with the Washington Department of Fish and Wildlife to close, with gates, all the main roads in winter range that access Sherman Highway: Trout Lake, Coyote Creek, and Lane Creek (2000-020, 2000-085, and 2000-220). Some illegal access to the road that parallels the power line occurs.

No Action Alternative

Under the no action alternative, the existing forage cover ratio within winter range areas would not change in the short term. Habitat would not improve and conditions on summer and winter range for mule deer would continue to decline as understory trees encroach into open stands and continue to reduce forage. Competition and subsequent stress to larger trees that currently provide overstory cover for smaller trees would continue to decrease the quality and longevity of good winter cover. Without adequate forage, this area would not provide suitable ungulate habitat and would not contribute toward meeting the Forest Plan objectives for big game population levels. The no action alternative would not affect existing open road densities or habitat security. Without thinning, a stand replacing fire in the watershed could eliminate overstory cover but would also create the conditions for a great flush of forage.

Proposed Action Alternative

The proposed activities would yield long-term improvements in conditions for mule deer by opening the stands and improving forage. About 70% of the big game winter range would experience disturbance as a result of the proposed project. The disturbance would take place over the course of several years. The proposed vegetation treatments would dramatically improve forage conditions, would decrease existing overstory cover by removing smaller trees, and would provide better overstory cover in the long-term. None of the treatments would remove large overstory trees, which provide good cover for big game in the winter because they intercept snow and keep the areas around the tree boles relatively snow-free. The most important short-term issue would be the loss of forage caused by the proposed prescribed fire. Prescribed fire would result in localized decline but not complete elimination of forage. However, improved forage conditions would be expected in these areas the following year.
Cumulative Effects
The cumulative effects area for summer and winter range consists of the Colville National Forest and surrounding area. Several projects within the cumulative effects analysis area by a variety of landowners have improved summer habitat conditions for mule deer. Over the past decade, the Colville National Forest alone has improved more than 10,000 acres of mule deer foraging habitat by opening stands and conducting prescribed fire. Since 1993, live trees larger than 21” in diameter have generally not been cut; these important larger-canopied trees provide good overstory cover. More than 1,000 acres of private industrial timberlands have had forage reduced by post-harvest herbicide treatments designed to eliminate shrubs (big game browse) competition with young trees.

The quantity and quality of ungulate winter range in northeast Washington in and around the Colville National Forest has been dramatically reduced from historical levels. Much of what was historically winter range is now in private or other ownerships. Many of these lower elevation areas have been converted to agricultural uses and may provide some winter forage, depending on land use, distance to suitable cover, and landowner tolerance. Settlement and the advent of various land management activities have resulted in roads that affect habitat security as well as the introduction of several noxious weed species that affect forage availability. Fire suppression over this same time period has contributed to a decline in the amount and distribution of forage and an increase in the amount of cover, which has been particularly detrimental to mule deer, which tend to inhabit more open conditions than white-tailed deer.

In the cumulative effects area, several recent timber sales and associated prescribed fire projects have occurred, both on National Forest System land and on land managed by Washington Department of Fish and Wildlife. All but one occurred in the wildland/urban interface, at lower elevations and primarily in warmer, drier environments. Projects on National Forest System land were planned using the concept of managing towards historical ranges of variability for different structural stages, which should maintain successional patterns and processes similar to those with which big game, primarily mule deer, evolved. Continued management under the concept of historic range of variability should benefit mule deer. Management on non-National Forest System lands usually must be done in accordance with Washington Forest Practices rules, which allows for heavy harvest. Management on the large tract of Washington Department of Fish and Wildlife land east and north of the planning area emphasized mule deer habitat. Non-National Forest System land primarily occurs at lower elevations in warmer, drier environments. In many of these non-National Forest System areas, successional stages are skewed towards younger stands, and young stands provide forage for big game. Except for closed-canopy stands in warmer, drier environments, the proposed activities on National Forest System land, when added to harvest that has already occurred, would not dramatically change the percentages of different successional stages across the cumulative effects analysis area, thus would not negatively affect big game. Closed-canopied stands within the wildland-urban interface have been opened by removing smaller understory trees, retained larger trees, and opened stands to conditions present historically. The amount of harvest in the wildland-urban interface has decreased the amount of closed-canopied stands, and proposed projects will continue to do so. This shift probably will benefit mule deer, and somewhat benefit elk, to the detriment of white-tailed deer and moose.
The viability of any of the big game species would not be negatively affected by the project.

*Yellow-billed cuckoo (Status: Threatened – Federal)*
The last confirmed breeding records of yellow-billed cuckoos in Washington State are from the 1930’s. In eastern Washington, about 10 have been observed since 1990, and a single bird appeared at the Little Pend Oreille National Wildlife Refuge in 2012, about 25 miles southeast of the project area boundary. Because systematic surveys have not been conducted, we cannot eliminate the very low probability that some might occupy the project area.

The habitat elements critical for yellow-billed cuckoo are nesting habitat and foraging/migrating habitat (Teachout 2015). Yellow-billed cuckoos nest almost exclusively in riparian woodlands 50 acres or larger that are dominated by cottonwoods and willows. Little is known about their foraging or migratory habitat requirements, though it appears that they use a wider variety of habitats than the habitat in which they nest, so maintaining a variety of habitats would meet their requirements.

**No Action Alternative**
The No Action alternative would not affect yellow-billed cuckoos or their habitat because it would not affect any components of their life history: riparian areas or foraging/migrating areas.

**Proposed Action Alternative**
In the proposed action, none of the riparian areas would be affected by harvest, and the little that would be affected by prescribed fire would not lose their large cottonwood trees, so nearly no potential nesting habitat would be affected.

Commercial and non-commercial timber harvest would be conducted in several areas. A result of these treatments is that habitat conditions would move towards those that occurred historically, so treatments should either benefit yellow-billed cuckoos or have minimal effects.

**Cumulative Effects**
The cumulative effects area consists of the lands on both sides of the Kettle Crest, bounded on the east by the Columbia River and the west by the Sanpoil or Kettle rivers. Prime nesting habitat in the valleys, the large riparian cottonwood galleries on non-NFS land, have been lost under Lake Roosevelt or have been reduced along the Sanpoil and Kettle rivers as trees senesce and die and recruitment of young trees does not occur. Recent projects on NFS lands have attempted to mimic natural processes and would result in habitat moving towards conditions that occurred historically.

The no action alternative would not affect yellow-billed cuckoos or their habitat, so it would not contribute to cumulative effects to this species.

The proposed project, which would not affect riparian areas and would negatively affect migrating/nesting habitat, would not contribute to cumulative effects to yellow-billed cuckoos.

Surveys for yellow-billed cuckoos have not been conducted, so they could occupy the project area, though the probability remains extremely low. The minimal positive effects to nesting habitat and the minimal effects to foraging/migrating habitat may affect but are not likely to adversely affect yellow-billed cuckoos or their habitat.
**Birds (Forest Plan Management Indicator and Region 6 Sensitive Species)**

A wide range of habitat elements is important to maintain a diversity of bird species. For some, management of these elements is dictated by standards and guidelines in the Forest Plan; for others it is derived from post-Forest-Plan Regional or National guidelines developed using the best available science. Effects to each habitat element are the crux of the analysis for these species. Because the Forest Service manages habitat and the State of Washington manages wildlife populations, the Forest objective is to provide habitat capable of supporting the desired population of Management Indicator and Region 6 Sensitive bird species.

Table 14. Potential effects to Forest Plan Management Indicator and Region 6 Sensitive Bird Species Habitat

<table>
<thead>
<tr>
<th>Bird Species</th>
<th>Habitat</th>
<th>No Action Alternative</th>
<th>Proposed Action Alternative</th>
<th>Cumulative Effects</th>
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</thead>
<tbody>
<tr>
<td>Pileated Woodpecker</td>
<td>Down logs, snags and large hollow trees</td>
<td>Slightly increase habitat quality in the short-term but decrease it in the long-term as large snags fall and few large trees remain on the landscape</td>
<td>Thinning would reduce but not eliminate large snags; prescribed fire slightly increases the number of snags; would not negatively affect the viability of piledated woodpeckers</td>
<td>No action alternative would not cumulatively affect populations; Proposed action would retain late structure stands and enhance younger stands toward late structure conditions. No negative cumulative effects to piledated woodpeckers.</td>
</tr>
<tr>
<td>American Three-toed Woodpecker</td>
<td>Old growth spruce-fir and lodgepole pine forests</td>
<td>Would not change American three-toed woodpecker’s use of the area; more snags would remain on the landscape which they could use for forage</td>
<td>In areas proposed for underburning, habitat quality would improve; in other areas of proposed thinning, habitat would decline in quality but would not be eliminated.</td>
<td>No action alternative would not cumulatively affect populations; Proposed action would retain late structure stands and enhance younger stands toward late structure conditions. No negative cumulative effects to American three-toed woodpeckers.</td>
</tr>
<tr>
<td>Bird Species</td>
<td>Habitat</td>
<td>No Action Alternative</td>
<td>Proposed Action Alternative</td>
<td>Cumulative Effects</td>
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<tr>
<td>White-headed Woodpecker</td>
<td>Open stands of mature and old growth ponderosa pine and mixed conifer forests</td>
<td>Would not reduce habitat but would increase the risk of large fires that could kill live trees decreasing foraging habitat</td>
<td>Promotes open stands and would increase the population as long as larger ponderosa pine snags are retained for nesting; may impact individual white-headed woodpeckers or their habitat but is not likely to result in a trend toward Federal listing or loss of viability.</td>
<td>The no action alternative would continue the downward trend of white-headed woodpecker habitat; The proposed action, when combined with other similar recent projects in the cumulative effects area should improve habitat conditions</td>
</tr>
<tr>
<td>Lewis’ Woodpecker</td>
<td>Open Ponderosa pine forests with brushy understories and snags for nesting; standing hardwoods and decaying coniferous trees</td>
<td>Would not improve habitat unless a large, landscape level fire occurred</td>
<td>Proposed activities would benefit Lewis’ woodpeckers if snags can be maintained;</td>
<td>The no action alternative would not result in improvements to habitat over the cumulative effects area; The proposed action would not cumulatively increase the amount of habitat</td>
</tr>
<tr>
<td>Great Gray Owl</td>
<td>Nesting: large trees with suitable nesting platforms; Foraging: meadows, pastures, marshes, lakes, and young clear cuts or in open forests</td>
<td>Would not affect potential nest sites or other habitat components in the short-term; Wildfire could result in a loss of habitat and a reduction in potential habitat for many years</td>
<td>Nesting habitat would remain intact; minimal improvement of foraging conditions; may impact individual great gray owls or their habitat but not likely to result in a trend toward Federal listing or loss of viability</td>
<td>No action alternative would not contribute to the long-term maintenance of potential habitat; Proposed action would not cumulatively reduce nesting habitat to the level where it would negatively affect great gray owls and would slightly increase the amount of foraging habitat</td>
</tr>
<tr>
<td>Spruce</td>
<td>Large young stands</td>
<td>No negative effect;</td>
<td>Enhances habitat</td>
<td>In general, FS</td>
</tr>
<tr>
<td>Bird Species</td>
<td>Habitat</td>
<td>No Action Alternative</td>
<td>Proposed Action Alternative</td>
<td>Cumulative Effects</td>
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<tr>
<td>(Franklin’s) Grouse</td>
<td>of lodgepole pine, spruce and subalpine fir</td>
<td>a stand replacing fire could result in a flush of young lodgepole pine which would improve habitat</td>
<td>in the long-term as openings created by disturbance would grow into young, dense stands of trees; short-term decline in some habitat</td>
<td>projects combined with the proposed action retain existing habitat or cumulatively affect very small amounts; the no action alternative would continue the downward trend of habitat quality</td>
</tr>
<tr>
<td>Barred Owl</td>
<td>Mature or old growth forests with high canopy closure</td>
<td>No effect</td>
<td>Would decrease the amount of nesting cover but the amount remaining would be adequate; decrease quality of foraging habitat</td>
<td>No action alternative would not cumulatively affect populations because no landscape would be altered; Proposed action would retain late structure stands and enhance younger stands toward late structure conditions. No negative cumulative effects to barred owl.</td>
</tr>
<tr>
<td>Dusky (Blue) Grouse</td>
<td>Summer nesting/brooding: open park-like stands generally above 2,500 feet</td>
<td>Would not improve habitat; a severe wildfire could remove nesting habitat in the short-term but improve habitat in the long term by opening stands</td>
<td>Improve habitat by opening closed stands or rejuvenating stagnant shrubs, grasses, and forbs in already open areas</td>
<td>No cumulative effects under the no action alternative; Proposed Action would have a positive cumulative effect to nesting habitat when combined with other FS projects</td>
</tr>
<tr>
<td>Dusky (Blue) Grouse</td>
<td>Winter roosting: Mature “limby” Douglas-fir or</td>
<td>No positive or negative effect</td>
<td>Large trees would be retained including</td>
<td>No action alternative would have a long-term</td>
</tr>
</tbody>
</table>

104
<table>
<thead>
<tr>
<th>Bird Species</th>
<th>Habitat</th>
<th>No Action Alternative</th>
<th>Proposed Action Alternative</th>
<th>Cumulative Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Raptors</td>
<td>subalpine fir trees near ridgetops</td>
<td>No immediate short-term impact on any known raptor nest or raptor habitat; long-term natural forest successional processes would continue to increase stem densities; insect/disease and/or wildfire could reduce habitat well below current levels</td>
<td>Would nearly eliminate or decrease habitat in some areas but sufficient habitat would remain in the project area to maintain the larger area’s use by these accipiters; most larger blocks of habitat and burned areas that will provide habitat within 20 years would not be affected.</td>
<td>No action would not contribute toward forest conditions that support raptors; Proposed action would contribute to a decrease in habitat (dense, mid-structural stage stands) but their viability would not be negatively affected by this project.</td>
</tr>
<tr>
<td>(Coopers &amp; Sharp-shinned hawks)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Raptors</td>
<td>Nesting: Dense sapling, pole and small tree stands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Goshawk)</td>
<td>Nesting: Mature tree stands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bird Species</td>
<td>Habitat</td>
<td>No Action Alternative</td>
<td>Proposed Action Alternative</td>
<td>Cumulative Effects</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Other Woodpeckers</td>
<td>Existing snags and green replacement trees; down logs</td>
<td>Would not result in the immediate loss of existing snags; would cause a faster loss of snags over the long term</td>
<td>Might displace but would not remove woodpeckers from the area; would enhance habitat by improving the longevity of existing snags; would retain large down wood; might result in the lowest levels of large snags in any project analyzed in the past 20 years on the east side of the Kettle Crest</td>
<td>No action alternative would not create a measurable positive or negative effect in the cumulative effects area; proposed action would add little to the cumulative negative effects of reduced snag levels because the existing levels are already so low; viability of other woodpeckers and species that depend on tree cavities would not be negatively affected by this project.</td>
</tr>
</tbody>
</table>

**Migratory Land Birds**

Migratory land birds were not selected as Management Indicator Species during the development of the Forest Plan. However, since that time, interest and concern over the status of several individual species, and migratory land birds as a group, has increased considerably because populations of several Neotropical migratory bird species have declined.

Long-term monitoring of migratory birds in the western U.S. indicates that the main area of concern related to forest management is habitat alteration or loss due to exotic species invasions and habitat alteration due to fire suppression.

Within the Sherman Pass Project area, the areas of concern would include wetlands, riparian areas, and areas with deciduous trees or large snags. Within coniferous forest habitats, areas with open stand conditions dominated by large trees are also important because this condition is more limited than other coniferous forest habitats.

Outside of riparian areas in the project area, no open-water wetlands exist. The project area does contain small and large stands of aspen and small stands of cottonwood, which are located along more moist habitats.
No Action Alternative
The no action alternative would not result in any management-induced changes to migratory land bird habitat conditions. Forest succession would continue. In the absence of other disturbances, more existing openings, riparian areas, and deciduous habitats would be expected to grow closed. The local population levels of birds requiring those more open habitats would decline. Opportunities to develop large tree habitat in the project area would not be realized. The project area would be more susceptible to stand-replacing fire, which would eliminate habitat for a wide variety of birds that depend on large, live trees.

Proposed Action Alternative
Timber harvest, prescribed fire and other activities associated with the Sherman Pass Project would affect several of the migratory birds that occur on or near the Colville National Forest. Activities affect each species differently and at different levels (individual, population, community, and landscape). Management activities create, enhance, or destroy habitat depending on the species considered. Impacts to migratory birds will be assessed on the project’s effect on overall habitat conditions within the project area. Generally, projects that improve riparian shrub and deciduous tree conditions or promote the future development of large trees would provide improved nesting and foraging opportunities for the land bird species of greatest concern (USDI Fish and Wildlife Service 2008). Proposed management activities have the potential to affect migratory land birds both positively and negatively.

The proposed activities affect a small amount of habitat relative to the overall ranges of the birds that use the environments that occur in the area. None of the proposed activities would substantially negatively or positively affect riparian areas. Nearly all the proposed treatments in areas experiencing mortality from pine beetles would move conditions in the watershed from the more closed, middle structural stands to a more diverse condition with openings and blocks of retained, untreated patches similar to what was on the landscape historically. The proposed activities would enhance habitat for species that depend on open stands of large trees.

Cumulative Effects
Within and adjacent to the Sherman Pass Project area, migratory land bird habitat conditions have been affected by a wide variety of management activities and natural processes. Fire suppression has reduced much of the habitat diversity that occurred across the project area. In the higher elevations of the project area and along the Kettle Crest, three medium-sized fires and one large fire have burned within the past 25 years. These burned areas provided a flush of snags for foraging, open conditions for nesting, and conditions that favor species that depend on early-successional habitat.

The no action alternative would not contribute to the long-term maintenance of diverse land bird habitats. The proposed action provides positive opportunities to restore under-represented habitat via thinning, maintenance of openings and shrub fields via prescribed fire, and promotion of healthier more resilient forest conditions across the planning area. The viability if neotropical migratory birds would not be negatively affected by this project.
Waterfowl
Waterfowl are not a Management Indicator Species under the Forest Plan. However, Forest Plan Standards and Guidelines provide management direction to insure their habitat needs are considered in project planning.

A few very small (< 1 acre) open-water wetlands exist in the project area, primarily along Sherman Highway (oxbow ponds created when highway construction straightened the creek and isolated sections of the creek). Broods of mallards and other puddle ducks have been recorded from those wetlands.

No Action Alternative
The no action alternative would not affect any wetlands or upland so would have no effect to waterfowl use of the project area.

Proposed Action Alternative
The proposed action would not affect any wetland area, so post-hatching areas would not be affected. Uplands in which waterfowl nest are proposed for both harvest and prescribed fire. Nesting starts early and eggs would have hatched by the time that thinning activities usually start (generally late June). Prescribed fire, often conducted during spring, has burned over nests in other projects and could affect nesting areas in this project. If a fire burns over a nest early into incubation, the hen often nests again. Timing of fire is an uncontrollable variable in this project, and some nests are expected to be lost. The number of nests lost would be less than five because fewer than five broods have been seen on the ponds. Though management activities might affect a year’s productivity, they would not affect long-term use of the project area by waterfowl.

Cumulative Effects
Because the no action alternative would not affect any wetland or upland and would have no effect to waterfowl use of the project area, it would not contribute to cumulative effects for this project. The proposed action would not affect wetlands, so would not contribute to cumulative effects to wetlands, but would affect nesting habitat. Fewer than five nests would probably be lost to project-related activities so the number lost would be a small fraction of those nesting in the cumulative effects area and would not affect viability of waterfowl.

Mammals (Forest Plan Management Indicator and Region 6 Sensitive Species)
A wide range of habitat elements are important to maintain a diverse mammalian fauna. For some, management of these elements is dictated by standards and guidelines in the Forest Plan; for others it is derived from post-Forest-Plan Regional or National guidelines that have been developed using the best available science. Because the Forest Service manages habitat and the State of Washington manages wildlife populations, the Forest objective is to provide habitat capable of supporting the desired population of Management Indicator Species and Region 6 Sensitive species.

Gray Wolf (Sensitive USFS Region 6 List)
The Forest Plan, written when wolves did not occupy the Forest, calls for wolf monitoring by recording location and determining validity of reported sightings. Wolves now occupy the Colville National Forest
and the Forest Service will manage habitat for them while the State of Washington manages their populations, records their locations, and determines the validity of reported sightings.

Within the northern Rocky Mountains, wolves depend on big game as a year-round food source. On a biomass basis, ungulates comprise more than 90% of wolves' diets.

Wolf denning sites in the northern Rocky Mountains are characteristically located on southerly aspects of moderately steep slopes in well-drained soils. The sites are usually within 0.25 miles of surface water and at an elevation overlooking surrounding low-lying areas. In some areas, wolf packs are sensitive to human disturbance near den sites and may abandon the den as a result of disturbance. However, recent studies and experience in other states suggests that wolves are more adaptable to human activities than previously thought.

At least one wolf pack containing radio-collared animals occupies parts of the project area south of Sherman Highway. People have also reported animals north of the highway, though it is not known if this is the same or another pack. Wolves have not been known to den in the project area, and the pack that occupies the area south of Sherman highway so far has denned south of the Colville National Forest boundary.

We examined current conditions within the National Forest System lands in the project area and cumulatively on all lands within several watersheds. Both contain fawning areas and summer and winter range for big game, thus provide prey for wolves the entire year. The entire project area supports summer range for big game.

The current forage conditions of summer and autumn habitat in the study area could improve primarily by opening some of the more closed canopy areas and stimulating forbs and browse through mechanical treatment or fire and secondarily by managing noxious weeds. Most of the area is not a livestock grazing allotment, so competition with livestock for forage is nearly non-existent.

An increase in noxious weed species and their distribution has also decreased forage palatability and availability, but the extent has not been measured. Noxious weeds constitute the greatest threat to herbaceous and grassy forage. New noxious weed species continue to invade from private land east and west of the project area and from the Sherman Highway corridor.

Habitat security within winter range areas is managed primarily by regulation of open road densities during winter months. To decrease road densities in winter range, we coordinate with Washington Department of Fish and Wildlife to close, with gates, all the main roads in winter range that access Sherman Highway: Trout Lake, Coyote Creek, and Lane Creek (Forest Service Roads 2000-020, 2000-085, and 2000-220). Some illegal access to the road that parallels the power line occurs.

Because recent information suggests that sensitivity to human disturbance may be less than previously thought, we did not detail potential habitat for denning or rendezvous sites. We did not find any denning or rendezvous sites during field reconnaissance and movements of collared wolves suggest that no dens or rendezvous sites occur in the project area.
No Action Alternative
The no action alternative would have no effect to wolves. Habitat would not improve, and conditions on summer and winter range for mule deer would continue to decline as understory trees encroached into open stands and continued to reduce forage. Without adequate forage, this area would not provide suitable ungulate habitat and would not contribute toward meeting the Forest Plan objective for deer population levels, and thus would not maintain a viable population of wolves. The no action alternative would not affect existing open road densities, habitat security, travel corridors, or hiding cover. Without thinning, a stand-replacing fire in the watershed could eliminate overstory cover but would also create the conditions for a tremendous flush of forage.

Proposed Action Alternative
The proposed action may impact but is not likely to lead in a trend towards federal listing or loss of viability for wolves. Wolves primarily prey on big game, so management for wolves involves providing big game as prey. Management actions in the proposed action would result in more browse and forage and a better distribution of cover and forage than currently exist and so improves the prey base for wolves. Additionally, we will retain at least 10% of each unit in an unthinned condition to maintain ungulate escape/hiding cover distributed throughout the units.

The proposed project would have no effect to opportunities for wolves to den or maintain rendezvous sites.

The use of those roads that would be re-opened and reconstructed would not negatively affect wolves because public motorized traffic would not occur on these roads. Though harvest activities would eventually be conducted along all the currently closed roads that would be opened, harvest would be concentrated in one area, and then move to the next. Therefore, sufficient seclusion habitat would remain so that wolves could still use the area.

The proposed prescribed fire, both in fire and harvest units, would improve forage quality for big game though there would be a decrease in quantity in the short-term. Excluding fire would contribute to a decline of forage quality over time because overstory trees compete with forage species for moisture and sunlight.

Cumulative Effects
The area considered for cumulative effects analysis consists of the mid and upper elevations of the Kettle Crest. More than 95% of this area is National Forest System land, so management on National Forest System land would influence wolf use of these areas. Wolves would use the areas at lower elevations on either side of the cumulative effects analysis area, too, because these areas also supply good habitat for big game.

There are two ongoing Forest Service projects (Kettle Face, just south of the project area and Walker, west and north of the project area) in the cumulative effects analysis area. Several other projects are in various stages of being planned (Orient, Deer-Jasper, Sanpoil), but many others have occurred in the past, including the recent Malo-Eastlake project to the west, the Deadman project to the north, the Bangs project to the southeast, and the Kettle Face project to the northeast. All these projects have been planned using criteria similar to the existing project, and all have contributed positively to
providing wild ungulate prey for wolves while maintaining sufficient denning sites and seclusion areas. The proof of this is the expanding wolf population in northeastern Washington.

The planned, completed, and currently implemented projects on National Forest System land in the cumulative effects area contained or contain units that improved conditions on both summer and winter range for big game, thus wolves. The proposed activities would improve conditions for big game and thus for wolves as well. The long-term result of harvest on non-National Forest Service land would improve cover quality but functions more to improve forage.

Across the cumulative effects area, especially in the mid and upper elevations to the west, fires in the 1910s and 1920s and subsequent logging initiated large tracts of dense stands that have matured and whose value as summer cover has peaked and continues to decrease as the stands age. In the very dense stands, or stands of lodgepole pine, dead trees that have fallen create impediments to deer movement as well as blocking sunlight from reaching the forest floor. Proposed harvest in this and other projects would decrease this marginal cover, increase forage, and move the cover and forage closer to the optimum level, thus improving summer range conditions for big game.

Road density has increased from activities on National Forest System and other lands and probably peaked on National Forest System lands in the early 2000s. Noxious weeds grow along most roads. Road construction into areas that are unroaded or have few roads has had and continues to have a negative effect to wild ungulate seclusion habitat.

Current projects on National Forest System land and timber harvest on non-National Forest System land does not preclude wolves from denning or maintaining rendezvous sites, as evidenced by their increase in distribution and abundance in northeastern Washington.

The proposed project will not result in a loss of core area habitat that would negatively affect wolf movement in the cumulative effects analysis area. At least four wolf packs travel the cumulative effects area, frequently in areas of managed stands. Considerably large amounts of core area exist in the cumulative effects area, especially at higher elevations. These blocks are not contiguous with forested habitat in Canada or the “Wedge”. Though these blocks are not connected to the block of core area in the “Wedge” because of the highway and human habitation in the lower elevations along the Kettle River, wolves do not consider these as impediments to movement. Evidence exists that the pack that occupied the western part of the “Wedge” also travelled on to the Kettle Crest, and two wolves from the Smackout pack between the Pend Oreille and Columbia Rivers crossed the Columbia and Kettle Rivers and travelled into Canada. Current and future projects that construct or reopen roads would reduce core area habitat for the length of the project, but would not preclude wolves from using an area.

Road building in conjunction with harvest activities on Washington Department of Natural Resources and private timber lands has caused a slight decrease in seclusion habitat on those lands. However, they occupy < 5% of the cumulative effects analysis area.

The no-action alternative would have no effect to wolves because it would not affect habitat elements necessary to maintaining wolves.
The proposed action would have a slight, temporal negative affect to core areas but would not cause a measurable, negative effect. The proposed action improves habitat conditions for big game, the primary prey of wolves. The proposed action would not affect denning or rendezvous sites. The proposed action “may impact gray wolves but is not likely to lead in a trend towards federal listing or loss of viability” for gray wolves or gray wolf habitat.

Canada Lynx (Status: Threatened – Federal)
Starting in 1991, along with the Washington Department of Wildlife (now Department of Fish and Wildlife), the Forest Service developed a primary lynx habitat map on the Colville National Forest (Washington Department of Wildlife 1993). In late 1999, the Colville National Forest refined this map and redefined Lynx Analysis Unit boundaries to better reflect areas that have the potential to support lynx habitat.

The Sherman Pass project area contains portions of the North Sherman and West Sherman Lynx Analysis Units. These Lynx Analysis Units lie just south of the core of where lynx densities were highest in northeast Washington during the 1970s, and they occur in the central part of the string of Lynx Analysis Units that hug both sides of the Kettle Crest. Together, these two Lynx Analysis Units cover more than 54.5 square miles. The Colville National Forest manages all land within both Lynx Analysis Units.

Unlike many Lynx Analysis Units in northeast Washington, the West Sherman Lynx Analysis Unit contains many young stands, primarily initiated in 1988 when the White Mountain fire opened the cones of lodgepole pine and set the stage for the current bonanza of foraging habitat. The North Sherman Lynx Analysis Unit contains large patches of older stands of lodgepole pine and/or western larch that were established during the Dollar Mountain fire in 1929 and which currently provide very poor lynx habitat because the stands do not provide much habitat for prey for lynx, though they usually do contain down wood for denning.

Within a Lynx Analysis Unit, we examine different aspects of lynx habitat:

- Non-lynx habitat within a Lynx Analysis Unit (permanent openings and drier environments);
- Connectivity habitat (habitat that allows lynx to move within and between Lynx Analysis Units);
- Unsuitable habitat (which could at some point support lynx habitat, but currently does not);
- Foraging habitat (habitat for snowshoe hare, red squirrel and other alternative prey);
- Denning habitat (areas with lots of down logs); and
- Human access (roads, trails, and snowmobile routes).

Table 15. Lynx habitat within the North Sherman and West Sherman Lynx Analysis Units in the Sherman Pass Project

<table>
<thead>
<tr>
<th>Lynx Habitat Type</th>
<th>Acres</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foraging</td>
<td>10,040</td>
<td>33%</td>
</tr>
<tr>
<td>Denning</td>
<td>8,290</td>
<td>28%</td>
</tr>
<tr>
<td>Denning/Poor Foraging</td>
<td>11,250</td>
<td>37%</td>
</tr>
</tbody>
</table>
Since the 1980s, lynx populations have plummeted and lynx have not been definitively confirmed from the area in the 2000s, though anecdotal sightings occur about every other year. In 2009, we initiated a lynx hair snagging survey, following National Lynx Detection Survey Protocol (McKelvey et al. 1999), to determine if a population of lynx remained in the Kettle Range. We completed the survey in late summer of 2011 and no lynx were detected. Therefore, the area does not have a sustaining, reproducing lynx population.

No Action Alternative
The no action alternative would, in the short term, have no effect to lynx because it would not affect connectivity habitat, foraging habitat, denning habitat, or human access. In the long run it would either decrease the amount of foraging habitat because of the lack of regeneration harvest or, because it could set the stage for a massive flush of forage habitat following a landscape-level fire due to buildup of flammable material, have a positive effect by regenerating dense stands of young lodgepole pine.

Proposed Action Alternative
In the proposed action, all or portions of 88 units would affect lynx habitat, primarily by reducing stem densities and creating openings. On the west side of the Kettle Crest, the proposed project would maintain nearly the entire north-south corridor. East of the Kettle Crest, proposed treatments in a few units would reduce the effectiveness of the corridors. Retention of untreated areas east of the Kettle Crest would retain sufficient cover for lynx to move through, particularly during summer. Units east of the Kettle Crest would have 10% of their area left in untreated condition to maintain understory lateral cover.

Cumulative Effects
The cumulative effects area consists of the Lynx Analysis Units on the Kettle Crest, which cover a total of about 199,000 acres.

In addition to this project, the Forest Service has harvested timber in several Lynx Analysis Units within the cumulative effects analysis area, most recently the Walker Fuels Reduction Project that lies west of the Kettle Crest immediately to the north of the Sherman Pass Project. The Sherman Pass Project proposes harvest in high-quality lynx foraging habitat to provide human safety and protection of structures, thus the project could adversely affect lynx. The amount of lynx foraging habitat affected by the proposed project, when combined with the recent Walker project, would affect less than 2% of the good foraging habitat initiated by the White Mountain Fire of 1988. This level would not adversely affect lynx or preclude them from using the area. The Deer-Jasper project along Boulder-Deer highway will start to be harvested within 2 years. That project included as its purpose and need improving lynx habitat. Nearly 30% of the cumulative effects analysis area has been designated as off-limits to timber management under the current Forest Plan. Harvest in this project, combined with past and foreseeable future projects, would not negatively affect lynx.
Large patches created by past fires have recently grown into and others will continue to grow into high-quality foraging habitat. The area affected by the White Mountain Fire in 1988, a small amount of which would be negatively affected by this project, provides excellent snowshoe hare habitat. Cattle graze within some forage stands and reduce forage available to snowshoe hare, thus reducing the quality of the foraging habitat, though the level of grazing is sufficiently low to preclude severe pruning. Aside from rare exceptions for human safety that affect small patches of foraging habitat, understory thinning would not occur in forage stands, which would retain their quality as foraging habitat.

The proposed project affects about 200 acres of foraging habitat by proposing fuels reduction treatment along Sherman highway to provide for human safety and protection of infrastructure in case of a large wildfire in that area. The total amount, combined with the amount affected by the Walker project, compared to the more than 10,000 acres of foraging habitat nearby, would not reduce foraging habitat to the level where lynx would be negatively affected.

This proposed action impacts less than 7% of the denning habitat in the project area, and negatively affects less. Along with projects in the past and foreseeable future, this project does not negatively affect denning habitat to where lynx would not den in the cumulative effects area.

Current and future projects would retain most existing corridors widths of at least 400 feet wide, thus should retain their utility to lynx. Again, most of the higher-elevation corridors would remain unharvested except for along major roads. Decreases in the quality of the north-south corridors along the Kettle Crest occurred along the Boulder-Deer highway in the Deer Jasper project, but not to the level where lynx would not travel through the area.

Nearly all current projects temporarily increase road density by opening currently closed roads and constructing temporary roads. These roads probably would not negatively affect lynx movements during the period in which they are open (Interagency Lynx Biology Team 2013). They might negatively affect lynx because noxious weeds would follow the soil disturbed along the road corridors and cause loss of snowshoe hare habitat. Most of the noxious weed species that currently infest the area do not grow well in the cooler, moister habitats that lynx occupy. Though the loss of habitat due to noxious weeds would occur, the extent of the effects on snowshoe hare, thus lynx, is not known.

**Summary**
The no action alternative would have “no effect” to lynx.

Though fuels treatment units along Sherman highway are proposed in good foraging habitat, the amount is extremely small both when considering the amount of foraging habitat in the project area and cumulative effects area. The proposed action "may affect but is not likely to adversely affect" lynx because the project has been planned using the best available science (Ruggiero et al 1999). Informal consultation with the United States Fish and Wildlife Service will be conducted.

**Wolverine (Status: Sensitive USFS Region 6 List and proposed for listing under Endangered Species Act)**
Wolverines are rare in northeastern Washington, but both confirmed and unconfirmed sightings have been reported from a few areas on or near the Colville National Forest. One wolverine was documented...
near the Kettle River, south of Danville, about 7 miles north of the project area, in 2005 (Pilgrim and Schwartz 2006). A wolverine was photographed in the Wedge in February of 2012, about 30 miles northeast of the project area. About 15 miles north of the project area boundary, 2 run-pole and 2 hair-pole sets were set for wolverine during the winters of 2010/2011, 2011/2012 and 2014/2015 but have not documented any animals.

Because of the wolverine’s large territorial requirements, the Sherman Pass Project area provides wolverine habitat, including a small amount of denning habitat on the north slope of Sherman Peak. This area receives a relatively high backcountry winter use and reports of denning wolverines have not come from these areas.

No Action Alternative
The project area contains a diversity of tree sizes and ages, though not in the percentages that occurred historically. The no action alternative would not change the condition of the successional stages. While the no action alternative would not negatively affect wolverine, it would not improve conditions for wolverine feeding habitat.

The no action alternative would not affect travel corridors.

The no action alternative does not begin to move cover in winter range of wolverine prey species to a more desirable condition. It keeps the project area at greater risk for large-scale disturbances that could negatively affect prey by eliminating cover availability for many years. The no action alternative would continue the overall decline in forage quality and quantity for prey species as the forest matures and closes.

Proposed Action Alternative
The proposed management activities would open stands to create more early successional conditions, open stands in dry environments, and allow some stands to develop larger structure more rapidly than without management by reducing tree competition for light and moisture. The proposed post-management conditions are those under which wolverines evolved, and the proposed project would not negatively affect wolverine or their movements.

The proposed action alternative would not affect travel corridors. No new system roads are proposed and the proposed temporary roads do not affect corridors and would not preclude wolverine from using the area. Harvest would not result in corridors being so restricted that wolverines would not use them.

The proposed treatments would result in more browse and forage and a better distribution of cover and forage for wolverine prey species. Proposed treatments would open stands, reduce competition from young trees, retain older and larger trees on the landscape, and promote browse and forage. None of the treatments are designed to remove large overstory trees. Though the proposed action would result in some loss of cover, management activities in winter range would not create large openings that deer tend to avoid because of deep snow. In both summer and winter range areas, prescribed fire would open the understory as well as regenerate and improve forage.
Cumulative Effects
The area considered for cumulative effects analysis consists of the Kettle Range south of the Canadian border. Several projects have occurred on National Forest System and non-National Forest System land in the past two decades, most of which have included timber harvest. Planned and completed projects will affect or have affected wolverine habitat though none have affected denning habitat. Activities (timber harvest, prescribed fire) have modified habitat and increased both road densities and human presence. Wolverines still occasionally move through the area (Pilgrim and Schwartz 2006).

No Action Alternative
The no action alternative would not contribute to cumulative effects to wolverine because the no action alternative does not affect wolverine.

Proposed Action Alternative
Several recent timber sales and associated prescribed fire projects occurred within the cumulative effects area. All but two occurred in the lower elevations and primarily in warmer, drier environments. Wolverine, generally, do not occupy the warmer, drier environments. We planned all these projects using the concept of managing towards historical ranges of variability for different structural stages, which should maintain successional patterns and processes similar to those with which wolverine evolved.

In many of the non-National Forest System land areas, successional stages are skewed towards younger stands. Young stands provide forage for big game, one of the primary prey items of wolverine. Except for closed-canopy stands in warmer, drier environments, the proposed activities on National Forest System lands, when added to harvest that has already occurred, would not dramatically change the percentages of different successional stages across the cumulative effects analysis area, thus would not negatively affect wolverines.

On National Forest System land, most corridors along the creeks remain forested. Along the Kettle Crest, wolverines traveling along any corridor would meet little ground that was opened by human activity. The Forest Service adopted guidelines to maintain corridors to connect late and old structural stands. All current and future projects will retain these corridors. The Forest Service does not have guidelines to maintain cover on major ridges and saddles. Harvest on major ridges and saddles would restrict movement but sufficient cover remains in riparian areas and on the more dense slopes to provide cover for wolverine. Because most of the better wolverine habitat in the Kettle Crest lies at higher elevations and nearly all of this land is National Forest Service land, sufficient habitat remains in the cumulative effects analysis area to allow wolverine to move through the area. The proposed action would not negatively affect travel corridors in the cumulative effects analysis area.

The Bangs, Kettle Face, and Deadman projects on the east side of the Kettle Crest and the Malo Eastlake and Walker Fuels Reduction projects on the west side were recently or are currently being implemented on National Forest System land and contained elements that improved conditions for big game, thus
wolverine. This trend would continue with future projects, including the early-in-planning Sanpoil project on the west side of the Kettle Crest, and the East Deer Creek proposed project on the east side.

Noxious weeds have severely impacted big game habitat throughout the West, whether or not harvest activity has taken place, which decreases and in many cases offsets the improved forage conditions that result from opening the canopy. Ferry County maintains an aggressive weed control program that attempts to stop the spread of noxious weeds, with mixed results due to the scope and magnitude of the issue. Along road corridors in the project area, the Forest Service would spray treat for noxious weeds, which might limit but would not entirely prevent their spread.

Current and future projects that construct, reconstruct, or reopen roads would reduce seclusion habitat for the portion of time that the project remains active. The Forest Plan requires that new roads be closed at the end of harvest activities, so the most severe negative effects should be limited to the time during which the roads remain open to vehicle traffic. Closed roads reduce disturbance from humans and improve seclusion habitat, but road closures are not completely effective. Roads built into seclusion habitat would influence human access until the road prism becomes too difficult to navigate.

The few potential natal denning areas that occur in the cumulative effects area lie at high elevations and are protected from motorized disturbance. Because this project does not affect denning habitat, it would not contribute to cumulative effects to potential denning areas.

Because potential habitat would be affected, though the existing habitat quality is marginal, the proposed action “may affect” individual wolverine, but “will not lead in a trend towards federal listing or loss of viability.”

**Beaver (Forest Plan Management Indicator Species)**

On the Kettle Crest, beaver periodically occupy most low-gradient streams that feed the Kettle and Columbia Rivers, flooding areas and creating habitat, eating most of the palatable forage, and then dispersing to other locations. The palatable trees and shrubs recover, the dams often degrade and blow out, the area becomes habitable again for beavers, and an immigrating beaver restarts the cycle.

Beaver sign is present on all low-gradient sections of major streams of the project area, though beaver do not currently occupy all sections. Beaver trapping has become more common as fur prices rise and the beavers along Sherman Creek are susceptible to trapping because they are easy to access.

Though beaver inhabit many stream sections, habitat is poor along most of the streams primarily because no large-scale disturbance has created conditions favorable to regeneration of aspen and cottonwood.

**No Action Alternative**
The no action alternative would not allow removal of conifers in areas of aspen or cottonwood and would not create any disturbance, so would not set the stage for maintenance or regeneration of these hardwoods that are beneficial to beavers.
Proposed Action Alternative
The proposed project would have a very small, positive effect to beaver habitat in some of the riparian units but probably would not result in a measurable change in the beaver population. Harvest would retain aspen and cottonwood greater than 10” in diameter. Prescribed fires would affect some of the area, which might stimulate some growth of either cottonwood or aspen.

Cumulative Effects
The no action alternative would not affect beaver or beaver habitat but would allow succession to proceed, which eventually would cause most early-successional hardwood species on which beaver depend to be replaced by conifers, which would decrease beaver habitat quality.

The proposed action would not contribute to cumulative effects to beaver because it has little positive and no negative effects to beaver or beaver habitat. The viability of beavers would not be affected by this project (Youkey, 2012).

American Marten (Forest Plan Management Indicator Species)
American marten are strongly associated with dense stands of older trees in colder, high-elevation habitats with abundant snags and down wood. Cavities in large trees and down logs provide natal and maternal den sites and resting sites. The Forest Service defines potential American marten habitat as areas in colder environments with dense stands of larger trees.

In the project area, marten do not occur in much of the available habitat, possibly because much of the habitat consists of drier, harsher environments that do not provide the tree size classes or support the habitat heterogeneity that marten require. Most marten tracks have been recorded from older stands adjacent to the 1988 White Mountain fire, though this is a result of most winter human traffic (backcountry skiing) being in that area.

Nearly 18,000 acres, or slightly more than half of the project area consists of cooler or colder biophysical environments that could or do support marten habitat. The large fires that swept through the west in the early part of the last century destroyed large patches of American marten habitat, including swaths on the Kettle Crest with fingers into the Sherman project area. Since then, harvest of the large, remaining overstory trees in the mid elevations also negatively affected American marten habitat by removing large trees and snags that American marten use for feeding and reproducing. Additionally, snags created during those fires have mostly fallen or were harvested shortly afterwards, so these important elements of American marten habitat are rare or absent over large areas. However, forested stands have grown more closed and the trees larger, and currently much of the area burned in the early 1900s provides functional marten habitat, though remain low in both den trees and down wood.

Nearly half of potential habitat is of marginal quality, primarily consisting of stands of smaller trees established during the fires of the previous century. Down wood in these stands varies greatly, and few large snags exist.

No Action Alternative
In the short term, the no action alternative would not affect American marten positively or negatively. In the long term, existing successional processes would continue and more of the single-story stands
dominated by lodgepole pine would mature, die, and fall over, and in many places be replaced by spruce and subalpine fir. Once these stands grew to maturity, they would provide American marten habitat.

The no action alternative does not propose any harvest, prescribed fire or other management, so in the short-term would not affect travel corridors. In the long-term, lack of prescribed fire and thinning would increase the potential for a landscape-level fire, which would dramatically decrease or eliminate cover over a large area.

**Proposed Action Alternative**

Proposed management activities would affect about 17% of the adequate American marten habitat in the project area. The larger down woody material that marten use for hunting and for cover would remain on site. Additionally, riparian areas along which marten travel would remain intact.

Thinning along the Sherman highway would dramatically open the stands when the dead lodgepole pine is removed. Effects from commercial harvest would mostly be short-term because closed stands are being opened, and marten generally avoid openings. The proposed commercial harvests lie at the edge of areas both in the watershed and on the Kettle Crest that support marten habitat, which decreases but does not eliminate the negative effects to marten because of the large amount of American marten habitat being proposed for harvest.

Nearly all proposed harvest would retain various-sized patches of unharvested trees, which would decrease the medium-term negative effects to American marten by providing islands of habitat in the matrix of young stands. Additionally, in the medium-term, lodgepole pine, spruce and subalpine fir that grow in the openings will begin to provide snowshoe hare habitat within a few decades, and because American marten eat snowshoe hares, the areas proposed for harvest could again support low-quality American marten habitat within a few decades.

The proposed project would not eliminate marten from the project area or threaten their viability on the Kettle Crest. Sufficient habitat would remain in the unroaded area within the project area boundary, which is contiguous with marten habitat on the rest of the Kettle Crest. In addition, riparian areas and other corridors would retain sufficient habitat so that marten could move through them.

Under the proposed action, cover that serves to hide marten would be reduced over large areas along Sherman Highway and in the habitat around Fritz Creek. The riparian corridor along Pass Creek would also lose some cover where Forest Service Road 2020-000 intersects it. Within a few years after harvest, the combination of regrowth and remaining down woody material would provide sufficient cover to allow marten to move across portions of the proposed harvest units along Pass Creek and Sherman highway during spring, summer and autumn, but aside from untreated dense habitat along the riparian stringers, the areas would remain too open for marten to move through during the snows of winter.

**Cumulative Effects**

The cumulative effects area for the American marten consists of the Colville National Forest.

In the short-term, the no action alternative does not negatively affect populations of American marten because no landscape would be altered. In the longer term, no action would provide better habitat for American marten than the proposed action by allowing succession to move smaller-diameter trees to
grow into larger trees and shade-tolerant trees to replace early successional species (both of which produce better American marten habitat).

Several projects have recently been planned or are being implemented in the cumulative effects area. None of the existing and ongoing projects, nor any of the planned projects, proposes activities that would negatively affect the persistence of American marten in each of the project areas, so no cumulative effects would negatively affect the viability of American marten (Youkey, 2012).

Pacific Western (Townsend’s) Big-eared Bat (Sensitive USFS Region 6 List)
Pacific western big-eared bats may occupy almost any type of habitat, from grasslands to mixed conifer forest. This bat roosts and hibernates in caves or mine shafts but may also use cavities in large trees or snags (Ormsbee et al. 1998, Perkins 1995, Perkins 1990). Maternity colony sites are less well understood but require warmer conditions. These sites have primarily been found in human-built structures or small caves in boulder fields or cracks in cliffs (Reid et al. 2010). Mines in this area are too cool to provide maternity sites.

No mines occur in the project area boundary. No human-built structures, cliffs, boulder fields, or caves occur within the project area so no maternity colonies are expected to occur. Many snags occur throughout the project area, and big-eared bats could use them as day roost sites. Canopies in most environments are fairly closed, though areas of warm, dry conditions in which big-eared bats would pursue their prey do exist, primarily at the lower elevations on the east side of the project area.

No Action and Proposed Action Alternatives
No habitat for hibernacula or maternity colonies exists so there would be no effect to these primary requirements of big-eared bats by the proposed project or the no action alternative.

During harvest, all snags over 16” are targeted for retention. At times, snags would be felled for safety reasons during logging operations. However, sufficient snags would remain to provide day-roosting habitat for big-eared bats.

Harvest would open stands and improve foraging conditions for Townsend’s big-eared bats.

Cumulative Effects
The area considered for cumulative effects analysis consists of the Kettle Crest. Planned projects and treatments on other ownerships within the Forest boundary could contribute to cumulative effects to Townsend’s big-eared bats because private landowners are not required to manage for these bats and old buildings can be modified or destroyed. Most cliff faces and large boulder fields on the west side of the Kettle Crest lie on National Forest System land and few if any management activities take place on or near them.

The no action alternative would not contribute to cumulative effects to Townsend’s big-eared bats because the no action alternative would not affect them.

The proposed action would have a slight positive effect because dense stands would be opened which slightly improves foraging conditions for these bats.
Forest Service timber treatments in this and other projects would not negatively contribute to cumulative effects to either hibernacula or maternity sites because we buffer maternity colonies and conduct prescribed fire and timber projects near mines outside the hibernation period. Illegal use of historical structures that support Townsend’s big-eared bats could cause disturbance of roost sites and maternity sites during summer and hibernacula during late autumn and winter. However, few recreationists or miners explore mines during winter, and on National Forest System lands, most mines used by bats are closed by bat-friendly closures.

The no action alternative is expected to have “no impact” to Townsend’s big-eared bats. Because these bats have been documented north of the project area during the summer and northeast of it during the winter, they likely occupy the project area. The proposed activities “may impact” individual Townsend’s big-eared bats but are “not likely to result in a trend toward Federal listing or loss of viability”.

**Invertebrates (USFS Region 6 Sensitive List)**
Several invertebrate species (butterflies, slugs, and snails) are on the Region 6 sensitive species list. Because adult butterflies fly, habitat fragmentation due to roads is not an issue. Direct mortality from vehicles probably is not an issue because adults do not feed on roads, and vehicle speeds on forest roads are generally low.

The proposed activities “may affect” individual Rosner’s Hairstreak, Eastern Tailed Blue, Tawny-edged Skippers, Peck’s Skippers, Fir Pinwheel, or Magnum Mantleslugs but are not likely to lead in a trend towards federal listing or loss of viability.

**Table 16. Potential effects to Region 6 Sensitive Invertebrate Species Habitat**

<table>
<thead>
<tr>
<th>Invertebrate Species</th>
<th>Habitat</th>
<th>No Action Alternative</th>
<th>Proposed Action Alternative</th>
<th>Cumulative Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meadow Fritillary</td>
<td>High elevation meadows and openings in aspen and pine forests; feeds on <em>Viola canadensis</em></td>
<td>No positive or negative effect</td>
<td>Treatments would improve potential habitat; no negative effect.</td>
<td>The no action would not contribute to cumulative effects; the proposed action would have a minor positive cumulative effect.</td>
</tr>
<tr>
<td>Rosner’s Hairstreak</td>
<td>Brood-rearing habitat is Western red cedar forests; Nectary species is <em>Antennaria</em> and <em>Senecio</em> species</td>
<td>No positive or negative effect</td>
<td>Treatments would result in more nectaring flowers and retain large cedars</td>
<td>The no action does not contribute to cumulative effects; the cumulative effects under the proposed action would slightly improve both rearing and</td>
</tr>
<tr>
<td>Invertebrate Species</td>
<td>Habitat</td>
<td>No Action Alternative</td>
<td>Proposed Action Alternative</td>
<td>Cumulative Effects</td>
</tr>
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</tr>
<tr>
<td>Eastern Tailed Blue</td>
<td>Open, brushy to lightly wooded, dry habitats and weedy areas</td>
<td>No positive or negative effect</td>
<td>Slightly improve habitat because conditions created would favor their host plants</td>
<td>The no action does not contribute to cumulative effects; the cumulative effects under the proposed action would slightly improve habitat</td>
</tr>
<tr>
<td>Peck’s and Tawny-edged Skipper</td>
<td>Moister areas at high elevations such as pond and marsh meadows and stream margins</td>
<td>No positive or negative effect</td>
<td>Proposed project would not negatively affect either species; would marginally enhance some habitat</td>
<td>No action alternative does not contribute to cumulative effects; Proposed project would not contribute to negative impacts in the cumulative effects area</td>
</tr>
<tr>
<td>Fir Pinwheel</td>
<td>Riparian forests in or near talus or under fallen logs</td>
<td>No positive or negative effect</td>
<td>Some ground disturbing activity and prescribed fire could occur in riparian areas; loss of habitat would be negligible</td>
<td>The no action and proposed action would not contribute to cumulative negative effects for this species</td>
</tr>
<tr>
<td>Magnum Mantleslug</td>
<td>Rock talus, deep leaf and needle duff, large woody debris in association with water sources</td>
<td>No positive or negative effect</td>
<td>Activities have a very low chance of negatively affecting individuals</td>
<td>The no action and proposed action would not contribute to cumulative negative effects for this species</td>
</tr>
</tbody>
</table>
Sensitive Plants
The following section is excerpted from the Sensitive Plant Species Biological Evaluation for Sherman Pass Project (Ahlenslager, 2014). The full biological evaluation is available in the project file.

Existing Conditions, Direct and Indirect Effects

Existing Condition
No federally listed threatened or endangered plants or plants proposed for federal listing are known to occur in the Sherman Pass analysis area (USDI FWS 2007, 2009, and 2011). Fifty-four vascular and non-vascular plant species listed on the Regional Forester’s Special Status Species List (2011) are documented or suspected for the Colville National Forest. One sensitive plant species is known from the project area, strict blue-eyed grass (Sisyrinchium montanum). Two other sensitive plant species occur within two miles of the project area: crenulate moonwort, (Botrychium crenulatum) and western moonwort (B. hesperium).

During the pre-field review, species that normally occur well below the elevation range of the project area or those where typical habitat is not present are omitted from further analysis. Field reconnaissance is limited to areas within, adjacent to, or near the project area where proposed ground disturbing activities may affect sensitive plant species. Intuitive-controlled sensitive plant surveys were conducted in 2012 and 2013. The intuitive-controlled method first involves walking through the project area and the perimeter of the potential habitat. Next, the surveyor conducts a complete examination of specific areas of the project or walks more than once through the area. A map showing areas surveyed is on file at the Supervisor’s Office. Sensitive plant surveys and documentation were conducted according to established protocols.

The Colville National Forest is mandated to protect species viability for plants listed on the 2011 Final Region 6 Regional Forester Special Status Species List. Botanical surveys on National Forest system lands are conducted for sensitive species documented or suspected to occur in planning areas with suitable habitat.

No Action Alternative
Under the no action alternative, current management plans would continue to guide management of the project area (USDA FS 2014a). No fuels management, tree removal, or prescribed burning would be implemented to address the purpose and need. Natural processes would continue to dominate.

On-going activities such as fire prevention and suppression, dispersed recreation, mining, road maintenance, noxious weed treatments, and established special use permits would continue. No new activities would be initiated to accomplish proposed project goals. Changes in stand condition and/or progression toward old-growth conditions would be slow. The risk of losing much of this area to stand-replacing wildfire would increase over time. The no action alternative may impact individual sensitive plants, but is not likely to result in a trend to federal listing or loss of viability of any sensitive plant species.
Proposed Action Alternative

This alternative includes thinning of small to intermediate trees and the treatment of surface fuels. Under the proposed action alternative, timber harvest and prescribed fire would be used as tools to reduce fuel loads. Shrubs, dense clumps of regeneration and smaller fuels would be targeted for removal with the proposed fuel treatments. This alternative is designed to promote and restore single-storied open stand conditions. The one known sensitive plant occurs in treatment units 82 and 78 and is adjacent to a proposed temporary road segment.

Invasive plants would be treated prior to ground disturbing activities such as timber harvest, fuel treatments, and road activities. If the design elements proposed for invasive plant control for this project area are implemented, then the proposed vegetation treatments and other activities should not increase invasive plant distribution and so not affect sensitive plant populations.

Although Whitebark pine is not known from the project area, it may occur in it along the higher elevations of the Kettle Range in the Profanity Potential Wilderness Area. No treatments are proposed within the Profanity Potential Wilderness Area, so no impact is expected. There will be no thinning of competing lodgepole pine saplings to reduce densities and the potential for bark beetle infestation (Rourke 2014).

The proposed action may impact individual sensitive plants, but is not likely to result in a trend to federal listing or loss of viability of any sensitive plant (vascular or nonvascular) species.

Cumulative Effects

No Action Alternative

Forest Service activities that overlapped in time or space in the vicinity of this project were considered when analyzing cumulative effects, as well as recommending design elements. Since there are no activities proposed in the no action alternative, there would be no cumulative effects to sensitive plant populations or their habitats.

Proposed Action Alternative

The effects of Forest Service activities proposed in the action alternative combined with past, ongoing and reasonably foreseeable activities in the project area, could negatively affect sensitive plant species over their ranges. The spread of invasive plants and soil compaction caused by past timber harvest activities and grazing, when combined with the proposed action, could cause negative effects to sensitive plant habitat and sensitive plants. These factors could result in degraded habitat poorly suited or no longer ecologically capable of supporting sustainable populations of species of interest. Design elements to reduce the potential for weed spread and soil compaction are included in the action alternative.

With the addition of the design elements, including those that protect RHCA, no negative effects are anticipated from the proposed action alternative and therefore no cumulative effects are anticipated.
Fisheries
This section is excerpted from the Fisheries Biological Evaluation/Management Indicator Species Report (for the Sherman Pass Project (Honeycutt, 2015). The full report is available in the project file.

Existing Conditions, Direct and Indirect Effects

Riparian Management Objectives
The Inland Native Fish Strategy (USDA Forest Service 1995) amended the Forest Plan to increase protection of native fish and their habitats. The four Inland Native Fish Strategy Riparian Management Objectives (temperature, large woody debris, width depth ratio, and pools per mile) are used to assess the health of the riparian systems and provide for the minimum needed for good fisheries habitat. The Inland Native Fish Strategy applies to all water bodies regardless of whether or not they have fish. However, because the Riparian Management Objectives are most relevant in fish bearing streams, formal surveys were only done in fish bearing streams. For non-fish bearing streams, ponds, and wetlands, a qualitative assessment was made by a hydrologist or fish biologist.

Temperature
Trout are very sensitive to temperature increases. The Riparian Management Objective is for no measurable increase in the maximum water temperature. Maximum water temperatures should fall below 15 degrees Celsius within adult holding habitat and below 9 degrees Celsius within spawning and rearing habitats. The Colville National Forest uses the Washington State standard of a maximum 7-day average of less than 16 degrees Celsius. Project activities that may increase stream temperatures include any activities that remove vegetative cover along the stream.

Large Woody Debris
Large woody debris is an important habitat and structural component for streams. The Riparian Management Objective is for greater than 20 pieces of large woody debris per mile. Each piece should be greater than 12” in diameter and greater than 35 feet in length. Project activities that may reduce large woody debris include any activities that remove vegetative cover along the stream. Roads near riparian areas reduce the amount of wood available for large woody debris recruitment. Trees that fall across the roads are quickly cut up to clear the road for traffic. Roads also provide access for firewood gathering.

Width Depth Ratio
Width Depth Ratio is a measure of bank stability and natural channel morphology. It is important in providing habitat for inland native fish. The Riparian Management Objective is for mean wetted width/mean wetted depth less than 10. A site-specific analysis was done using the Colville National Forest Stream survey data and a bankfull width depth of less than 13 was chosen to replace the wetted width to depth ratio. Project activities that may remove bank cover leading to bank erosion include those that remove vegetative cover along the stream. Erosion from roads and under sized culverts may lead to excessive sediment in streams, which can cause over-widening.
Pools per Mile
Pools are an important component of fish habitat and are often the limiting factor in a trout stream. Pools are used for overwintering, cover, and rearing habitat. The Riparian Management Objective is for greater than 56 pools per mile for streams less than 20 feet wide or greater than 26 pools per mile for streams 50 feet wide. However, a site-specific analysis was done using the Forest’s stream inventory data. Twenty-five pools per mile was determined to be a valid riparian management objective. Project activities that may reduce pools per mile include the same activities that affect large woody debris and width depth ratios. Large woody debris often creates pools. As a stream widens or down cuts, pools can fill in or vanish completely.

Existing Condition
Inland Native Fish
Fisheries in the analysis area include trout fisheries on 11 main streams that feed into Sherman Creek and one stream that feeds into O’Brien Creek. The fish bearing streams in the analysis area are Canyon Creek, Lane Creek, Milk Creek, Fritz Creek, Hart Creek, McGahee Creek, Pass Creek, South Fork Pass Creek, Sherman Creek, North Fork Sherman Creek, Trout Creek, South Fork O’Brien Creek and an unnamed tributary in T36N, R35E, Section 8. Streams in the analysis area contain populations of Eastern Brook Trout, Redband Rainbow Trout, and Westslope Cutthroat Trout.

Regionally, most native salmonid numbers and distributions are lower than historic levels. This decline is due to dam construction and operation, water diversions, introduction of non-native fish species, the over-harvest of fish, and habitat degradation.

Habitat for Bull Trout, Westslope Cutthroat Trout, and Redband Rainbow Trout will be protected through implementation of the Inland Native Fish Strategy standards and guidelines.

Wetlands
There are 243 acres of wetlands within the analysis area. These wetlands include emergent, forested, and shrub wetlands. Wetlands are specialized habitats that provide a source of biodiversity because they often support unusual species of flora and fauna. They also moderate both high and low flows due to their ability to absorb and store water. When wetlands are also located in association with streams, they may exert a strong control on surface water quality. Because of their high moisture content, wetland soils are very sensitive to soil displacement and rutting as well as changes in the groundwater regime that may be induced by removal of the adjacent vegetation. Executive Order 11988 and Executive Order 11990 require protection of floodplains and wetlands, respectively. Through the implementation of the design elements and Best Management Practices, wetlands would be protected under the proposed action.

Roads
The main road of concern in the watershed is Highway 20 along Sherman Creek. This road is within the RHCA of Sherman Creek for a majority of its length, restricting large woody debris recruitment, reducing shading and litter-fall and contributing sediment from the highway. County Road 99 runs along the RHCA of South Fork O’Brien Creek and restricts recruitment of large woody debris. Bangs Mountain
Road (Forest Service Road 2000-136) has mass wasting issues and is contributing sediment into Canyon Creek. Lane Creek Road (Forest Service Road 2000-220) is also in the riparian zone of Lane Creek and is contributing sediment to the stream. Fritz Creek Road (Forest Service Road 2000-400) lies within the riparian zone of Fritz Creek and contributes sediment to the stream.

**No Action Alternative**

The effects of not treating the project area depend on whether or not a large wildfire occurs. The effect of a large and severe wildfire in these watersheds is uncertain and depends largely on subsequent winter storm events. When a large fire burns through a riparian stand, it makes the stream system less resilient when subjected to extreme climatic events. The stream may not be able to fully support fish populations. Adequate refugia must be present to ensure recolonization after major events such as a debris flow.

When severe fires remove large woody debris and vegetation in the riparian zones, stream velocities increase, stream bank stability decreases, pool habitat is limited, and stream temperatures increase because of reduced streamside shading (Minshall and Brock 1991). In contrast, low severity fire kills few overstory trees and has minimal effects on below ground plant structures, litter layers, and watershed conditions. The vegetation remaining after moderate- and low-intensity fire buffers against post-fire changes and facilitates watershed recovery (Wagenbrenner et al. 2006).

**Temperature**

The prediction is that in the event of a wildfire, temperatures would increase. Riparian areas can act as buffers against fire and therefore protect stream temperatures from the short-term direct effects of the heat generated by a fire. However, under severe fire conditions and high fuel accumulation, riparian areas may become corridors for fire movement (Pettit and Naiman 2007) and the resulting loss of riparian vegetation and riparian canopy cover can lead to increased solar radiation, which likely plays a larger role in warming stream temperatures (Brown 1969; Johnson and Jones 2000; Johnson 2004; Caissie 2006). Water temperatures can define diversity and distribution of aquatic organisms (Minshall et al. 1989; Taniguchi and Nakano 2000; Pilliod et al. 2003) and because the distribution of trout is highly dependent on stream temperatures, fire-related increases in stream temperatures could have negative impacts on some populations. Additionally, elevated water temperature can delay or prevent spawning, egg development, and rearing for salmonids (Bjornn and Reiser 1991).

**Large Woody Debris**

Large woody debris would remain below the Inland Native Fish Strategy large woody debris objective. The lodgepole stands along Sherman Creek would not be treated. These stands would not attain diameters to meet the Riparian Management Objective for large woody debris. The removal of trees along the Sherman Pass Highway reduces the contributing area for large woody debris. Trees that fall on the road would continue to be cut as part of the road maintenance. A large stand replacing fire, however, has the potential to add large amounts of large woody debris to a stream system. In addition, beavers are very active in this watershed and would continue to build large dam systems.
Width Depth Ratio
The width to depth ratio is at risk from the existing road system. Several of the stream crossings with culverts are considered to be functioning at risk, not properly functioning (high failure potential or currently failing), or fish passage barrier points. If a failure occurs, it could negatively affect width to depth ratios. Sedimentation from roads can fill channels and reduce the stream depths making streams wide and shallow, instead of narrow and deep.

Pools per mile
The Inland Native Fish Strategy pools per mile Riparian Management Objective as interpreted for this analysis would be reduced as pools fill from sedimentation over time. Sherman Creek and O’Brien Creek will continue to have reduced pool quality from the effects of the road system.

Proposed Action Alternative
Road management, vegetation management, and fire management activities have the potential to affect Inland Native Fish and fish habitat. Activities within the RHCA’s are the main concern. The Inland Native Fish Strategy Riparian Management Objectives are the measures for activities.

Fuel Treatments
The proposed action reduces the risk of a stand-replacing fire. By reducing the risk, there is a possible beneficial effect to fisheries, Riparian Management Objectives, and fish habitat from the proposed action.

Prescribed fire allowed in the RHCA’s does not prevent attainment of Riparian Management Objectives and minimizes disturbance of riparian ground cover and vegetation avoiding adverse impacts on inland native fish. Fuel treatments in the RHCA’s are beneficial because they prevent the complete loss of trees and vegetation in the event of a wildfire. Impacts are avoided by allowing backing fires where the fire enters the RHCA’s burning small woody debris and leaving large down woody material intact. Conditions would be such that 90% of the duff would be retained.

The prescribed burns would not cause a detrimental impact to fisheries. The filtration capacity of the riparian forest floor would not decrease and treatments are not expected to impact flows. For these reasons, it is unlikely that noticeable increases in sediment influxes to streams would be caused by the fuel treatments. The potential for prescribed fire to bare more soil than desired and to cause some increase in sediment production is recognized but this impact would be short-term. Natural vegetative recovery is usually within the same season in riparian areas due to the high moisture levels. Burning of slash and burning to restore open ponderosa pine and Douglas-fir stands would result in nutrient flushes into streams. This would be likely to support rather than damage the fishery, but in any event would probably be too minor and transient to be a detrimental influence.

The Inland Native Fish Strategy Riparian Management Objectives would be maintained or improved with these fuel treatments.

Vegetation Management
Since RHCA’s can encompass a larger area than the actual riparian area, some dry forest types are included. Mechanical thinning activities would occur in the upland forest types to promote larger tree
growth, and forest health, and to reduce the risk of a crown fire. For the mechanical thinning units, there would be no negative effect to trout or Riparian Management Objectives from thinning activities within individual unit boundaries with the exception of the reduction in risk of stand-replacing fire.

Proposed mechanical thinning is minimized in riparian vegetation, and would only occur where upland vegetation treatment is desired within RHCA to reduce the risk of crown fire. This would increase the growth of remaining trees and work towards attaining the Riparian Management Objectives for Large Woody Debris. Timber harvest can have negative effects to stream temperatures by reducing canopy and thus exposing channels to solar radiation (Chamberlin et al 1991). However, harvest in RHCA would not result in a canopy reduction of more than 25% to maintain shade and prevent increases in stream temperature beyond the Riparian Management Objective for temperature.

Equipment operating within RHCA can cause erosion. Rashin et al. (2006) found that stream buffers were most effective where timber falling and yarding activities were kept at least 10 meters (approximately 33 feet) from streams and outside of steep inner gorges. This 10-meter buffer for ground disturbing activities was found to prevent sediment delivery to streams from about 95% of harvest related erosion features. Of 193 erosion features located 10 meters from the stream channel, 95% did not deliver sediment. In addition, Rashin et al. found that virtually all chronic sediment delivery was associated with skid and shovel trails that crossed streams. The design elements require equipment to stay 50 feet from channels.

The objective of non-mechanical thinning treatments is to promote large tree growth along with forest health by reducing inter-tree competition. Non-mechanical thinning is allowed in the RHCA because it promotes stand health and large diameter tree growth, which benefits large woody debris recruitment.

The suppressed stands, mainly lodgepole pine, along State Route 20 and the BPA power line, would be treated. These treatments would benefit fisheries by creating stands that would contribute large woody debris to the streams. These treatments would reduce stocking densities in overstocked stands to reduce risk of disease and insect infestation leaving the healthiest and most vigorous trees that meet species and stocking requirements. This would result in larger trees in the RHCA for recruitment to stream channels and hillslopes for sediment retention and channel structure. In addition, there would be a decreased risk of insect and disease infestation in adjacent stands, including those portions of stands in the RHCA. Stands with insect and disease problems contribute to higher fire intensities than those that would have occurred historically leading to a long-term reduction of a large wood recruitment and potential increase in sediment yield to streams.

Ladder Fuel Treatments would prevent fire from reaching tree crowns, generally by removing smaller trees below the canopy. The RHCA standard widths encompass both upland and riparian vegetation in some units. To reduce the risk of crown fire developing and spreading to the riparian vegetation, the upland vegetation areas (Douglas-fir, lodgepole pine, western larch, and ponderosa pine) within the RHCA standard widths may be treated by hand to remove ladder fuels. The resulting adjacent stands would have reduced understory ladder fuels and risk of crown fire.
Since no treatments are going to be applied within 15 feet of the stream bank and cattle access would remain blocked, there would be no impact to stream banks and pools per mile. The Inland Native Fish Strategy Riparian Management Objectives would be maintained or improved under the proposed action.

**Roads and Riparian Management Objectives**

Roads are a major contributor to the degradation of fisheries. Road management activities have the potential to harm inland native fish and negatively affect Riparian Management Objectives. Sediment delivery to streams can impact aquatic habitat and organisms and, relative to this project, can occur as a result of temporary road construction and road reconstruction, as well as thinning and burning prescriptions. The impacts of sedimentation can include loss of beneficial spawning habitat (Stowell et al. 1983; Everest et al. 1987; Bjornn and Rieser 1991; Furniss et al. 1991), reduced incubation success (Chapman 1988; Bjornn and Rieser 1991), loss of summer and winter rearing habitat (Gibson 1978; Rimmer et al. 1984; Hillman et al. 1987), and impacts to important food sources (Bjornn et al. 1977; Chapman and McCleod 1987; Bjornn and Rieser 1991; Murphy and Meehan 1991).

Large woody debris is negatively affected by roads in the RHCA. These roads can cut off the RHCA from its large woody debris source, if the large woody debris is on the non-stream side of the road. In this situation, the large woody debris that falls on the road is cut up during road maintenance and never makes it to the stream.

Bankfull width depth ratios are negatively affected by roads in the RHCA as well as roads that contribute sediment. Roads in valley bottoms reduce the ability of the stream to meander across the valley bottom. This can cause bank cutting and possibly downcutting. Sedimentation from roads, either from dust or erosion, can fill channels or reduce the stream depths making streams wide and shallow, instead of narrow and deep. This filling also reduces pools per mile.

**Culverts**

Culverts cause additional effects to stream channels when they are not sized correctly. Roads and the erosion from the roads may lead to excessive sedimentation causing over-widening. Undersized culverts can cause downstream erosion. Increased concentrations of sediments and increased sedimentation rates can negatively affect spawning habitat, rearing habitat, overwintering habitat, and cause lethal effects to salmonids through increased egg mortality, reduced egg hatch, a reduction in the successful emergence of larvae (fry), and sediment induced death of juvenile and adult fish (Anderson, 1996).

Culverts may block overland flow, which increases the stream power downstream of the culvert. This causes bank erosion. There are two culverts on Forest Service Road 2000-220 that are currently undersized and restricting fish passage. Forest Service Road 2000-400 lies within the riparian zone of Fritz Creek and contributes sediment to the stream. There are also undersized culverts restricting fish passage on closed Forest Service roads 2000-404 and 2000-410 off of Fritz Creek road. Forest Service Road 2000-452 has an undersized culvert that restricts fish passage in McGahee Creek. These culverts and others that are undersized would be replaced before roads are used for haul. There would be short-term increases in sediment and turbidity during removal and upgrading of culverts. A 2007 study of culvert removals reports an average sediment delivery amount of about 150 pounds. However, this
amount could be reduced to about 4 pounds when using appropriate Best Management Practices (Foltz et al. 2007). Because of the potential negative effects to aquatic health and habitat in the event of culvert failures, the removal or upgrade of culverts would be a long-term benefit to watershed resources.

Road Reconstruction
Road reconstruction and use of roads for haul can cause negative short-term (5-10 years) effects. Sediment from ditch cleaning, cut-slope rejuvenation for curve widening, culvert replacement, and drainage dip construction, etc. would be produced from these activities. However, reconstruction of the roads should result in a moderate beneficial effect over the longer term, as sediment production from road templates decreases due to new armoring, drainage structure placement, and re-vegetation. Drainage ditch and culvert clearing, as well as road surface improvements, can considerably reduce the risk of erosion and road failures at stream and drainage crossings by removing debris that can back-up water causing it to flow over the road surface (Burroughs and King 1989; Sugden 2007).

Many roads in the project area have drainage problems and are eroding into streams. The reconstruction would stop this, particularly at stream crossings and on roads parallel to streams. This would improve the bankfull width depth ratio and pools per mile. There are approximately 90 miles of road reconstruction in the proposed action alternative. One of the roads that would be reconstructed is Forest Service Road 2000-214, which runs parallel to Sherman Creek and is currently closed and inaccessible. After using it for haul, the culverts would be removed and the road would be kept in hydrologically stable storage. This would have a beneficial impact to fisheries because the culverts on Forest Service Road 2000-214 are currently contributing sediment to Sherman Creek.

Dust Abatement
Without dust abatement, riparian road use for haul may contribute sediment into the streams. State Route 20 runs for most of its length in the RHCA of Sherman Creek. Other roads, identified as a moderate to high risk to aquatic ecosystems, have segments in the RHCA. To prevent a negative impact to trout from the dust created from the haul trucks, dust abatement would be employed. Reconstruction, including the rocking of the segments of road in the RHCA, would reduce sedimentation.

Temporary Roads
There are approximately 20 miles of temporary road construction proposed. Some of these roads are abandoned roads that still have drainage structures, compacted soil, and cut-slopes. After use, temporary roads would be made hydrologically stable. It is expected that full vegetative recovery would take place. In addition, cross drains and culverts would be removed and the areas designed to drain naturally. This would prevent water from ponding on the road and potentially causing a road failure that delivers sediment into the stream system. Waterbars and road out-sloping would be used to drain the roads which would help to decrease any adverse effects of using these temporary roads on fisheries due to sedimentation. By using abandoned roads as temporary roads and then having them grow back into a forest, there may be a small measureable effect to the amount of sediment cumulatively in the reach. The biggest effect is the long-term stability of the stream channels because of the reduction of risk of a road failure. There would not be a measureable effect on the fisheries.
Because temporary roads would be put back into production and monitored, large-scale loss of large woody debris in the RHCA is not anticipated. When temporary roads are opened for projects, hazard trees are removed for safety. There is a design element requiring hazard trees to be left on site in RHCAs.

**Closed Roads**

Some roads that are currently closed would be opened during the project. Some of these would be gated to limit access into parts of the project area. Since they would only be open during project activities, and effectively closed after, it is not anticipated that many snags would be lost. This should be fairly successful at protecting large woody debris in those areas. The greatest concern for fisheries would be the potential for compaction, rutting in wet areas, and wetland and stream disturbance if these roads become (illegal) off-highway vehicle routes. Prompt closure would help prevent the establishment of off-highway vehicles into new areas.

**Cumulative Effects**

The Sanpoil River fisheries may be affected by project activities and are included for cumulative effects analysis. In the Sherman Creek watershed, the cumulative effects area is Sherman Creek between the confluences of Fritz Creek and the Columbia River. In the O’Brien Creek Watershed, the cumulative effects area is O’Brien Creek from the confluence of South Fork and North Fork O’Brien Creek to the confluence of the Sanpoil River. The cumulative effects area ends where the effects would be diluted by the larger stream.

**Reasonably Foreseeable Activities in the planning areas**

The following assumptions were made with regard to future land management activities in these watersheds:

- Cattle grazing will continue at existing levels over the next 5-10 years;
- Timber harvest on private land and State land will continue;
- Road construction on State and private land will continue at decreased levels (compared to the last 20 years) since many areas are already accessible from primitive road systems;
- Road maintenance on County roads will increase slightly with increasing use by residents and non-residents of these watersheds;
- Private residential development will increase as the County continues to grow, baby boomers reach retirement age, and people decide to live in a rural setting. This trend will be limited by the amount of land available for sale, real estate market conditions, and the overall economy;
- Dispersed recreational use on state and federal lands will increase slightly in direct proportion to population growth in the County and in urban areas such as Spokane. Firewood gathering will continue.
- Root diseases such as Armillaria mellea will continue to infect Douglas-fir. This root disease also increases the susceptibility of Douglas-fir to secondary attack by bark beetles;
- The Forest Service may respond to insect attacks with some form of management such as timber harvest;
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- No changes are expected to Forest Service fire suppression policies in the next 3-5 years (i.e. no let-burn policy with regard to naturally occurring wildfires);
- State Route 20 will continue to be maintained including salting/sanding in the winter and hazard tree removal around the highway;
- Walker Fuels Reduction Projects, adjacent to the analysis area, will take place over the next 10 years;
- Paradise Peak Fuels Reduction, adjacent to the analysis area, will occur over the next 5 years;
- BPA power line management will be on-going including road reconstruction and vegetation management around the power lines; and
- Noxious weed treatments will continue to occur within and adjacent to the analysis area.

**No Action Alternative**

There are no impacts to fisheries from the no action alternative. As long as a large severe wildfire does not occur, the status quo would be maintained. If a large severe wildfire occurs, there could be a temporary drop in the fish population until the vegetation returns. If a large storm event occurs within the recovery period after a large severe wildfire, debris torrents may occur in burned over watersheds. It can be expected that refugia would exist for fish within the watersheds, though degraded habitat would likely support a different mix of species to the advantage of brook trout.

**Proposed Action Alternative**

Large Woody Debris

Temporary roads would be made hydrologically stable and newly opened roads would be closed to block unauthorized use and illegal firewood gathering.

Large woody debris recruitment would be improved. The lodgepole stands along Sherman Creek would be treated. These stands would attain diameters to meet the Riparian Management Objectives for large woody debris. Non-mechanical treatments are allowed in the riparian areas of RHCAs because they promote stand health and large diameter tree growth which benefits large woody debris recruitment. Proposed vegetation treatments protect or enhance large woody debris recruitment by reducing the chance of stand replacing fire and by growing larger trees faster.

This project adds wood to Sherman Creek. Trees would be felled into the channel in an effort to improve habitat, reduce fuels, and thin the stands.

Since the proposed action would improve large woody debris recruitment in Sherman Creek and have no effect to large woody debris in O’Brien Creek, there would be no cumulative negative effect to large woody debris recruitment.

**Bankfull Width Depth Ratio**

Proposed vegetation treatments protect bankfull width to depth ratios by reducing the chance of stand replacing fire.

The bankfull width to depth is at less risk from the road system. Several of the stream crossings with culverts that are considered to be functioning at risk, not properly functioning (high failure potential or
currently failing), or are fish passage barrier points would be upgraded or removed. A failure is less likely to occur. Sherman Creek and O’Brien Creek would continue to be affected by sediment from the road system, but rocking at crossings and reconstruction of drainage features would decrease the current sedimentation levels.

The proposed action would reduce sedimentation from roads into tributaries and ultimately into Sherman and O’Brien Creeks. The short-term sediment pulse from road related reconstruction activities would not add measureable amounts of sediment to Sherman or O’Brien Creek since Best Management Practices and design elements would be followed. There should be no cumulative effect to bankfull width to depth ratios in Sherman or O’Brien Creek from the proposed action.

**Pools per mile**
The pools per mile Riparian Management Objective as interpreted for this analysis would be improved on most streams since there is less sedimentation over time. However, the effects of sanding on Highway 20 will continue to contribute to reduced pool quality on Sherman Creek and O’Brien Creek.

The proposed action would reduce sedimentation from roads into tributaries and ultimately into Sherman and O’Brien Creeks. The short-term sediment pulse from road related reconstruction activities would not add measureable amounts of sediment to Sherman or O’Brien Creek since Best Management Practices and design elements would be followed. There should be no cumulative effect to pools per mile in Sherman and O’Brien Creek from the activities in the proposed action.

**Water Temperature**
Vegetation management in riparian areas would not increase stream temperatures, since they would not remove enough trees to affect solar radiation that reaches the stream. There are no direct or indirect negative effects to temperature from the proposed action.

There would be no cumulative negative effect to temperature. The temperature issues on Sherman and O’Brien Creeks are not expected to be resolved or negatively impacted by the proposed action alternative. The temperature problems are related to the highway.

**Irreversible & Irretrievable Effects**
There is no irreversible or irretreivable commitment of aquatic resources under the Proposed Action. This includes the fish populations, the fish habitat, and the Inland Native Fish Strategy Riparian Management Objectives.

**Significant Effects Discussion**
There would be no significant effects to fisheries from the activities included in the Proposed Action. Best Management Practices and design elements would be in place to prevent erosion from thinning related activities within the RHCAs.

**Fisheries**
Effects to the fisheries population from the proposed action are minimal. Sedimentation from the proposed activities is expected to be minimal because the Forest would be following Best Management Practices and design elements. There would be a slight improvement over time. The project would
have “no effect” to Bull Trout and “no impact” to Umatilla dace and pygmy whitefish since they are not present in the analysis area or cumulative effects reach. The area is not critical habitat for Bull Trout. The project would “not likely lead toward a trend to federal listing or loss of viability” to rainbow / Redband trout and Westslope cutthroat trout. Because there are no adverse impacts, the project is consistent with the Forest Plan as amended by the Inland Native Fish Strategy.

Heritage

The following section was excerpted from the Sherman Pass Project Cultural Resource Specialist Report (Beat, 2014). The full report is available in the project file.

Existing Conditions, Direct and Indirect Effects

Existing Condition

There have been nine (9) previous cultural resource inventories completed within the Sherman Pass Project area. There are twenty-five (25) known sites present within the project area. Past management practices have determined two (2) sites are Eligible, two (2) sites are Not Eligible, and twenty-one (21) sites are unevaluated for eligibility to the National Register of Historic Places. Historic properties that are unevaluated are managed as if eligible. Currently Heritage Program management attempts to relocate sites, monitor the sites for damage/deterioration, evaluate the sites for National Register of Historic Places eligibility, and preserve/protect the sites.

No Action Alternative

Under the no action alternative there would be no change from the current condition. Heritage sites would continue to gradually deteriorate over time subject primarily to natural forces (i.e. weather conditions, unexpected wildfire, etc.). Natural forces could destroy or damage standing or down historical structures affecting potential National Register eligibility characteristics of these properties. No reduction in vegetative cover could have an adverse effect on heritage resources. Historic structures could be consumed or damaged by fire.

Proposed Action Alternative

Under the proposed action alternative, vegetation management activities have the potential to damage or destroy sites directly by heavy machinery, falling trees, temporary road construction, etc., or indirectly as a result of discovery through increased access to each site. Additionally, the removal of natural barriers may allow cattle access to historic properties, which could increase the likelihood of damage due to cattle behavior and movement. Road reconstruction activities also have the potential to damage or destroy sites directly through the use of heavy machinery or indirectly by providing increased access to sites through road improvements.

However, hazardous fuels reduction can have a beneficial effect on historic properties with regard to the decrease in potential for uncontrolled wildland fire. Uncontrolled wildland fire would completely destroy many of the historic properties that exist within the project area. A reduction in fuels could mitigate a potential wildfire.
Cumulative Effects

No Action Alternative
Cumulative effects of past management practices are likely have some effect on historic properties, mostly due to fire suppression and the continued buildup of fuels. This buildup of fuels has the potential to affect historic properties through wildfire.

Proposed Action Alternative
The culmination of all the past, present, and future activities is that humans would have more and better access into areas where they have not in the past. Greater access can potentially lead to negative effects to Heritage resources. However, with implementation of the design elements, the negative effects would be reduced or eliminated. The cumulative effects of this proposed action are most likely beneficial to historic properties due to enhanced protection of these properties through proposed fuels reduction activities.

The project would have “no effect” on known resources due to design elements, which exclude/avoid sites located within the project area.

The Sherman Pass Project, including the design elements, meets the Forest Plan Standards and Guidelines for Cultural Resources item 2 page 4-37 and Federal regulations concerning Heritage Properties (National Historic Preservation Act and its implementing regulations at 36 CFR 800).

Visual Quality
This section is excerpted from the Sherman Scenery Specialist Reports for the Sherman Pass Project and (Jackson, 2015). The full reports are available in the project file.

This evaluation applies current National Forest Scenery Management methodology in conjunction with existing Colville National Forest Plan direction. It relies on field studies and photographs from inventoried sensitive viewpoints and other views of the project area, as well as coordination with project interdisciplinary team members, and consideration of public preferences for scenic quality. Integration of this scenery analysis into project planning ensures that the Sherman Pass Project is consistent with scenery-related Colville National Forest direction, U.S. Forest Service policies, and applicable elements of the U.S. Forest Service Visual Management and Scenery Management systems.

Existing Conditions, Direct and Indirect Effects

Colville Forest Plan
The Colville National Forest Land and Resource Management Plan (1988) has designated the following Visual Quality Objectives (VQO) for the Sherman Pass Project area by prescription.

- The Sherman Pass Scenic Byway (State Highway 20) is rated a sensitivity level 1 viewshed with a Forest Plan Management Area 3A prescription; the VQO is Retention in the foreground and a range of Retention to Partial Retention to Modification/Maximum Modification VQO in the middleground depending on visibility.
The Bangs Mountain Forest Road 2000-136, South Sherman Forest Road 2020-000, North Sherman Forest Road 2030-000, Hall Creek Forest Road 2050-000 and McMann/Quartz Forest Road 2053-000 travel routes are rated sensitivity level 2 viewsheds with Forest Plan Management Areas 3A and 5 prescription in the foreground; the VQO is Partial Retention in the foreground and Retention to Partial Retention VQO middleground.

- The Kettle Crest National Recreational Trail is a sensitivity level 1 with a VQO Retention foreground.
- The developed recreation facilities of Log Flume Heritage Site, Canyon Creek Campground, Growden Camp, Jungle Trail Trailhead, Sherman Overlook, Kettle Crest Trailhead and Sno Park, the White Mountain Fire Interpretive Site, Bangs Mountain Vista Picnic Overlook and Sherman Creek Trailhead are designated to the Retention VQO.

The middleground and background landscape areas in the project area occur in Forest Plan Management Areas 7 and 8. The VQO in these areas is Modification and Maximum Modification with a wood/forage and winter range habitat emphasis. Generally, these areas are not visible from Sherman Pass Scenic Byway and the scenically designated travel routes and viewsheds. The Modification to Maximum Modification VQOs are minimums, higher VQO’s of Retention to Partial Retention in areas that are sensitive for recreation and scenic objectives may be desirable.

Foreground is based on landscape visibility and is defined as views up to ½-mile distance zone, immediate foreground is viewed up to 300 feet, the middleground is ½-mile to 4 miles distance zone, and background is 4 miles to the horizon from the travel way and use areas.

Table 17. Management Area, Visual Quality Objective, Viewshed Name and Sensitivity Level in the Sherman Pass Project
<table>
<thead>
<tr>
<th>Management Area</th>
<th>Visual Quality Objective (VQO)</th>
<th>Viewsheet Name Sensitivity Level – 1 or 2 Distance Zone – Foreground (FG), Middleground (MG) &amp; VQO</th>
</tr>
</thead>
</table>
| MA 1 Old Growth Dependent Species Habitat (1,551 acres) | Partial Retention to Modification | • Sherman Pass Scenic Byway – Sensitivity Level 1: FG/Retention VQO, MG/Partial Retention to Modification VQO  
• South Sherman Forest Road 2020-000 – Sensitivity Level 2: FG/Retention to Partial Retention VQO |
| MA 3A Recreation (3,814 acres) | Retention; Partial Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/Retention VQO, MG/Retention to Partial Retention VQO  
• Bangs Mountain Forest Road 2000-136 - Sensitivity Level 2: FG/Partial Retention VQO  
• South Sherman Forest Road 2020-000 - Sensitivity Level 2: FG/Partial Retention VQO  
• North Sherman Forest Road 2030-000 - Sensitivity Level 2: FG/Partial Retention VQO  
• Hall Creek Forest Road 2050-000 - Sensitivity Level 2: FG/Partial Retention VQO  
• McMann/Quartz Forest Road 2053-000 - Sensitivity Level 2: FG/Partial Retention VQO |
| MA 4 Research Natural Area (1,130 acres) | Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/MG Retention VQO |
| MA 5 Scenic Timber (10,477 acres) | Retention; Partial Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/Retention, MG/Partial Retention VQO |
| MA 6 Scenic Winter Range (431 acres) | Retention; Partial Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/Retention, MG/Partial Retention VQO  
• South Sherman Forest Road 2020-000– Sensitivity Level 2: FG/MG Retention to Partial Retention VQO |
| MA 7 Wood/Forage (8,424 acres) | Modification; Maximum Modification | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/Retention VQO, MG/Partial Retention to Modification-Maximum Modification VQO |
| MA 8 Winter Range (2,146 acres) | Modification; Maximum Modification | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/ Retention VQO, MG/Partial Retention to Modification-Maximum Modification VQO |
| MA 10 Semi-Primitive Motorized Recreation (23 acres) | Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/MG Retention VQO  
• Kettle Crest Trail: FG/Retention VQO |
| MA 11 Semi-Primitive Non-Motorized | Retention | • Sherman Pass Scenic Byway - Sensitivity Level 1: FG/MG, Retention VQO |
**Desired Landscape Character**

People's interests and expectations regarding ecosystems help establish desired aesthetic conditions for the varied landscapes. The aesthetic characteristics of landscapes are an integral part of community life, forming the “sense of place” in which people live and interact with one another. Individuals who visit the Forest to experience its “natural appearing” and/or “cultural” landscape qualities value high scenic quality. The desired landscape character for Sherman Pass Scenic Byway and other scenically designated viewsheds and travel routes is to promote a sustainable landscape character specific to each ecotype of the forest. All naturally established existing landscape patterns throughout the forest are to be maintained with changes that will not degrade the existing landscape character. Areas where unnatural landscape character exists from past management practices can be improved through rehabilitation or enhancement to promote landscape character that is scenically and ecologically attractive. The goal of scenery management is to promote landscape character that is naturally appearing and will be scenically sustainable in time.

The landscape character goal for the Sherman Pass Project area is to maintain a natural appearing to slightly altered landscape character that expresses predominately natural processes in the scenic viewsheds where those landscape patterns exist. It is important to maintain high scenic quality along Sherman Pass Scenic Byway - State Highway 20 travel corridor due to its designation as a State Scenic Highway as well as being rated a level 1 scenic viewshed in the Colville National Forest Plan. Retaining screening along the existing BPA power line corridor, the landscape setting in developed recreation sites, and identified dispersed recreation sites is a priority. Retaining high scenic quality in areas where a healthy canopy exists while reducing hazardous fuels conditions surrounding the Sherman Pass Scenic Byway corridor is also a priority. In areas where the landscape character is not sustainable due to the insect and disease infestations, the goal is to restore the landscape character to be more reflective of the inherent disturbance patterns associated with each ecotype.

The goal of scenery management is to promote landscape character that is naturally appearing and will be scenically sustainable in time by reducing some risk of large-scale disturbances, through wildfire or insect and disease infestations that are out of scale for the vegetative character type.

**Analysis Area**

The effects to the scenery resources can be short-term and long-term. The time frame of measurement is from when the project is implemented and is completed. Short-term is usually less than 5 years, and long-term is 5 years to 50 years. Effects that are eliminated by the natural course of a single growing season are not considered effects because they are so short lived. Most treatments have long-term effects as vegetation takes time to become re-established while logging activities such as skidding and slash burning are usually short-term effects lasting less than 5 years. The project analysis area is the area from which the proposed treatments can be visibly discerned. This analysis is done within the project boundary.
Existing Condition

The Sherman Pass Project area has been divided into four separate landscape areas based on landscape visibility, sensitivity levels, and visual quality objectives for the scenic travel routes for assessing scenic effects. These four landscape areas are:

1. The Sherman Pass Scenic Byway (State Highway 20);
2. South Sherman Forest Service Road 2020-000 and North Sherman Forest Service Road 2030-000;
3. Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000 travel routes; and
4. The Kettle Crest National Recreation Trail

Sherman Pass Scenic Byway

The Sherman Pass Scenic Byway (State Highway 20) travels through the project area for 35 miles connecting the communities of Republic to the west and Kettle Falls on the east. Along this section of State Route 20, the Byway passes through the Kettle Range. Highway 20 is the main travel corridor with several road corridors intersecting the highway and travelling through the diverse mountainous landscape. These road corridors are the Bangs Mountain Forest Service Road 2000-136, South Sherman Forest Service Road 2020-000, North Sherman Forest Service Road 2030-000, Hall Creek Forest Service Road 2050-000 and McMann/Quartz Forest Service Road 2053-000.

The project area is nestled into Columbia Mountain-Jungle Hill area to Graves Mountain range on the north end and Mt. Washington, Sherman Peak, Paradise Peak and Scalawag Ridge area on the south. Sherman Creek runs along the south side of Highway 20 adding variety in the scenery east of Sherman Pass. The Sherman Pass Project is not visible from towns or private residences. However, the project area is adjacent to private lands including homes and other developments, Sherman Creek Recreation Wildlife Area and Washington State Department of Natural Resources managed lands.

The proposed vegetation management treatment is located in three primary areas along the highway, the west side of Sherman Pass from the forest boundary near the Quartz Creek area winding up towards the Mt. Washington Area, the Sherman Pass Summit Area, and the west half of Sherman Pass Highway on both sides of Highway 20. Sherman Pass has an elevation of 5,575 feet and is the highest pass in the State of Washington kept open year round. Views are open to distant panorama vistas along the west side of the scenic byway and become predominantly confined to an enclosed tree lined foreground on the east side of the pass except in a few open areas where views of the surrounding mountains are seen.

Some areas viewed along the Sherman Pass Scenic Byway have a landscape character that is not reflective of a healthy green canopy and the forest is becoming brown and diseased from mountain pine beetle infestations that are slowly dominating the forest stands. This is of particular scenic concern in developed recreation sites along Sherman Pass Scenic Byway. Within the Sherman Pass Scenic Byway, there are seven developed recreation sites along the travel route. Each site is unique offering different experiences for the user. In addition, the Kettle Crest National Scenic Trail traverses through the Sherman Pass summit area. It is important to maintain a vegetation setting around each site as much as feasible, favoring hardwood and understory shrubs to soften removal of the diseased overstory.
South Sherman Forest Road 2020-000 and North Sherman Forest Road 2030-000 - Partial Retention VQO
South Sherman Forest Road 2020-000 is a main secondary travel route accessed off Highway 20 on the south side of the highway east of Sherman Pass Summit. South Sherman Forest Road loops around Paradise Peak and comes out by Growden Camp. It provides opportunities for driving for pleasure, hunting, dispersed use, and ties into several forest roads out of the project area. North Sherman Forest Road 2030-000 (Albian Hill) is a main secondary travel route accessed off Highway 20 on the north side of the highway east of Sherman Pass Summit. It provides access to several developed trailheads for the Kettle Crest National Recreation Trail including Jungle Hill, Wapaloosie, and Old Stage. The North Sherman Forest Road traverses along the side slopes paralleling the Kettle Crest Mountain Range. The landscape area is natural appearing and primarily in a semi-primitive non-motorized setting.

McMann/Quartz Forest Service Road 2053-000 and Hall Creek Forest Service Road 2050-000 – Partial Retention VQO
McMann/Quartz Forest Service Road 2530-000 and Hall Creek Forest Service Road 2050-000 are main secondary travel routes accessed off Highway 20 on the south side of the highway west of Sherman Pass Summit. Hall Creek Forest Service Road provides access to Snow Peak trailhead, which leads to Snow Peak Cabin. McMann/Quartz Forest Service Road provides opportunities for driving for pleasure, hunting, dispersed use, and ties into several forest roads out of the project area.

Kettle Crest National Recreation Trail – Retention VQO
The Kettle Crest National Recreation Trail traverses through the Sherman Pass summit area. The Kettle Crest trail leads to the Columbia Mountain loop trail, which is accessed from the Kettle Crest Trailhead. The trail provides access to the top of the Columbia Mountain with a distant panorama view overlooking the landscape area. The Kettle Crest Trail does not travel through the Sherman Pass project area except for the area near the summit between Kettle Crest Trailhead and Sherman Pass Campground and Overlook area. Views of the project area from Columbia Mountain and within the project area have a high scenic concern to maintain a natural appearing setting.

No Action Alternative
The no action alternative would maintain the existing range of High to Moderate Landscape Character and Scenic Integrity (condition). The vegetative component of the landscape would continue to grow through the pattern of natural succession with a high risk of future disturbance, primarily wildfire. Forest succession that has resulted from fire suppression shapes forest landscapes. The highly textured tree density patterns would continue to dominate the landscape character where they exist. Scenic quality of landscape character and scenic condition would have very low human intervention with nature taking its course. Disturbance to the existing landscape that would occur through mechanical disturbance related to activities of tree removal and prescribed burning would not be done. The opportunity to enhance scenic quality, by improving the forested setting and enhancing large tree character and aspen stands would not be done. A transitional approach to treating the landscape by moving the landscape character towards a more sustainable forest setting that is more resilient to fire; disease and/or insect infestations would not be done. Consequently, the risk of large-scale disturbances, which are already outside of their natural disturbance regime, would remain.
Existing high fuel loadings have the potential to result in a sudden change to the landscape character that could result from a wildfire, which would be seen as a burned area. In the case of wildfire, the landscape character could dramatically change from a forested green setting to an area dominated by the visual evidence of wildfire. Fire intensity patterns would probably range from low to moderate to high viewed in the foreground and middleground from the travel routes. The visual effects of a large-scale wildfire would change the landscape character from a highly green textured pattern to a black, brown, and green interwoven landscape pattern. Wildfire visual characteristics would be dominant and evident for 5 to 10 years or more. Snags would be created as a result of wildfire. The snags would be dominant for at least 5 years, and then begin to fall and create a jackstraw effect viewed along the travel corridors and would appear visually out of character for a natural appearing landscape. In general, natural forest disturbances that result in extensive areas of dead or dying trees are perceived negatively. There would be some risk to losing the highly valued large ponderosa pine and Douglas-fir if a wildfire were to occur. A sustainable green scenic forest may not be maintained over time because of this high disturbance risk related to high fuel loadings and potential for wildfire.

The landscape would also continue to be affected by insects and diseases, with the associated tree mortality and visual impacts to the landscape character. The Sherman Pass Scenic Byway corridor and associated developed recreation sites are at a high risk for additional tree mortality as the insect and disease infestations would spread beyond areas that are currently affected.

The road system would not be modified to reduce impacts on aquatic habitat and hydrologic function, and would not provide the opportunity to improve scenic integrity by rehabilitating roads or bringing them up to their maintenance level standard.

**Proposed Action Alternative**

Vegetation removal activities and associated transportation changes (particularly temporary road construction and road reconstruction) would have a direct effect on the landscape character and scenic integrity (condition). Scenic quality is primarily affected by: 1) the type of vegetation treatment proposed and implementation of vegetation treatments, especially logging systems, and 2) implementation of surface fuel treatments.

Landscape character is the naturally established landscape pattern that makes each landscape identifiable or unique.

In the project area, scenic integrity effects would be seen as the result of changes to landscape character caused by implementation of the vegetation management activities and amount of ground disturbance or vegetation removal. These effects would be seen in foreground areas of identified travel corridors; middleground or background views of the area from Sherman Pass Scenic Byway; secondary travel routes; developed recreation sites; identified dispersed recreation sites; trails; and the Kettle Crest National Recreation Trail. Examples of scenic integrity effects include actions such as new skid trails, reconstructed roads, fresh tree stumps and slash, blackened tree boles, disturbance to the ground resulting from mechanical activity of cutting trees, and changes to the textured landscape pattern. Overall, the reduction of fuels and thinning to enhance large tree growth and restoring aspen stands in
the landscape would benefit long-term scenic quality by providing a more resilient, sustainable forest, which is typical of the Okanogan Highlands vegetative character types.

**Landscape Character and Scenic Integrity Positive Elements**

1. Enhancement of landscape character would be done by thinning and reducing dense stands of trees, providing variety in spatial distribution of plant communities and moving towards more variety in age classes. Where they exist, large diameter trees would be retained and would stand out as more dominant after removing small trees around them. Views into the forest would be more open.

2. Mosaic stand conditions would be maintained or created by leaving tree clumps, canopy gaps, and complex patches of young and understory vegetation.

3. Enhancement of aspen stands would increase scenic quality and variety in the landscape.

4. Enhancement of scenery viewing would occur through restoring/opening a scenic vista view from Sherman Pass Overlook kiosk by thinning and removing diseased trees that block the view.

5. Reduction of natural fuels levels would begin the transition of moving the forest, on a landscape scale, towards the sustainable landscape character.

6. Utilization of existing landings, roads, firelines, and natural fuel breaks would reduce further visual impacts associated with implementation. In these areas, visual impacts would be contained within areas already impacted rather than introducing new impacts.

7. Treatment methods of thinning and pruning would provide texture changes to the existing dense to mosaic textured landscape and would blend in well.

8. On the landscape scale, using prescribed fire in a timely manner and in phased treatments would reduce the future risk of a potential high intensity wildfire that would affect scenic quality.

9. Fire hazard would be reduced and forest vegetation health and resiliency would be improved around developed recreation facilities of Log Flume Heritage Site, Canyon Creek Campground, Growden Camp, Sherman Overlook, Kettle Crest Trailhead and Sno Park, White Mountain Fire Interpretive Site, and Sherman Creek Trailhead.

**Landscape Character and Scenic Integrity Potential Negative Elements**

1. Stumps would be more evident in some foreground areas of Sherman Pass National Scenic Byway, secondary travel routes and developed recreation facilities of Log Flume Heritage Site, Canyon Creek Campground, Growden Camp, Sherman Overlook, Kettle Crest Trailhead, and Sno Park, White Mountain Fire Interpretive Site, Sherman Creek Trailhead and dispersed recreation sites.

2. Coarse woody debris (slash) would be seen before underburning, hand or machine piling, and pile burning is accomplished. This would occur along Sherman Pass Scenic Byway, secondary travel routes, and developed recreation facilities of Log Flume Heritage Site, Canyon Creek Campground, Growden Camp, Sherman Overlook, Kettle Crest Trailhead and Sno Park, White Mountain Fire Interpretive Site, Sherman Creek Trailhead and dispersed recreation sites. This would create a short-term negative visual effect until the material is burned, decomposes, or is softened by early successional grasses and forbs. The proposed underburning and pile burning may not entirely eliminate the slash.
3. Prescribed fire has the potential to create larger forms (openings) in the landscape than intended, possibly burn out of the area intended, and/or to burn trees that are desired to be retained for scenic quality or other resource objectives.

Sherman Pass Scenic Byway
The immediate foreground (up to 300’ distance zone) and foreground (up to ½-mile distance zone) of the Sherman Pass Scenic Byway (Highway 20) travel route are highly sensitive to any new visual impacts. Overall, the proposed action would maintain the existing High to Moderate Landscape Character and Scenic Condition and meet the established Visual Quality Objective of Retention foreground and Partial Retention middleground. The proposed vegetation management treatment is located in three primary areas along the highway, the west side of Sherman Pass from the forest boundary near the Quartz Creek area winding up towards the Mt. Washington Area, the Sherman Pass Summit Area, and the east half of Sherman Pass Highway on both sides of Highway 20.

The proposed action would increase visibility into stands along Sherman Pass Scenic Byway by removing trees in the immediate foreground and foreground, enhancing large tree character, opening up the mid-canopy, and creating greater foreground diversity. The commercial thinning treatments would favor leaving pine and larch species that have the desired large tree character and fire resiliency. This would improve the scenic character and the scenic stability of the area. In visually sensitive areas, especially along the scenic byway (Sherman Pass and Washington State Highway 20), treatments would consider the viewshed in design. While reducing fuels in the area along the travel routes and between the Highway 20 and the power line corridor, treatments would be structured to provide pleasing views into the upslope areas of the forest, especially where large “yellow belly” ponderosa pine are found. In locations where roads exit off the highway, screening would be left intact as much as possibly to shield the road from view of highway passengers. This would be an enhancement for scenic quality by promoting and invigorating the growth of large ponderosa pine stands in a manner that remains visually subordinate. Removal of smaller trees opens view into stands and removal of hazard trees or dead and dying trees would enhance scenery by highlighting the healthy green stands. The effects to scenery include views of stumps and slash in areas and evidence of underburning in areas. A growing season would reduce the effects to the remaining scorched tree trunks and dead saplings resulting from underburning. Fire, at low intensity is a natural occurrence in this area, and its effects do not degrade the scenic quality. This treatment can greatly improve a stand’s resiliency to large stand replacement fire, which can affect the scenic quality.

Landscape character changes would be seen as thinned stands of trees and a more open forested canopy character. The proposed action would improve species composition, stand density, and reduce ladder fuels and canopy closure. Landscape changes would primarily be seen as a texture change from the existing highly textured landscape to a slightly more open mosaic landscape pattern. This would result from “heavy” thinning from below the canopy, primarily removing relatively small trees to reduce competition. Stumps would be more evident in some areas of foreground and middleground. Logging systems would primarily be ground based with some skyline cable logging operations. Skyline corridors have the potential to introduce lines in the viewshed, feathering edges by leaving clumps and aligning the cable corridors to blend in the landscape would be done.
Coarse woody debris (slash) would be seen along the travel route before underburning, hand or machine piling, and pile burning. This would create a short-term negative visual effect until the material is burned, decomposes, or is softened by early successional grasses and forbs. The proposed underburning and pile burning may not entirely reduce the slash. Prescribed fire has the potential to create larger openings in the landscape than intended, possibly burn outside of the area intended, and/or to burn trees that are desired to be retained for scenic quality or other resource objectives.

These treatments would improve scenic stability from low to moderately high where “all dominant scenery attributes of the valued scenic character are present and are likely to be sustained” (page 19, App. J). The appearance of the stands would be improved as they become healthier. This treatment would create stumps, slash, and soil disturbance that would be visible from foreground views. These effects would be minor within the first one to two years. As regrowth of shrubs and grasses occurs, these effects would be significantly reduced. This treatment would not create openings that are visible from middleground or background distances. The effects of this prescription would not reduce the scenic integrity of the units as they are expected to be negligible within 2-3 years. These prescriptions would improve the scenic character by moving stands toward the historic range of variability. The more open stands of relatively fire resistant tree species would improve scenic stability.

These treatments would be an enhancement for scenic quality by promoting and invigorating the growth of large mixed conifer stands in a manner that remains visually subordinate to the landscape character, with treatment very light on the ground.

The proposed action alternative would move stands toward desired future conditions, which are within the historic range of variability, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity to a minimum, meeting all standards.

South Sherman Forest Road 2020-000 and North Sherman Forest Road 2030-000 (Albian Hill) - Partial Retention VQO
The immediate foreground (up to 300’ distance zone) and foreground (up to ½-mile distance zone) of the South Sherman Forest Road 2020-000 and North Sherman Forest Road 2030-000 (Albian Hill) travel routes are sensitive to any new visual impacts.

The proposed action alternative would move stands toward desired future conditions, which are within the historic range of variability, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity to a minimum, meeting all standards.

McMann/Quartz Forest Road 2053-000 and Hall Creek Forest Road 2050-000– Partial Retention VQO
The immediate foreground (up to 300’ distance zone) and foreground (up to ½-mile distance zone) of the Hall Creek Forest Road 2050-000 and McMann/Quartz Forest Road 2053-000 travel routes are sensitive to any new visual impacts.

The proposed action alternative would move stands toward desired future conditions, which are within the historic range of variability, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity to a minimum, meeting all standards.
Kettle Crest National Recreation Trail – Retention VQO
There is a small piece of the Kettle Crest National Recreation Trail in the project area. Views of the project area from Columbia Mountain and within the project area have a high scenic concern to maintain a natural appearing setting. The view from Columbia Mountain includes the west slopes of the entire ridgeline from Sherman Pass Summit to Coyote Mountain range and is visible as a middleground setting defined as views from ½-mile to 4 miles distance zone. From Graves Mountain to the east, the project area is seen as background, defined as views from 4 miles to the horizon.

As a middleground view, the biggest concern would be introduction of form or line contrast in the highly textured landscape. Form is the most noticeable feature at a distant view with landform, ridgelines, and dissected valleys being natural elements. There are no other existing openings such as old clearcuts or meadows. Line is noticeable with the Sherman Pass Highway corridor travelling through the valley bottom. Openings created could create a noticeable form change that could be negative if openings are cleared with linear edges that would introduce a distinct contrast that would catch the viewer’s eye.

The proposed action would not create any openings greater than 5 acres in small pole thinning units that would be seen along McGahee and Graves Mountain west sloping faces that run down to the Sherman Creek valley bottom. The treatment units would have feathered edges and in areas where skyline cable logging is proposed (units 2210063a, 2210060), which are partially visible from Columbia Mountain viewpoint, the corridors would be kept short with feathered edges to avoid introducing unnatural lines in the landscape.

Thinning would create a more open landscape but the openings would be small scale compared to the landscape area. The appearance would be a noticeable change to the existing highly densely textured landscape character. A transitional approach to move the high density stands towards a lower density species pattern and variety in composition would be implemented through harvest management activities and reduction of hazardous fuels and is desirable for landscape character and scenic enhancement. Restoring pattern, structure, and composition appropriate to the fire regime is beneficial for scenic quality. The landscape character would have a texture change with clumpy mosaic openings in the canopy.

The proposed action would move stands toward desired future conditions, which are within the historic range of variability, and reduce the risk of uncharacteristic fire, while keeping effects to scenic integrity to a minimum, meeting all standards.

Cumulative Effects

Present, Ongoing, and Reasonably Foreseeable Future Actions
This cumulative effects analysis considers effects of past, present, and reasonably foreseeable future actions within the Sherman Pass National Scenic Byway (State Highway 20); Bangs Mountain Forest Road 2000-136; South Sherman Forest Road 2020-000; North Sherman Forest Road 2030-000; Hall Creek Forest Road 2050-000; McMann/Quartz Forest Road 2053-000 travel routes; and the Kettle Crest National Recreation Trail viewsheds. The geographic boundary for this cumulative effects analysis is the Sherman Pass Project Area and the temporal boundary is approximately 10 years following completion.
of proposed vegetation and fuels management treatments, the amount of time needed for evidence of logging and prescribed burning to soften and blend into the landscape more completely.

**Past Actions**
Vegetation management has occurred in the past in the Sherman Pass Project Area. There have been numerous timber sales, fuels reduction treatments, and activities associated with hazard tree removal in developed campgrounds and along travel routes. In addition, there have been large-scale wildfires. This has resulted in a more recently burned landscape pattern with a mosaic of burn intensities. The wildfires have contributed to landscape change as seen from the identified viewsheds.

The activities of past management activities in total combine to maintain the current high scenic integrity levels for the foreground of the designated viewsheds.

**Present Actions**
Vegetation management will continue to occur as routine hazard tree removal in developed recreation sites and along travel routes.

Fire suppression will continue contributing to the change of vegetation species associated with higher stand densities, different age compositions (primarily undergrowth) and subtle changes that are out of character for each environmental zone.

**Reasonably Foreseeable Future Actions**
Vegetation management will continue to occur as routine hazard tree removal in developed recreation sites and along travel routes.

Fire suppression will continue contributing to the change of vegetation species associated with higher stand densities, different age compositions (primarily undergrowth) and subtle changes that are out of character for each environmental zone.

**Other Required Analyses**

**Effects on Consumers, Minority Groups, Women, Civil Rights, and Environmental Justice**
The proposed action would contribute to consumers, but only in a limited capacity. It would provide wood products to one or more area sawmills, thus contributing raw materials that would become available to consumers.

All contracts and employment offered by the Forest Service contain Equal Employment Opportunity requirements. Therefore, no adverse or discriminatory effects to Minority Groups, Women, or Civil Rights are expected regarding access to federal contracts or jobs.

**Environmental Justice**
The Forest Service defines environmental justice in accordance with USDA departmental regulations (USDA 1997). Environmental justice includes the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (U.S. EPA 2013).
An environmental justice population is a group of people that meets the criterion for low-income or minority under Executive Order 12898 (Clinton 1994). An environmental justice population may be both low-income and minority. Fair treatment means that environmental justice populations do not bear a greater burden of environmental harms and risks than the general population from Forest Service programs and policies. Meaningful involvement includes:

1. Potentially affected environmental justice populations have opportunities to participate in decision-making processes affecting their environmental health;
2. The contributions of environmental justice populations may influence the agency’s decision;
3. The concerns of all participants are considered in the decision-making process; and
4. The decision makers seek out and facilitate the involvement of environmental justice populations (U.S. EPA 2010).

When assessing the Sherman Pass Project, there are two potential populations that may be affected: the Confederated Tribes of the Colville Reservation and low-income residents of Ferry County.

**Tribal Interests**

The Confederated Tribes of the Colville Reservation reserve hunting, fishing, and gathering rights on the north half of Ferry County, which includes the Sherman Pass Project area. The Confederated Tribes of the Colville Reservation were informed and invited to consult on the project and proposed actions. There was no response received from the tribal council or any tribal members.

Under the proposed action, mule deer habitat (and consequently hunting) would improve and sight distances increased in treated stands. The availability of traditionally gathered plants may improve with the opening of closed forest canopies and the reintroduction of fire. Effects to fisheries populations would be minimal with a slight improvement over time.

The Spokane Tribe and the Kalispel Tribe of Indians were also informed and invited to consult by letter. No response was received from either tribe.

**Low Income Residents of Ferry County**

The alternatives were assessed to determine whether they would disproportionately impact minority or low-income populations in accordance with Executive Order 12898. Approximately 21 percent of the people in Ferry County have an income that is below the federal poverty level (U.S. Census 2009-2013). Low-income people use the National Forest for recreation and to gather forest products such as firewood, game species, and huckleberries. However, we have no evidence that low-income people use this area of the National Forest disproportionately when compared to other people. The proposed action should not significantly restrict or inhibit the gathering of firewood, huckleberries or hunting of game animals. Where access and landing space permit, slash removal by the public for personal use firewood would be allowed and encouraged. The Sherman Pass Project would provide the same or slightly more firewood gathering opportunities in areas where biomass or leave tops attached is the selected surface fuel treatment. Mule deer habitat (and consequently hunting) would improve and sight distances increased in treated stands. The availability of huckleberries may improve with the opening of closed forest canopies and the reintroduction of fire.
The project would likely produce a short-term economic benefit to the local community. The benefits would come in the form of increased employment in local timber companies. The project would also benefit companies and businesses that support those operations including local fuel businesses, mechanics, and other businesses that provide support services.

Based on the composition of the affected communities, along with cultural and economic factors, the activities that are proposed would not have a disproportionately adverse effect to human health and safety, or environmental effects to minorities, those of low income, or any other segments of the population. There are no significant negative direct, indirect, or cumulative effects relative to issues of environmental justice through the implementation of the action alternative.

Unavoidable Adverse Impacts
Soil compaction as a result of logging is unavoidable. Sediment from soil-disturbing activities reaching streams is unavoidable. Many of these unavoidable effects are short-term and substantially mitigated by design elements and Best Management Practices. Further discussion is included in the Soil and Hydrology reports in the project analysis file (Jimenez 2014; Hickenbottom 2015).

Smoke from burning forest fuels is unavoidable. By burning within prescription parameters documented in the project burn plans, potential adverse effects would be substantially reduced. Adverse air quality effects from prescribed burning would be substantially less than would result from the same forest fuels under wildfire conditions. For more discussion about smoke and air quality effects, see the Sherman Pass Project Fuels and Vegetation Effects Report (Rourke and Corvino, 2015) in the project analysis file.

Snags and downed logs would be unavoidably lost as a result of timber harvest and prescribed burning. However, snags and downed logs would be created by prescribed burning and secondary tree mortality. For more discussion, see the Wildlife Management Indicator Species report (Loggers, 2015) in the project analysis file.

Some extent of noise and evidence of harvest or fire is an unavoidable effect of this project. However, the Forest Plan identifies specific visual and recreational objectives across the Forest. These values would be maintained in the proposed project (Jackson 2015; McQuay 2014).

Irreversible and Irretrievable Commitments of Resources
The term “irreversible commitment of resources” refers to actions that disturb a nonrenewable resource or a renewable resource to the point that renewal can occur only over a long period of time, and, or at great expense. “Irretrievable commitment of resources” is the loss of production or use of renewable resources because of an allocation decision.

Proposed activities in the Sherman Pass Project are not expected to have any irreversible or irretrievable effects to wildlife populations, wildlife habitat, sensitive plant populations, aquatic resources, beneficial aquatic uses, or recreation and visual objectives.

The proposed action would affect about 124 acres of the project area through construction of temporary roads and landings; activities that are considered an irreversible commitment of soil resources. These resources are only restored to natural conditions after long periods of time. Some of the temporary roads in the proposed action are currently on the landscape but not recorded in the
Forest Service road system. These roads would be restored upon completion of the project and result in the rehabilitation of detrimental soil conditions, although recovery to background conditions would occur over several decades.

**Short-term Use vs. Maintenance and Enhancement of Long-term Productivity**

The proposal is intended to restore and maintain sustainability and long-term productivity. Short-term and long-term effects are discussed in the existing condition and direct and indirect effects of the proposed action for each resource in this Environmental Assessment.

**Climate Change**

This proposed action would affect 8,000 acres of forest by commercially harvesting smaller trees from the stand, retaining a residual stand of about 40 to 70 percent of the original stand by basal area. This scope and degree of change would be minor relative to the amount of forested land being treated in the region as a whole. A project of this magnitude would have such minimal contributions of greenhouse gases that its impact on global climate change would be infinitesimal. Therefore, at the global scale, the proposed action’s direct and indirect contribution to greenhouse gases and climate change would be negligible.

In addition, because the direct and indirect effects would be negligible, the proposed action’s contribution to cumulative effects on greenhouse gases and climate change would also be negligible.

The Intergovernmental Panel on Climate Change (IPCC) has summarized the contributions to climate change of global human activity sectors in its Fourth Assessment Report (IPCC 2007). The top three anthropogenic (human-caused) contributors to greenhouse gas emissions (from 1970-2004) are fossil fuel combustion (56.6% of global total), deforestation (17.3%), and agriculture/waste/energy (14.3%). IPCC subdivides the deforestation category into land use conversions, and large-scale deforestation. Deforestation is defined as removal of all trees, most notably the conversion of forest and grassland into agricultural land or developed landscapes (IPCC 2000).

This project does not fall within any of these main contributors of greenhouse gas emissions. Forested land will not be converted into a developed or agricultural condition. In fact, forest stands are being retained and thinned to maintain a vigorous forested condition that can continue to support trees and sequester carbon long-term.

This project is also consistent with IPCC recommendations for land use to help mitigate climate change. The 2007 IPCC report summarizes sector-specific key mitigation "technologies". For the forestry sector, the report recommends forest management including management to "improve tree species" and increase biomass. The proposed action is consistent with these recommendations because it would: restore species composition, spatial pattern, and forest structure; increase resilience to disturbance (fire and insects); relieve competitive pressures in the residual stands; and prepare seed beds for natural and planted regeneration.

Timber management projects can influence carbon dioxide sequestration in three main ways: (1) by increasing new forests (afforestation), (2) by avoiding their damage or destruction (avoided deforestation), and (3) by manipulating existing forest cover (managed forests). Land-use changes,
specifically deforestation and regrowth, are by far the biggest factors on a global scale in forests’ role as sources or sinks of carbon dioxide, respectively (IPCC, Intergovernmental Panel on Climate Change, 2000). Projects that create forests or improve forest conditions and capacity to grow trees are positive factors in carbon sequestration. The proposed action falls into this category.

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Sherman Pass Project Draft Environmental Assessment


**Interdisciplinary Team Members**

The following Interdisciplinary Team members participated in the preparation of the Sherman Pass Project Environmental Assessment:

Jean Lavell – Team Leader
Kathy Ahlenslager – Botany
Lucy Reeves – Transportation
Alicia Beat – Heritage
Jason Jimenez – Soil Scientist
Chris Loggers – Wildlife Biologist