CHAPTER III EFFECTS OF IMPLEMENTATION

INTRODUCTION

This chapter provides a summary of the key environmental effects of the alternatives as described in the specialist reports prepared for this project. The analysis and conclusions about the potential effects are synopsized and cited in the respective resource sections. The Resource Specialist Reports, which disclose the full analysis of the direct, indirect, and cumulative effects, are incorporated by reference and are available in the Project File, located at the Sullivan Lake Ranger District Office in Metaline Falls, Washington. This document incorporates by reference the recommendations from the Conger Roads Analysis Report, which was compiled by members of the core interdisciplinary team. This assessment of effects assumes compliance with standards and guidelines established in the Colville National Forest Land and Resource Management Plan (Forest Plan), Regional standards, State and Federal laws, and National policies. These standards, guidelines, policies and laws provide measures which minimize and sometimes avoid adverse impacts, and require rehabilitation of resources affected by Forest programs. The summary of effects of all the alternatives is listed by resource and the discussion centers on effects that are direct, indirect, or cumulative. These impacts can be either beneficial or adverse.

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The consequences of implementing each alternative are summarized in terms of changes in the affected environment from the current situation. Forest Service Handbook 1909.15, Environmental Policy and Procedures Handbook (USDA Forest Service 2004), identifies a list of environmental factors to be considered in data collection and environmental analysis. Factors which would not be affected by the proposed activity and were considered not relevant in comparison of alternatives are: American Indian rights (AIRFA), consumers, civil rights, minority groups, and women. The area does not contain, nor is it adjacent to, prime range or farmlands. The alternatives were assessed to determine whether they would disproportionately impact minority or low income populations, in accordance with Executive Order 12898. No local minority or low-income populations were identified during scoping or effects assessment. No minority or low-income populations are expected to be impacted by implementation of any of the alternatives. All past, present and reasonably foreseeable actions, both federal and non-federal, were researched and considered by the specialists in their reports (for more detail see Appendix C).

This project is not adjacent to, nor would it have any effect on, existing wilderness areas, Forest Plan designated roadless areas, or Research Natural Areas. This project would have no effect to designated recovery area for grizzly bear, woodland caribou, gray wolf or priority bull trout habitat.

Fuels, Silvicultural Treatments and Forest Health (issues #1 and #2)

The Conger Analysis Area is rich in species diversity and generally follows compositional changes based upon topographic position (elevation, slope, and aspect) and site moisture. In general, plant species most adapted to warm-dry conditions are found in the lower elevations on southwest facing slopes; cool and moist conditions are generally found on north and east

aspects; very moist and wet conditions are predominately isolated to major drainages in the Analysis Area.

Open canopy ponderosa pine and Douglas-fir generally dominate south and west facing slopes; grand fir, western redcedar and western hemlock dominate cool-mesic to cold-wet positions on the landscape. The positioning of shade tolerant species along the topographic gradient is highly dependant upon the frequency of fire; fire exclusion has generally increased the density and topographic extent of shade tolerant species at both the local (stand) and landscape scales (Analysis Area).

While landscape-level generalizations in dominant plant communities can be made, it is important to recognize that the Analysis Area is rich in microsite diversity, where abrupt topographic changes correspond with dramatic changes in potential vegetation. A common example involves a warm-dry Douglas-fir stand (~30 acres) that may contain patches of open ponderosa pine/ pinegrass communities (on a small rocky knoll) and dense patches of cool-moist western redcedar (in a seep or bench). In general, the patch size of these microsites is rarely greater than 3-5 acres in size. The abundance and distribution of these patches throughout the Conger Analysis Area underscores the high levels of biodiversity at both the landscape and local scales.

The majority of the project is located within areas designated by the Pend Oreille County Wildland-Urban Interface Wildfire Mitigation Plan to be reviewed for possible treatment to protect local communities. Within the Conger project area, approximately 2,749 acres (48%) of National Forest System lands are designated as rural land[1], and approximately 2,375 (42%) of National Forest System lands are designated as wildland urban interface (WUI) intermix and interface[2] (low density) lands.

Direct and Indirect Effects

Alternative A would continue with a management policy of fire exclusion, and would result in no improvement in stand vigor and related forest health, and would continue the landscape-scale trend of increasing stand densities, where stocking levels increase to the maximum capacity of the soils.

No silvicultural treatments are proposed under this alternative. No short-term effects associated with logging operations would occur.

Under this alternative, no fuels treatments would occur. Because no prescribed burning would occur, there would be no direct effects from prescribed burn treatments. No short-term mortality would occur as the result of prescribed burn treatments.

Alternative B would provide both mechanical and prescribed fire treatments to as many as 1,535 acres in 71 stands. Up to 1,733 acres in 46 stands would receive prescribed fire treatment only. Overall, up to 3,268 acres in 117 stands are proposed to be treated. These treatments include precommercial, non-commercial, and commercial activities. Mechanical slash and/or prescribed burn treatments are proposed where appropriate. The objectives of these treatments are to:

1. Reduce the connectivity and risk of large insect and disease outbreaks;
2. Minimize the long-term potential for large, uncharacteristically severe wildland fires; and to
3. Promote old growth habitat in both open and closed canopy stands.

[1] Rural land is defined in the County's Wildfire Plan as "a situation where the scattered small clusters of structures (ranches, farms, resorts, or summer cabins) are exposed to wildland fuels. There may be miles between these clusters."
[2] Intermix condition is defined in the County's Wildfire Plan as "a situation where structures are scattered throughout a wildland area…the wildland fuels are continuous outside of and within the developed area."
Interface condition is defined in the County's Wildfire Plan as "a situation where structures abut wildland fuels. There is a clear line of demarcation between the structures and the wildland fuels along roads or back fences."

Stand Composition and Structure

Under this alternative, treatments are designed to promote old, single-stratum structure (stage 7) for drier, fire-tolerant biophysical environments[3] (BPEs) and multi-stratum old forest structure (Stage 6) for moist forest BPEs. In drier stand types treatments are designed to reduce stocking in the midstory and to use prescribed fire to reduce fuels and to cause mortality to regenerating shade-tolerant fire-intolerant species. In many cases, there is a moderately healthy overstory, treatments are relatively straightforward, stands can be quickly moved to the desired stand condition, and there would be some immediate improvement in the structural distribution of the HRV. In many other stands (or patches within stands) the treatments are more challenging due to root diseases. In these cases (at the stand level) it may take some time before the target stand condition is reached. However, with few exceptions, these root disease pockets are localized patches within stands (<5 acres), and the overall stand treatment of thinning and/or burning would improve the HRV of structural stages in relatively short order. From a forest health concern, treatments designed to minimize site stress, especially for the drier BPEs (~53% of the land area) would increase stand resilience to insects, diseases, and wildland fire. One overall objective of the stand treatments is to minimize and revert the encroachment of shade-tolerant species in the drier BPEs. Mechanical treatment is more effective than prescribed fire alone in many stands because of the relative size and co-dominance of these encroaching species. However, 46 stands in 1733 acres are prescribed for burn treatments without the use of mechanical treatments where the size of encroaching species is smaller.

Insects and Disease Risk

Under this alternative, treatments are specific to the common pathogens of the Analysis Area, particularly root disease and mistletoe. As such, treatments are designed to curtail the spread of root disease by creating buffers of resistant species; mechanical treatments are targeting (in many cases) the removal of mistletoe-infested trees with a Hawksworth rating ≥3. At the landscape scale, this alternative is designed to have indirect treatments for reducing the spread and incidence of insect and disease risk by slowing (and reversing) the process of afforestation. Introduction of fire as a primary disturbance effect is of key importance in minimizing stocking levels of shade-tolerant species, reducing crown biomass and connectivity, and decreasing the contagion resulting in less severe and less frequent insect and disease epidemics. While this 5,730 acre project area may not significantly reduce the insect population in the intermountain west, re-introduction of fire as the primary disturbance event in the fire tolerant BPEs would increase stand- and landscape-level resiliency to insects and disease.

Restoration of Fire Regime

Understory broadcast burning (FDUB) is prescribed for 2,715 acres, or ~50% of the Analysis Area. The primary purpose of these understory burn treatments is to promote open conditions of light fuels complexes that provide opportunities for future burning at frequent and regular cycles. In the drier BPEs, as many as 2-5 fire cycles have been missed in stands; this has led to an increase in fire regime condition class (FRCC) for the drier types and a corresponding increase in fuels. Fuels reduction through burning and (where necessary) mechanical treatments would result in an open understory capable of supporting fine fuels complexes of pinegrass, light timber-litter, and shrubs. Overall, this provides increases in forage quality for wildlife, minimizes shade tolerant encroachment, and allows for old cohorts of healthy overstory fire tolerant species (ponderosa pine, Douglas-fir, western larch, and white pine in certain areas). Historically fires have affected the Conger Analysis Area every 15-20 years in drier sites, in patches ranging from 200– 500 acres in size (Shellhaas 2000a and 2000b). For management of these fire cycles within the WUI, it is necessary to manage for the fire regime and fuels complexes that are within the historic or natural range. As such, this alternative was driven by the objective to restore the fire cycles on the landscape and in many cases the past 50-70 years of fire exclusion require

[3] Biophysical environments represent potential natural vegetation association groups with similar fire ecology regimes.

mechanical treatments to remove the understory biomass to allow for burning without high mortality rates or suppression risk.

Short-term Effects of Silvicultural Treatments

Particularly in the warm-dry Douglas-fir/ grand fir BPE (Fire Regime IIIa) having an FRCC of 2-3, a substantial amount of material would need to be removed to achieve the desired future condition. The stocking ranges from 100 to as much as 250 ft^2 of basal area per acre in patches, and the overall stand-level reduction is to achieve a stocking level of approximately 70 – 100 ft^2/acre. Much of this material is in the 10"-20" DBH[4] tree size class and is composed of Douglas-fir, grand fir, and western redcedar. This material is considered commercial-sized wood, and the removal of these pieces would cause some damage to residual trees and soil disturbance depending on harvest system used. Immediately following thinning, effective wind speeds would increase, and stressed overstory remnant trees may be subjected to wind throw, particularly for stands with shallow and rocky soils.

Root disease treatments, where patches are cleared ~50 ft surrounding the infected area, would have higher impacts on the soils and surrounding remnant stand, because there is more material being removed (essentially a patch cut).

Commercial harvest of the viable midstory of shade tolerant species as well as sanitation salvage of insect or disease infected trees would provide economic return to finance many of the prescriptions that would generate no viable economic return (either few pieces of commercial-sized wood, or expensive access in nonroaded areas). This economic return could be used to aid in monitoring, stand improvement, wildlife, fisheries, recreation, and prescribed burning activities.

In areas outside the warm-dry BPEs, 250 acres (14 stands) are proposed to have combinations of regeneration, shelterwood, patch-cut thins, and sanitation harvests. In the stands having less retention (regeneration and shelterwood), the short-term effects would be more severe, as stand structure would be reverted to stand initiation (Stage 1) in the short term, and planting of early seral species would follow. These treatments are not likely to increase the fire resilience at the landscape or at the stand-level. However, these treatments represent a small portion of the Analysis Area (4%) and are not likely to have long-term consequences for fire resiliency in the Analysis Area.

Short-term Effects of Fuels Treatments

Two types of burn treatments are prescribed on a total of 2,930 acres (51% of the Analysis Area). The first is an understory burn treatment (FDUB) designed to resemble a natural fire event (to the best, most controlled extent possible) where fire enters the majority of the stand and burns with moderate to low intensity (heat). This type of burn may occur in areas that have or have not been thinned. The second burn prescription type is usually a follow-up for seed tree and sanitation treatments where slash fuels are burned to prepare the site for planting (site preparation burn or FJP). For stands slated for thinning, many of the stands could be assumed to carry fire behavior models that are slash driven (FM[5] 11), but the underlying fire behavior model remains an important base for fire behavior, particularly in thin-from-below treatments, where some areas of the stand would receive no treatment.

Following thinning in the drier BPEs, the understory broadcast burn treatment would reduce fuels from a slash-driven model to a prescribed open, light timber-litter model (FM 2/9), although it would take time following burning to achieve the desired fire behavior model away from resident duff. Heavy duff creates hazardous conditions for remnant trees as duff traps heat and slows fire spread. These combined effects lead to cambium scorching and it should be assumed that ~20%

[4] Diameter at breast height.
[5] Fuel models are based on ground cover conditions (i.e. grass, shrubs, slash or other timber litter), and the amount of ladder fuels creating connectivity to the canopy, that describe fire hazard potential.

of the basal area of remnant trees (particularly Douglas-fir) may die in years following burning. This assumption is based upon the first order fire effects model (FOFEM) for the remnant overstory tree cohort and general assumptions that resident trees that are weak from insects or diseases may succumb to additional heat pressures by fire. Some stands were identified to have high levels of litter and duff, and experienced crews would make the decision as to whether or not 'rake-back' or other precautionary measures may be warranted to protect retained trees from mortality.

Perhaps the largest and most profound short-term effect of fuels treatments is the conversion of the current heavy fuels loading to smoke. Winds generally approach from the SW and the Conger area is upwind from the Pend Oreille Valley; additional analysis regarding potential smoke outputs is important for addressing potential human health concerns prior to burning.

Alternative C is very similar to the proposed action (Alternative B), excepting up to 3,082 acres in 105 stands are proposed to be treated. Excluded stands from Alternative B are 185 acres in mostly the cool-moist Douglas-fir/grand fir BPE, slated for seed tree and shelterwood mechanical treatment prescriptions. These stands represent 4% of the Analysis Area. All other stand-level prescriptions are the same as Alternative B, and are designed to meet the same objectives.

The primary difference between Alternative B and C is any mechanical treatments in this alternative that result in commercial-sized wood would be moved the nearest road (if available) and decked. In nonroaded areas, the wood would be incorporated into the burn prescriptions and burned onsite. No commercial sales would occur as part of this alternative.

Stand Composition and Structure

The effects to stand composition and structure are the same as in Alternative B. Approximately 185 acres (3% of the Analysis Area) in the cool-moist Douglas-fire/grand fir BPE would remain in a young, multi-strata structural stage and these stands would likely reach the desired condition sooner (stage 6) than under the proposed action.

Insects and Disease Risk

The effects to insects and disease risk are the same as in Alternative B.

Restoration of Fire Regime

The effects of fire regime restoration and FRCC are the same as in Alternative B.

Short-term Effects of Silvicultural Treatments

While the prescriptions remain the same as in Alternative B, there are effects differences with stands in the nonroaded sections, or identified as helicopter units under Alternative B. In these nonroaded stands, wood would be left on site under this alternative because there are no commercial activities (i.e. timber sales) as part of this alternative. Hence, many of the short-term impacts to soils would be minimized in these stands. All other silvicultural treatments apply to this alternative (excluding the 185 acres of cool-moist forest described previously).

Short-term Effects of Fuels Treatments

Similar burn prescriptions would be applied as with Alternative B. One major difference is the treatment of the wood remaining on site in nonroaded areas would contribute to very high fuels loadings. Burn prescriptions would include more jackpot burning to reduce the ~50 ft^2 per acre of slash (FM 11 and potentially 13); the highly variable fuels structure from open areas of a stand (FM 9/2) to heavy slash areas (FM 11-13) would contribute to a wide range of soil heating profiles. Overall, these stands (where wood is not removed) would result in high temperatures and long residence times for fires. Smoke outputs are also expected to be higher for this alternative.

In stands where trees are harvested and removed from the stand, the short-term effects of fuels treatments would be the same as in Alternative B.

Cumulative Effects

WUI Issues, Batey Bould Trail, Powerline, Gardin-Taco Sale

Under **Alternative A** no fuels treatments or thinning would occur, the fire resiliency within the WUI would not improve. Higher probability of mortality, fuels complexes that allow for hot fires, increased ladder fuels, and stand-to-stand crown connectivity would generally increase through time under the no action alternative. Extreme weather conditions, with high wind speeds and extended periods of low humidity and high temperatures, would promote fuels conditioning and increased probability of large crown fires. Increased human uses, especially firewood cutting, would increase ignition sources. Often the firewood cutting was observed to be in areas of high root disease infestations. These areas would increase under this Alternative, and because of their open canopy, high fuels (shrub-dominated) condition, fuels have more time during the year to condition and could be more susceptible to accidental ignition by chainsaws or vehicles.

Under this alternative no acres would be treated adjacent to private property boundaries. This alternative would not meet the goals as stated in the Pend Oreille County Wildland-Urban Interface Wildfire Mitigation Plan to reduce the area of WUI land burned and losses experienced because of wildfires where those fires would threaten communities in the wildland-urban interface

Batey Bould trail use would not be affected by this alternative. Increased risk of large-scale fire events as a result of increased fuels connectivity could potentially alter the visual corridor and use of the trail.

The powerline would not be directly affected by this alternative. Increased risk of large-scale fire events as a result of increased fuels connectivity could potentially put the powerline at risk.
The Gardin-Taco timber sale has no cumulative effect under this alternative.

Under **Alternative B** fuels reductions would occur in 117 stands (3,268 acres) within the WUI (Analysis Area).

Four stands are near the Batey Bould trail; these stands are proposed to have sanitation treatments for root disease, and commercial and precommercial thinning. Some minor disturbances on the trails from logging equipment would be present in the short-term. Buffers would be in place around the trails to ensure trails do not expand into the existing stands.

Mechanical and prescribed fire treatments are proposed around the powerline. Smoke from prescribed burning increases conductivity, and scheduling and consultation would be required with the appropriate agency.

The Gardin-Taco timber sale has no cumulative effect under this alternative.

Under **Alternative C** fuels reductions would occur in up to 105 stands (3,082 acres) within the WUI (Analysis Area).

Treatments in the Batey Bould trail area may have a short-term impact using ground-based equipment; post-mechanical treatment fires could potentially take weeks for smoke to clear, as the slash and commercial-sized wood is left onsite.

Mechanical and prescribed fire treatments are proposed around the powerline. Smoke from prescribed burning increases conductivity, and scheduling and consultation would be required with the appropriate agency. Increased smoke from stands having remnant wood may increase the effect and down-time for the powerline.

The Gardin-Taco timber sale has no cumulative effect under this alternative.

There would be increases in available firewood for commercially-sized wood removed and decked on the nearest road. Potential liabilities exist due to private citizen injuries. Ignition points may also be created with additional chainsaw use and human activity.

Both Alternatives B and C would treat acres to reduce the area of WUI land burned and losses experienced because of wildfires where those fires would threaten communities in the wildland-urban interface. Both alternatives would move the project area toward meeting the goals listed in the Pend Oreille County Wildland-Urban Interface Wildfire Mitigation Plan.

Air Quality

Direct and Indirect Effects

For Alternative A there would be no change from current management direction. This alternative would have no immediate adverse effect on air quality. Current management activities in this area contribute little additional pollutants to the local airsheds. The primary sources of pollution would be smoke from other projects both on National Forest and private lands, vehicular exhaust, agricultural activities and dust from motor vehicle traffic in the area.

The risk of smoke intrusion into Class I airsheds from any prescribed burning operations in the planning area would be very minimal due to distance and prevailing winds. Smoke created in the Conger planning area is normally carried to the northeast by the prevailing southwest flows aloft and would not normally affect Class I airsheds. Smoke emissions from the project area would not normally affect Spokane, Washington, or Sandpoint, Idaho, because of the direction of the prevailing winds and distance from the project. Dust that escapes the local area and mixes with the general atmosphere generated from increased vehicle traffic, logging activity and gravel pit sites may temporarily affect air quality. Both action alternatives include prescribed burning in a combination of natural and activity fuels (alternatives B and C). The total emissions from burning would be spread out over approximately a five year period. However, in alternative A, no fuels treatments would be completed. As a consequence, these standards may be exceeded in the event of a wildfire.

Cumulative Effects

The potential for air quality degradation and reduced visibility increases in the long-term with Alternative A. Without some type of vegetative management, the trend would be for a larger portion of the Conger landscape to be prone to lethal, stand-replacement fires or fires of a greater severity and size than what occurred historically. Consumption of increased fuel loads and understory biomass during a future wildfire event could create smoke emissions far greater than historical norms. These emissions could remain in the local and surrounding airsheds for a period of a few days to several weeks depending on the fire's size and intensity.

For all action alternatives, smoke produced from fuel treatments would compete with other activities within the airsheds. Activities such as agricultural field burning, other forest residue burning, residential wood stove use, motor vehicle produced exhaust and dust, and even dust from the Columbia Basin all produce pollutants that contribute to degradation of air quality. The monitoring of air pollutants during prescribed burning seasons is used to eliminate burning during times when such activities would result in violations of the State standards, including unacceptable impacts to non-attainment areas. The Forest Service voluntarily ceases burning operations to avoid violations of State standards. The monitoring of air pollutants during prescribed burning periods have not recorded any violations of the State standards to date. Burning of activity-created as well as natural fuels would occur during both spring and late summer/fall burning seasons. Demand for airspace integrity has been historically low during the spring and relatively low during late summer/early fall periods. Constraints to late season burning would come usually after the first fall rains when the Department of Natural Resources, private

logging companies, and citizens alike begin pile burning activities. This is also a time for inversions to occur and although particulate matter (PM) standards may not be exceeded, visibility and political considerations may necessitate a curtailment in prescribed burning, at least with the Forest Service.

Most often, smoke and PM flows to the northeast and dissipates rapidly during good to excellent dispersion days. The Forest Service limits the number of acres burned on one day, or ceases burning altogether in order to meet the Clean Air Act. The cumulative effect of any of the alternatives, when combined with other emission producing projects within the local air shed, would be that the Forest Service might need to extend the number of days when burning would occur. A conservative estimate is that nearly 500 acres of prescribed burning within harvest areas or 750 acres of burning within natural fuels areas could be accomplished on the "average" spring or fall day without exceeding National Ambient Air Quality Standards for PM10. Normally, not more than 50-75 acres is burned on any given day due to smoke considerations and person-power capabilities.

PM 10- Measure of fine particles of particulate matter that come from fuel combustion, agricultural burning, woodstoves etc. Particulate matter is measured in micrometers (microns). PM10 is all particles less than or equal to 10 microns particles.

The Forest Plan places no special requirements beyond those required through the Clean Air Act. The project meets the Clean Air Act through coordination with the State prior to burning, and the use of burning techniques that either minimizes emissions or provides for avoidance techniques. Prescribed burning is consistent with State laws requiring treatment of activity created fuels to reduce the effects of stand-replacing forest fires.

Management Indicator Species (MIS)

Deer, Elk, Blue Grouse, Franklin's Grouse, Northern Tree-toed Woodpecker, Pileated Woodpecker, Pine Marten, Barred Owl, Primary Cavity Excavators, Beaver, Great Blue Heron, and Raptors are the management indicators selected for the project based on their association with habitat present in the Conger project area and would be indicators of the project's effects on habitat.

Deer and Elk Winter Range (issue #3)

On Colville National Forest lands located west of the Pend Oreille River, the management emphasis on designated big game winter range is to provide suitable winter habitat for deer. The Conger project area encompasses approximately 3,157 acres of land designated as Management Areas (MA) 6 and 8, which are land allocations managed under the Forest Plan with an emphasis on winter range. Approximately 2,558 acres in the central portion of the project area are designated as MA-6; approximately 599 acres in the northern and southwestern portions of the project area are designated as MA-8. These totals are a result of the relocation of the MA-1 habitat in the project area north of its original location. The new MA-1 location, encompasses an area that used to be classified as MA-6 and 8, however, this was compensated for by assigning the original MA-1 location to MA-6, for a net increase in project area winter range of approximately 144 acres. Table 4 summarizes the potential forage and cover habitats for deer and elk in MAs 6 and 8 in the project area.

Forage- Deer and elk winter range consists of a mosaic of forage and cover habitats. Both deer and elk forage on understory plants, however the species differ in terms of forage preference. Elk are primarily grazers and are capable of consuming large quantities of coarse forage (e.g., grasses and sedges) whereas deer are browsers and better suited to selecting sparse but nutritious forbs and evergreen plants (Kirchhoff and Larsen 1998). However, when range conditions are poor or forage is seasonally limited (e.g. winter) elk and deer may exhibit increased dietary overlap and may both subsist on browse (Cowan, 1947, Kirchhoff and Larsen 1998).

Optimal foraging habitats are typically characterized by areas with an open forest overstory (<40 percent canopy cover) where sunlight penetrates to the forest floor, causing forage species such as grasses, forbs, and shrubs to grow. Elk and deer are associated with forest edge areas and tend to forage closer to the edge rather than the interior of a natural or created opening, where simultaneous access to foraging and cover areas is maintained. Consequently, under Forest Plan direction for the management of winter foraging areas, no point in created openings should be further than 600 feet from a forested edge. For this analysis, foraging habitats are defined as open, park-like stands (structural stage 7), meadow/ shrub habitats, and open stands of seedlings /saplings (structural stages 1 and 2). There are approximately 752 acres of foraging habitat on winter range in the project area (Table 4).

Cover-Deer and elk rely on forest stands for hiding cover and protection from inclement weather. The Forest Plan defines three types of cover including hiding, thermal, and snow intercept. Hiding cover consists of vegetation capable of hiding 90 percent of an animal's body at a distance of 200 feet (Thomas et al., 1979). On the Newport-Sullivan Lake Ranger Districts, forest stands in structural stages 3, 4, 5, and 6 normally provide suitable hiding cover due to their high understory tree densities.

Although recent research has questioned the significance of the thermal benefits forest cover provides, deer and elk may seek forest stands with dense canopies for protection from wind and infrared radiation, and their slightly warmer nighttime temperatures (Duncan, 2000). Dense forests also intercept snow, which reduces snow accumulations and facilitates travel between foraging areas. The Forest Plan defines adequate thermal cover for deer as stands of evergreen trees that are 40 feet high or taller with a canopy closure of 60 percent or greater (70 percent or greater for elk) with a distribution not to exceed 600 feet between cover units. For this analysis, thermal cover was defined as stands in structural stages 4, 5, and 6 with greater than 60 percent canopy cover. Snow intercept cover is provided by multi-storied stands with over-story trees that are at least 12 inches in diameter. For this analysis, forest stands in structural stage 6 with greater than 70 percent canopy cover were used to define snow intercept cover. These stands are characterized by large trees and multiple cohorts of trees.

Table 3 displays the acres of each habitat type on big game winter range in the project area. Each stand was assigned the habitat component that best described the stand, using the criteria given above. Note that most stands typed as thermal or snow intercept cover, also provide hiding cover, by virtue of their dense understories. Also, some forage for big game is available in most stands typed as cover, dependent on the amount of sunlight reaching the forest floor. By far, the most productive and best quality foraging areas are located in the more open habitats typed as forage in Table 3.

A forage/cover ratio approaching 50:50 is the Forest Plan objective for winter range habitats. As displayed in Table 3, only about 24% of the winter range in the project area is open foraging habitats. The winter range is cover rich with about 17% of the area in thermal or snow intercept cover and 58% typed as hiding cover.

Table 3. Acres of habitat components on big game winter range (MAs 6 and 8)

	Existing[1/]		Forest Plan Goal	
Habitat Type	**Acres**	**%**	**Acres**	**%**
Forage	752	23.8	1,579	50
Thermal Cover	321	10.2	947	30
Snow intercept cover	227	7.2		
Hiding cover	1,836	58.2	631	20
Other (e.g., rock)	21	0.6	--	--
Total Winter Range	3,157	100	3,157	100

Seclusion-Gaines (2003) listed five factors associated with roads and their influence on elk including hunting, poaching, avoidance/displacement, collisions, and disturbance. Similar affects have been documented on deer. Further, an expansive network of roads provides easy access to many public lands, which facilitates off-road uses in the form of off-highway vehicles (OHVs), horses, mountain bikes, and foot traffic (Wisdom et al. 2004). Elk tend to exhibit a flight response to avoid a disturbance whereas deer tend to seek patches of dense cover. These responses may result in energetic costs to the animals over the long term. Road systems also increase habitat fragmentation and can facilitate the spread of non-native plants that may reduce the quality of foraging habitat.

Under the Forest Plan, road densities in MAs 6 and 8 should not to exceed 1.5 miles of open road per square mile of winter range during the season of use. There are approximately 10.1 miles of open roads on deer winter range in the project area. The open road density is 2.0 miles per square mile. About half of the road miles on winter range are county-owned roads. The Forest Service does not have the authority to manage use of those roads. Forest roads that are physically open in the project area appear to receive little to no motorized use in a given winter. There are approximately 5.0 miles of motorized trail on deer winter range (about 1 mile per square mile). Almost all of the trail mileage is part of the Batey-Bould Motorcycle Trail system. Motorized use of these trails in the winter has never been documented. Snowmobile use is problematic, since the trail treads are narrow, twisty, and located in dense forest.

Direct and Indirect Effects

With all alternatives, the existing MA-1 area would be re-located to include more suitable forest stands for old growth associated species. The original MA 1 would be re-classified as MA-6, resulting in a net increase of 144 acres (5 percent) of designated winter range in the project area. Impacts to specific components of big game winter range are presented in Tables 5 and 6.

Alternative A

There would be no immediate impact to winter range habitats since no forest management would occur with this alternative. Over time, certain younger forest stands would mature and begin to attain the necessary height and crown closure of thermal cover. Other stands that are too over-stocked with young trees may stagnate and never develop enough overhead canopy to provide thermal regulatory properties for big game.

Over time, existing, open foraging sites would slowly decline in productivity as encroaching young conifers shade out upland shrubs, grasses, and herbs. More cover would be recruited on the winter range at the expense of productive foraging sites. Fuel loading and ladder fuels would continue to increase incrementally in forest stands across the project area. The potential for a large, intense wildfire to remove whole stands of conifers would increase over the long run. In such an event, the resultant increase in sunlight on the forest floor would promote the growth of big game forage plants; potentially providing new foraging opportunities for big game. However, high-intensity fires have the potential to burn large expanses of forest and result in openings so large that they may be underutilized by forest edge-associated big game species, due to the absence of nearby cover.

Stand replacement wildfires are the most likely to provide good growing conditions for noxious weeds. With such high-intensity burns there would be more overhead canopy removed (higher light levels), more duff consumed (exposing soils), and less living vegetation for newly established weeds to compete with for sunlight, water, and soil nutrients. If burned areas became infested with weeds, existing native plants could be replaced, including those palatable to big game animals. Large infestations could change the way the animals use the landscape by effectively reducing the area of suitable habitat.

Alternatives B and C
Timber harvest and under-burning proposed with these alternatives would be designed to restore the historic fire regime of the area. Smaller ground fuels and fuel ladders would be reduced across the project area. Future wildfires that might occur in these stands should burn cooler and would be less likely to ascend into the crowns of overstory trees. Thus, the risk of a hot crown fire removing forest cover over large areas of winter range would be reduced with these alternatives.

Effects to Forage - Timber harvest would open up the forest canopy and allow more sunlight to reach the forest floor. As a result, the productivity and vigor of any existing browse and green forage should improve in treated areas. This would be particularly true within regeneration harvest areas (seed tree harvest, shelterwood harvests) where most overstory trees would be removed. In areas where prescribed fire would be employed, decadent, woody vegetation on many upland shrubs and grasses would be burned off. A “pulse” of nutrients would be released into the soil. Forage plants for big game should respond to these burns with profuse basal sprouting and an increase in palatability for several years following treatment.

No new roads would be constructed with this project that could provide pathways for the spread of noxious weeds. Noxious weeds could potentially colonize soils exposed by road reconstruction, ground-based logging equipment, and prescribed fire. However, a number of factors would work to minimize the potential for weeds to spread in the project area. Prescribed fires would be completed during optimum weather and fuel moisture conditions in order to ensure low-intensity fire behavior. Thus, most (if not all) of the forest duff should be maintained in burned areas and very little soil should be exposed. Reconstructed roads would be seeded and closed with several excavated earth berms following the project. These road entrances would then be planted with shrubs and/or trees in order to effectively close the roads to off-highway vehicle (OHV) access. In addition, the project design would incorporate other routine practices to check the spread of noxious weeds such as seeding exposed soils at landings, skid trails and burn piles.

Effects to Cover - No treatments would occur within stands presently classed as thermal cover or snow intercept cover on big game winter range. Thinning in other forest stands would reduce the inter-tree competition for sunlight, water, and soil nutrients, and increase the vigor of the remaining trees. As a result, the residual trees should be better able to fend off insect and disease attack. Over time, thinning should promote the rapid development of larger, full crowned trees sooner than had no treatment occurred. High quality thermal cover could be developed in these stands over the long term.

Commercial timber harvest would remove or degrade hiding cover where it exists. Regeneration harvest prescriptions such as seed tree and shelterwood would convert hiding cover to open forage habitat for 15 or more years. Where partial harvest prescriptions such as thinning are used, hiding cover would be locally degraded for five years or more, and essentially removed for at least that long within new skid trails and pockets of sanitation harvest. Based on partial harvests completed elsewhere on the ranger districts, there should still be enough understory vegetation retained to provide hiding cover at the stand level.

Young trees (seedlings / saplings) within certain forest stands or older plantations would be pre-commercially thinned. This would be done to concentrate growth on the most full-crowned and vigorous trees of the desired species. With this prescription, hiding cover would be locally degraded but not removed at the stand level.

Low severity prescribed fires would be used to remove logging slash, thin out thickets of fir and other conifer regeneration, and reduce finer ground fuels. Burning would occur during optimum weather and fuel moisture conditions in order to ensure low-intensity fire behavior. Treated areas would be a mosaic of burned and unburned sites, owing to discontinuous fuel concentrations. Hiding cover would be degraded in burned areas; particularly where prescribed fire and timber

harvest are used in combination. However, tree boles, burn "skips", and the skeletons of burned trees and shrubs should still be providing adequate horizontal cover at the stand level. Any grasses and upland shrubs that are burned over should quickly re-sprout from their bases and regain much of their above ground biomass within one or two growing seasons.

Table 4. Acres of proposed treatments in winter range habitats by alternative. No treatments would occur with Alternative A.

	Forage		Thermal Cover		Snow-intercept Cover		Hiding Cover	
Treatment	**B**	**C**	**B**	**C**	**B**	**C**	**B**	**C**
Thinning	12	12	0	0	0	0	343	343
Thinning-shelterwood harvest	13	13	0	0	0	0	0	0
Thinning-sanitation treatment	68	68	0	0	0	0	444	444
Seed tree harvest	0	0	0	0	0	0	83	0
Seed tree harvest-thinning	0	0	0	0	0	0	42	0
Seed tree harvest-sanitation treatment	0	0	0	0	0	0	22	0
Shelterwood harvest	0	0	0	0	0	0	16	16
Shelterwood harvest-sanitation treatment	0	0	0	0	0	0	22	0
Sanitation treatment	0	0	0	0	0	0	10	10
Precommercial thin	82	82	0	0	0	0	8	8
Broadcast burn	623	623	0	0	0	0	1,084	1,084
Site preparation burn	0	0	0	0	0	0	190	10

Table 5. Acres of big game winter range (MAs 6 and 8) habitat components by project alternative.

	Alternative A (No Action)		Alternative B		Alternative C	
Habitat Component	**Acres**	**Percent of Winter Range**	**Resulting Acres[6]**	**Percent of Winter Range**	**Resulting Acres[6]**	**Percent of Winter Range**
Forage	752	23.8	937	29.7	768	24.3
Thermal cover	321	10.2	321	10.2	321	10.2
Snow-intercept cover	227	7.2	227	7.2	227	7.2
Hiding cover	1,836	58.2	1,651	52.2	1,820	57.6
Rock, other	21	0.6	21	0.6	21	0.6
	3,157	100	3,157	100	3,157	100

As displayed in Table 5 above, all alternatives would maintain existing thermal and snow intercept cover stands, over at least the short term. Alternative B would increase the available forage acres on big game winter range by 5.9%, Alternative C would increase forage by 0.5%. Following the project, there would be no areas of open forage that lie further than 600 feet from a usable cover block for deer.

Effects to seclusion

Alternative A

No impacts to seclusion would occur under Alternative A because open road densities and the current level of human activity in the project area would not change.

Alternatives B and C

The level of human activity in the project area would increase for the duration of the project. Big game animals (particularly elk) might avoid areas of ongoing timber harvest and prescribed

[6] With regeneration harvest prescriptions (seed tree and shelterwood), all cover components would become forage. Partial harvests, precommercial thinning, and under-burning proposed with this project would degrade but not remove hiding cover.

burning. It is worth noting that white-tailed deer have been documented foraging on arboreal lichens and conifer needles within active logging units on the ranger districts. Certain logging units might be harvested over the snow, in order to better protect soils. If this were to occur, all activities would be confined to one half of the project area (either north or south of Smalle Creek) in a given winter. This measure would provide wintering big game with more secure habitat they could displace to if disturbed.

No new roads would be built with this project. All presently closed roads would remain administratively closed to the public. A few roads that are presently bermed and brushing in would be reconstructed and used with this project. Once project activities are complete, the FS would re-install berms and plant shrubs / conifers on these road entrances. This measure has proven successful at precluding OHV travel on closed roads elsewhere on the ranger districts. Thus, motorized access should not be increased on big game winter ranges as a result of this project. Where harvest areas lie adjacent to open roads, the FS would maintain vegetative buffer strips along the roads to maintain line-of-sight distances from the roads into the stands.

Blue Grouse

Alternative A—Under the No Action Alternative, the suitability of current nesting habitat would decline over time as small coniferous trees encroach upon park-like forest stands. Understory vegetation would be shaded out, reducing forage availability for blue grouse. In contrast, additional winter roosting sites could be created as younger trees mature and develop large crowns. However the build up of forest fuels due to recent fire suppression activities could result in large-scale, stand replacement wildfires that could potentially entirely remove substantial amounts of roosting habitat.

Alternative B and C—Timber harvest and controlled burning can help establish and maintain park-like areas with forest floors that are not covered with re-growth. Actions proposed under Alternatives B and C are directed towards removing conifer encroachment from mature stands and reducing fuel loads. Thinning and other timber harvest operations in younger stands would facilitate their succession into mature stands suitable for blue grouse. Mature winter roosting and feeding trees are important for this species and would not be targeted for removal under either of the action alternatives. Individual birds or nests could be impacted by prescribed burning activities. However this impact would be short term and localized and would be offset by the restoration of stands capable of providing nesting and roosting habitat and the increase in understory forage following fires.

Franklin's Grouse

Alternative A—No impacts to Franklin's grouse would occur under Alternative A because no silvicultural or fire treatments would occur. Over time, young, dense stands would mature and become less suitable for this species. Additionally, the build up of forest fuels due to recent fire suppression activities is conducive to large-scale, stand replacement wildfire that could completely remove dense forest stands and potentially mature and older structural stage forest used by Franklin's grouse.

Alternative B—Under Alternative B, 23 acres (82 percent) of lodgepole pine dominated stands in structural stage 3 would receive seed tree harvest treatment and site preparation burning. Fifty-one acres (19 percent) of stands in structural stage 5 would be thinned and a total of 105 acres (40 percent) would be broadcast burned. Some habitat for Franklin's grouse would be lost due to silvicultural treatments. Seed tree harvest treatments would shift the age structure of treated stands to a younger age class that, over the short term, would have little value to Franklin's grouse who require dense stands. However, over several years, these stands would mature and could again provide suitable nesting and forage sites for this species. Thinning medium aged stands would accelerate their development to mature stands, where they would lose some of their value to this species.

In contrast, broadcast burning has the potential to create new habitat for Franklin's grouse in the project area. Lodgepole pines thrive under the influence of fire, and on many sites fire is essential to the dominance of this species. This has been attributed to the early seed production, prolific seed production, high seed viability, high seedling survival, and rapid growth characteristic of this species (Anderson, 2003). However, it may take one to two decades before it becomes suitable for Franklin's grouse.

Alternative C—Alternative C does not propose any activities on mixed/lodgepole pine stands in structural stage 3, however it does involve the same amount of thinning and burning in structural stage 5 stands as Alternative B. Consequently, Alternative C would not remove any suitable Franklin's grouse habitat. All other impacts associated with Alternative C would be comparable to those described previously for Alternative B.

Northern Three-toed Woodpecker

Alternative A—No impacts to northern three-toed woodpecker habitat would occur under this Alternative because no silvicultural or fire treatments are proposed. Downed wood would continue to be recruited in mature stands that would provide foraging and nesting and foraging opportunities. However, over time, as fuel loads increase due to fire suppression activities, these stands could be removed by large-scale, stand-replacement wildfires.

Alternative B and C—Under Alternative B thinning or sanitation treatments would be applied to approximately 151 acres of forest with a lodgepole pine component; 23 acres of this habitat would be seed tree harvested. Approximately 290 acres would be broadcast burned as a means of restoring the natural fire regime and approximately 23 acres would be burned for site preparation. Under Alternative C approximately 151 acres would be thinned or given sanitation treatment. Alternative C also proposes to broadcast burn 290 acres of forest with a lodgepole pine component.

Silvicultural activities would retain Douglas-fir and grand fir, so lodgepole pine would be removed from these stands. However, mature trees would not be targeted. Thinning would improve overall health and vitality of the stands, which could provide higher quality habitat for three-toed woodpeckers. No impacts would occur in stands with a dominant Engelmann spruce component under either of the alternatives.

Pileated Woodpecker, Pine Marten, Barred Owl

Pileated woodpeckers, pine marten, and barred owls are MIS species associated with mature and old-growth forests (e.g., those in structural stages 5, 6, and 7). Pileated woodpeckers rely on old growth stands for feeding and nesting and require an average territory size of approximately 600 acres per pair. Optimal habitat for pine martens includes old-growth conifer and mixed stands with a dense overstory (40-60 percent) and abundant understory vegetation. Pine martens den and hide in rotten logs, stumps, and slash piles and prey on various rodent species (e.g., mice and voles) that rely on understory vegetation. Barred owls forage in mature and old growth stands in structural stages 5 and 6 with open understories to allow maneuverability while flying. Optimal habitat for nesting and roosting includes old growth stands and riparian forest habitats where dead and dying trees and snags provide abundant cavities.

Direct and Indirect Effects

Impacts to mature and old growth habitats

Alternative A— In the absence of a natural fire regime, forest stands in structural stages 5, 6, and 7 would become encroached upon by young conifers over time. Increased stand densities, in combination with the build up of forest fuels due to past fire suppression policies, has increased the potential for large-scale, stand replacement fires that could completely remove mature and old growth forest stands and the foraging, nesting, roosting, and denning habitats they provide for pileated woodpeckers, pine marten, and barred owls.

Alternative B—Alternative B would relocate designated MA-1 habitat to the north, and increase it from approximately 640 acres to 730 acres. Approximately 591 acres of the new MA-1 would consist of structural stage 5, 6, and 7, an increase of 25 acres. In addition, the new MA-1 contains approximately 12.9 miles of class 2, 3, and 4 streams, whereas the existing MA-1 encompasses approximately 3.3 miles of class 2, 3, and 4 streams.

No silvicultural activities or burning would occur in MA-1 habitats under this alternative. Alternative B proposes thinning or sanitation treatments on approximately 1,065 acres of stands in structural stages 5, 6, and 7, under-burning on 2,692 acres, and seed tree or shelterwood regeneration harvest on 175 acres. Both silvicultural and burn activities have the potential to remove overstory cover, however the greatest amount of removal would occur under seed tree or regeneration harvest regimes. No timber harvest activities would occur in mature forest stands that would meet the North Idaho Zone definition of old growth. All timber harvest activities are aimed at reducing the risk of large-scale wildfire and would not involve the removal of trees greater than 21 inches in diameter, with the exception of a minimal number that would need to be removed from equipment corridors or to maintain worker safety. Consequently, the integrity and function of these habitats would be maintained and proposed silvicultural treatments would promote the development of late-successional stand characteristics.

Thinning and sanitation treatments would increase the vitality of mature and old growth stands and increase their resiliency to fire, insects, and disease. Less crowded stands would have a lower chance of severe, stand-replacement forest fire that could remove dominant overstory trees and snags used by pileated woodpeckers and barred owls for roosting and nesting. Stands that are more open would also enable barred owls to have better maneuverability through forest stands while hunting. Thinning would remove some overstory cover and would reduce the suitability of these habitats for pine marten if they reduce canopy cover to less than 40 percent. Thinning in younger stands would be beneficial to all of these species because it would facilitate the successional development of mature and old growth forest characteristics.

Seed tree and shelterwood regeneration harvest prescriptions would remove larger patches of trees from forested stands, however, seed tree harvesting would only occur in structural stage 5 stands, impacting 175 acres or 3.8 percent of potential habitat. Larger openings devoid of cover would be avoided by pine marten. No trees larger than 21 inches in diameter would be cut under any prescription so potential nesting or roosting sites for pileated woodpeckers or barred owls would be maintained.

Prescribed burning would have variable impacts on habitats used by pine martens, pileated woodpeckers, and burrowing owls. In stands with less fuel build up, fires would primarily burn understory shrubs, leaf litter, and herbaceous vegetation and would have little impact on overstory trees. However, the reduction in horizontal cover could result in the temporary displacement of these species. In stands with more extensive ground and ladder fuels, prescribed fires could become severe and result in the removal of mature and old growth trees as well as snags and downed wood that provide nesting, denning, and foraging sites. Extensive high intensity fires are not anticipated with this project and the risk of intense fire behavior would be minimized by igniting during optimal fuel and weather conditions and avoiding ignition of dense cedar/hemlock stands with the greatest risk.

Alternative C— As under Alternative B, Alternative C would relocate designated MA-1 habitat and increase it to 730 acres. No silvicultural activities or burning would occur in MA-1 habitats under this alternative. Alternative C proposes to thin or apply sanitation treatments to approximately 981 acres, conduct regeneration harvest on approximately 30 acres, and under-burn 3,226 acres of stands in structural stages 5 and 6 and 7. As noted previously, activities in mature stands would focus on promoting old-growth characteristics through under-burning and thinning and sanitation treatments that target trees less than 21 inches in diameter. No seed tree harvest would occur under Alternative C. Consequently, substantial impacts to overstory cover in these stands would be less than under Alternative B. Impacts to mature and old growth forest stands

would be the same as those described previously under Alternative B, although no seed tree harvest would occur.

Impacts to core habitat areas
Alternatives A, B, and C—No impacts to core habitats would occur under any of the alternatives.

Impacts to downed wood
See discussion under Primary Cavity Excavators.

Impacts to pine marten travel corridors
Alternative A—No direct impacts to travel corridors would occur under this alternative because no management activities are proposed. However, over time the increased build-up of forest fuels could result in a large-scale, stand-replacement wildfire that could consume entire travel corridors.

Alternative B— Alternative B proposes to thin or apply sanitation treatments to approximately 164 acres and burn approximately 347 acres (452 total acres affected). Where activities are proposed, two connections would be maintained between neighboring core habitat areas, MA-1 and structural stage 6 stands, per Forest Plan direction. Thinning and sanitation treatments would not eliminate the function of travel corridors for pine marten but would likely reduce their effectiveness for up to 15 years, until tree crowns grow closed once again.

Fires would also impact the effectiveness of travel corridors to pine marten, but to varying degrees depending on their intensity. In thinned stands with less fuel build up, fires would be less severe, primarily removing understory brush, grasses, and herbaceous vegetation, and leaving much of the overstory cover and large pieces of downed wood. However, fires in stands with substantial fuel build up are likely to be more severe and could remove portions of the travel corridors entirely. However, the risk of such fires would be minimized by burning under optimal fuel, weather, and moisture conditions and avoiding ignition in stands of dense cedar/hemlock that have the greatest risk. Additionally, within burned areas, tree boles, logs, shrub skeletons, and downed wood would remain that would maintain cover that could facilitate the movement of pine marten between habitat blocks in areas where overstory cover has been reduced.

Alternative C— Alternative C proposes thinning, sanitation, and burning treatments within project area travel corridors (101 acres thinning/sanitation treatment; 343 acres burning; 444 acres total), comparable to Alternative B but does not include seed tree harvest and proposes less than 1 acre of shelterwood regeneration harvest. Impacts to corridor structure and function would be comparable to those described previously under Alternative B.

Primary Cavity Excavators

Primary cavity excavators, such as woodpeckers, sapsuckers, and flickers, are forest dwelling birds that are specialized for nesting and foraging in decayed wood. These species comprise a group of MIS that represent dead wood habitats. They require trees with rotted heartwood for excavating nest holes and use both snags and down logs for foraging. By providing habitat for these species, habitat is also provided for secondary cavity nesters, including bluebirds, some swallows, wrens, flycatchers, kestrels, screech owls, and vultures.

Direct and Indirect Effects

Alternative A—Snags and downed wood would continue to be recruited over time, increasing in size as stands mature through natural succession. Without active fuel reduction, fuel bases in forest stands would increase, creating conditions conducive to large, stand-replacement wildfires. Additionally, as stands become overstocked and less healthy they would be increasingly susceptible to insect infestations and disease. Both types of disturbance have the potential to kill a significant number of trees and create an abundance of new snag and downed wood habitat that would benefit cavity nesters. However, it would take several decades following a fire of this

magnitude before a new crop of snags and downed wood could be added, while stands reinitiate and mature.

Alternatives B and C—All snags and downed wood would be retained in stands under both of the action alternatives, with the exception of individual hazard trees that would need to be cut down to maintain worker safety. Any hazard trees felled would be left on site to contribute to down log levels. This would ensure that all forest stands continue to meet forest plan snag requirements. Some additional live defective trees or snags could be created if reserve trees are injured or killed during the course of felling or skidding operations. Prescribed fire, which would occur on approximately 2,820 acres under Alternative B and 2,610 acres under Alternative C, would not impact downed wood habitats in stands with little build up of forest fuels. In these areas, fires would primarily burn understory brush, leaf littler, and herbaceous vegetation with little likelihood of killing a substantial number of overstory trees. However, in stands with significant fuel build up, stand-replacement fires are possible that could kill many trees, although extensive high intensity fires are not anticipated with this project. Over time, these trees would provide snag habitat for cavity nesters, and would eventually fall. On the ground, these trees would provide suitable dead wood habitat for other types of wildlife, including fishers and pine martens that use downed logs and stumps for foraging and denning.

Beaver

Alternative A—Hardwood stands that currently provide beavers with foraging habitat would be maintained over the short term. However, as forest succession progresses, these shade intolerant species would be replaced by more shade tolerant conifer species. Large scale wildfires, which are likely in the project area due to recent fire suppression policies that have resulted in increased fuel loads, would create new open patches where hardwood species would thrive.

Alternatives B and C—No harvest activities would occur in Riparian Habitat Conservation Areas (RHCA) under either of the action alternatives. Thus, no timber harvest would occur within 100 feet of any wetland less than one acre in size or within 150 feet of wetlands larger than one acre (USDA Forest Service 1995). Streams are similarly protected with RHCAs that range from 100 to 300 feet depending on the flow and fish bearing status of the stream. As such, there would be negligible impacts to conditions in existing hardwood stands. Prescribed fire, proposed under both Alternatives B and C, to reduce forest fuels and re-establish the natural fire regime, would likely have little impact on riparian areas. Primarily leaf duff, understory shrubs, and dense clumps of regenerating conifers would be removed. Riparian areas would be too moist in most cases to burn, although there is the potential for a minor loss of overstory trees. If existing fuel loads cause fires to increase in severity, some riparian habitat may burn.

Great Blue Herons and Raptors

Alternative A—Over the short term, there would be no impacts to great blue herons or raptors in the project area because no timber or fuels management activities would occur under this alternative. Forest habitats would continue to provide these species with nesting and foraging opportunities but would fluctuate over time as forests mature through succession. Decades of fire suppression activities have created conditions that are conducive to large-scale, stand replacement wildfires. Forested habitat types would be alternately removed and created, favoring some species and adversely affecting others, should a high intensity fire occur.

Alternatives B and C— No impacts are likely to occur to ospreys and great blue herons because virtually all foraging, nesting, and roosting habitats for these species lie outside the project area in closer proximity to the Pend Oreille River Valley.

Silvicultural activities proposed under Alternatives B and C would directly impact raptors and great blue herons through the removal of forested habitat that could be used for nesting. Seed tree and shelterwood harvest prescriptions would have the greatest impact, however all activities

would retain large, dominant trees that could be used for nesting by ospreys, great blue herons, red-tailed hawks, goshawks, and great horned owls. Any nests found during project implementation would be documented and appropriate actions would be taken, per Forest Plan direction, to minimize impacts to nesting birds.

Created forest openings would receive increased levels of sunlight that would induce growth of understory vegetation. These openings would become productive habitats for small mammals. Songbird populations would also increase due to the creation of new edge habitat. Species, such as red-tailed hawks and golden eagles, would likely take advantage of these new foraging areas. However, other species, such as Cooper's hawks, sharp-shinned hawks, and owls that require more cover would avoid these openings.

Thinning and sanitation treatments focused on reducing tree densities in younger stands could eliminate nesting habitat for Cooper's and sharp-shinned hawks. However, thinned stands with moderate canopy cover and a more open understory provide optimal foraging habitat for goshawks and great-horned owls because they can more easily maneuver while hunting. Additionally, thinning in young stands would facilitate their succession into mature stands suitable for use by mature and old growth forest associated species.

Prescribed burning under Alternatives B and C would also remove some habitat used by raptors and great blue herons, especially in areas with substantial fuel build up where fires have the potential to consume entire forest stands. Extensive burns could impact species that require high amounts of canopy cover (e.g., Cooper's and sharp-shinned hawks). However high intensity fire behavior would be minimized by burning under optimal fuel, moisture, and weather conditions and avoiding ignition in dense cedar/hemlock stands with the greatest risk. High intensity fires are not anticipated with this project, with the exception of some smaller pockets consisting of a mosaic of burned patches and unburned fire skips.

Neotropical Migratory Landbirds

Alternative A—No direct impacts to land birds would occur under this alternative as it does not propose any timber or fuels management activities. However, increased forest fuel build up due to past fire suppression policies has increased the likelihood of stand-replacement wildfires that could remove substantial portions of forested habitat in the project area used by land birds.

Alternatives B and C— Deforestation and fragmentation have been implicated in local and regional declines of songbirds in many parts of the world (Hagan and Johnston 1992), and many forest songbirds are now commonly found only in large tracts of forest (Bellamy et al. 1996). Activities that reduce the quality and quantity of nesting, breeding, and foraging habitats are most likely to adversely impact these species. Silvicultural and burn treatments proposed under Alternatives B and C could have adverse impacts on land birds including the direct removal of habitat, as well as decreased habitat effectiveness due to disturbance or habitat fragmentation. Under both action alternatives large trees and snags would be maintained so habitat for mature or old growth forest associated species (e.g., sapsuckers) would not be substantially reduced. Additionally, no harvest activities would occur in RHCAs Habitat Conservation Areas.

Thinning and sanitation treatments could impact individual migratory birds if trees removed contain nests with eggs or young. However, this loss would not have long-term impacts to landbird populations. Many species are capable of re-nesting and would likely do so elsewhere in the project area.

Seed tree and shelterwood regeneration harvest would create new edge habitat in the project area. Many songbirds thrive near forest edges and populations of these species would be expected to increase following treatments. However, forest edges also harbor a more abundant and species-rich assemblage of nest predators than do forest interiors (Marini et al. 1995) and songbirds may suffer higher nest predation near these new openings (Paton 1994).

Broadcast burning, if conducted during the spring, could also impact individual birds if nests are destroyed. This is particularly true for species that nest on the ground or in understory shrubs. Burning could result in a local, temporary reduction in nest success for some species. In many project area stands fuel loads are high and there is the potential for fires to become severe and remove substantial amounts of forest habitat. If this occurs, utility of burned areas to nesting birds would be greatly reduced for one or two nesting seasons, until understory vegetation reestablishes.

Increased levels of human activity in the project area during timber harvest and burning are potential sources of disturbance to land birds. Individual birds may be displaced from feeding or nesting areas in the vicinity of these activities, although this impact would be temporary and localized, and is not likely to impact their long-term use of these areas.

Cumulative Effects

Cumulative effects of the alternatives are based on past, current, and reasonably foreseeable future activities in the project area and areas immediately adjacent that have affected or continue to affect wildlife and their habitats. These activities include grazing allotment actions, fuels management and reforestation/thinning activities on NFS lands, forest practice applications approved by the WADNR[7], ongoing road use, and road/trail improvement projects. For a complete list see Appendix C.

Large Tree Habitat and Mature/Old Growth Forests — None of the proposed activities associated with this project involve the removal of trees larger than 21 inches in diameter, although, a few large trees would be lost within equipment corridors, prescribed burn areas, and to mitigate hazards to workers (snags). State Forest Practices regulations do not prohibit the harvest of large diameter trees on state or private lands. Many large trees have been removed from these ownerships in the area and this trend is likely to continue over time. Loss of large trees in areas adjacent the project area could impact species that nest or roost in dominant trees such as bald eagles, and great gray owls. Because large trees are associated with mature and old growth forests, their loss impacts other species that require greater canopy cover and downed woody debris characteristic of these successional stages (e.g., owls, cavity nesters.). These wide-ranging species could use areas within and adjacent to the project area, provided that travel corridors are available. This project, in combination with other similar Forest Service timber management activities, would promote the development of large tree habitat and late successional stand structure by reducing inter-tree competition for resources (e.g., water, light, nutrients) and increase the resistance of remaining trees to fire, insect, and disease through thinning.

Forage Plants—Thinning and other timber removal activities associated with this project and other Forest Service, State, and private projects would open the forest canopy and encourage the growth of understory forage plants both on and adjacent to the project area. Locally, forage conditions would improve due to the increased abundance and palatability of forage plants. Although improved forage conditions could result in increased use of these areas by wildlife, use is dependent on the presence of travel barriers (e.g., highways), large open spaces, and the level of human disturbance.

Hiding Cover/Travel Corridors—All silvicultural activities associated with this project would reduce the amount of hiding cover in the project area to some degree. These effects would be cumulative to the impacts of the forest management activities on other land ownerships, described previously. Measures to reduce impacts to hiding cover, including maintaining buffer strips along roads and trails, and retaining patches of reserve trees in seed tree harvest areas, have been incorporated into this project and other Forest Service projects. However, there are no requirements for these provisions on private lands.

[7] WA Department of Natural Resources

Removal of forest habitat and reconstruction of roads in the project area, in combination with those activities, and new road construction, on adjacent land, would also contribute to the overall level of habitat fragmentation, resulting in increased edge effects. Fragmentation reduces the amount of interior habitat and may create travel barriers for species that avoid large openings and areas with low canopy cover. Such barriers may restrict access to high quality habitats, limiting the available habitat within a home range, or isolate small populations. Travel corridors would be maintained with this and other Forest Service projects, however, there are no such requirements for activities on private lands.

Seclusion— Activity along forest roads and reconstruction of existing roads to facilitate activities proposed for this project would add to the relatively high levels of activity along roads and trails in the project area, however, conservation measures, including closing reconstructed roads following the completion of timber and fuel management activities and prohibiting motorized vehicle use along closed roads would minimize impacts to seclusion on the Colville National Forest. Impact to seclusion would be localized and temporary and would not be substantial unless multiple projects were being carried out in proximity to one another. On state and private lands new roads would continue to be built and their construction would comply with forest practices rules that include provisions for minimizing disturbance to some sensitive species (e.g., bald eagles), however the closure of these roads post project is not known.

Table 6. Summary of Effects to MIS and Landbirds.

Species	Alternative	Effects
deer and elk	A	Potential loss of open foraging habitats over time to young conifer encroachment. Increasing fuel loads would elevate the risk of wildfire removing cover over large portions of winter range.
	B, C	Thermal and snow intercept cover maintained on winter range. Increase in open forage acres; the limiting habitat type on project area winter range. Improvements would be greatest with Alt. B.
blue grouse	A	Potential loss of open park-like forest habitats over time to young conifer encroachment.
	B, C	Timber harvest and prescribed burning would promote more open under-stories and increase green forage production. This improvement would be greatest with Alt. B. Roost tree habitat and hiding cover near water sources maintained.
Franklin's grouse	A	Increasing fuel loads would elevate the risk of suitable forest habitat loss to future, hot fires. New habitats likely created in burned areas over 20 years.
	B	Large, contiguous blocks of suitable habitat not present. Lodgepole trees removed within many harvest areas. Young, dense stands of this tree species promoted over 20 years in certain treated areas. No wet spruce stands harvested.
	C	No activities within presently suitable habitat.
northern three-toed woodpecker	A	Increasing risk of wildfire removing live tree habitat. Such fires would create a "pulse" of snag habitat.
	B, C	Lodgepole pine trees favored for removal in harvest areas. No stands with a dominant spruce component harvested. No snags marked for harvest.
pileated woodpecker, pine marten, and barred owl	A	Old forest structures recruited according to natural processes. Increasing risk of wildfire removing overhead canopy, large trees, and snags over large areas.
	B, C	Old growth forest stands, travel corridors maintained. No snags or large live trees, or 12+ inch logs marked for harvest. MA-1 area (old growth associated species habitat) moved to better location. Large tree habitat promoted through thinning. Reduction in canopy closure and horizontal cover in treated areas. Decreased risk of habitat loss to stand replacement wildfire.

Species	Alternative	Effects
primary cavity excavators	A	Increasing risk of stand replacing fires that could create a large "pulse" of snag habitat. Most snags would have fallen after 10-15 years, leaving a long term gap in future habitat.
	B, C	No snags or 12+ inch diameter logs marked for harvest. High-intensity fire risk reduced.
beaver	A	Many hardwoods lost over time to forest succession. This process could be reversed by wildfire; particularly high-intensity burns.
	B, C	No activities within RHCAs. Upland hardwoods promoted by conifer harvest, burning.
great blue herons and raptors	A	Old forest structures recruited over time according to natural processes. Increasing risk of wildfire removing overhead canopy, large trees and snags over large areas.
	B, C	Protection of large tree and old forest habitats as described above. Reduction in overhead canopy, immature forest stands, and dense stand understories in treated areas. Increase in open foraging sites. Decreased risk of large scale habitat loss to stand replacement wildfire.
neo-tropical migratory land birds	A	Potential loss of shrub fields and other open forest habitats to succession. Increasing risk of conifer forest habitat loss to high-intensity wildfire.
	B, C	Protection of large trees, old forest stands, snags, and RHCAs as described above. Large tree habitat promoted through thinning. Reduction in canopy closure and horizontal cover in treated areas. Promotion of open habitats such as shrub fields. Direct nesting losses to timber harvest, burning. Decreased risk of large scale habitat loss to stand replacement wildfire.

Threatened, Endangered, and Sensitive Species (TES)

The Conger project area contains habitat for several federally threatened or endangered species that were considered in the analysis. The following table briefly describes the effects of the proposed Conger Timber and Fuels Management Project on threatened, endangered, and sensitive species, including the rationale for each determination (Table 7). Full analysis for each species is located in the Biological Evaluation (located in Appendix B).

Table 7. Summary of Effects to Threatened, Endangered, and Sensitive Species

Species	Alternative	Determination	Rationale for Determination
bald eagle	A	not likely to adversely affect	No immediate impacts to existing habitats. Increasing fuel loads would elevate the risk of large tree loss to future, hot fires.
	B, C		No large trees marked for harvest. Large trees promoted through thinning. No known nest, perch, or winter roost in project area. Newly discovered, occupied habitats would be avoided.
gray wolf	A	not likely to adversely affect	Increasing risk of large scale, forest cover loss to future, hot fires. Such fires could promote big game forage.
	B, C		Project is outside recovery habitat. Decreased risk of cover loss to fire. Increase in open forage on big game winter range. No change in road access.

Species	Alternative	Determination	Rationale for Determination
grizzly bear	A	not likely to adversely affect	Increasing risk of forest cover loss to future, hot fires. Such fires could promote green forage.
	B, C		Project is outside recovery habitat. Potential for local improvements in forage from burning and timber harvest. No change in road access.
Canada lynx	A, B, C	no effect	Project lies outside primary lynx range. Activities would not occur within the vicinity of any known lynx den site. Project is consistent with Lynx Conservation Assessment and Strategy (LCAS).
bull trout	A	no effect	No effects to existing or potential habitat
	B, C	not likely to adversely affect	Actions would maintain the current condition and would not hinder or prevent attainment of relevant indicators
wolverine	A, B, C	not likely to cause a trend to federal listing	Same as for gray wolves.
fisher	A	not likely to cause a trend to federal listing	Old forest structures recruited over time according to natural processes. Increasing risk of large scale habitat loss to future, hot wildfires.
	B, C		Decreased risk of habitat loss to stand replacement wildfire. Old growth forest stands, travel corridors maintained. No snags or large live trees marked for harvest. MA-1 area (old growth associated species habitat) moved to better location. Large tree habitat promoted through thinning. Reduction in canopy closure and horizontal cover in treated areas.
Townsend's big-eared bat	A, B, C	no impact	No known nursery, roosts, or hibernacula in project area
northern leopard frog	A	not likely to cause a trend to federal listing	No impacts to wetland or riparian areas.
	B, C		No activities in RHCAs.
sensitive plants	A	not likely to cause a trend to federal listing or loss of viability	No impacts to mature forest. Increased fuel base may result in large-scale wildfire.
	B, C		No harvest in RHCA or in proximity to wetlands. If broadcast burns become severe wet habitats unlikely to burn.

Sensitive Plants

Cumulative Effects

Cumulative effects of the alternatives are based on past, current, and reasonably foreseeable future activities in the project area and areas immediately adjacent that have affected or continue to affect wildlife and their habitats. These activities include grazing allotment actions, fuels management and reforestation/thinning activities on NFS lands, forest practice applications

approved by the WADNR, ongoing road use, and road/trail improvement projects. Because of the apparent absence of TES plants in the areas potentially impacted by the alternatives, based on field surveys, it is unlikely that the alternatives would contribute to negative cumulative effects to TES plants.

The alternatives would have ***no effect*** on the *Spiranthes diluvialis* based on 1) No sightings during intensive survey, 2) Apparent lack of suitable habitat based on existing knowledge of known populations, and 3) Distance to known populations (Okanogan County is location of closest population).

Fish Habitat

Direct and Indirect Effects of Alternative A

The Analysis Area would be more susceptible to pathogens and large stand-replacing forest fires (DCA, 2005a). Forest cover could suddenly and drastically decrease, including cover in riparian zones. This could potentially result in substantial hydrologic changes which may be greater than those predicted for the proposed alternatives. Similarly, to the extent that it makes the Conger Analysis Area more susceptible to stand-replacing wildfires, the No Action alternative could result in a sudden loss of substantial riparian shade, causing increases in stream temperature. Such a fire could result in loss of in-channel large woody debris that serves to promote the development in-stream habitat. The effects would be similar to those of timber harvest, but are likely to be more severe in terms of context and intensity.

During high hazard conditions, fires occurring in these watersheds may escape initial attack and result in substantial impacts to both soil and water resources. Depending on the frequency, size, location, and intensity of these fires, large areas of vegetation and soil litter would be removed. Increased rates of bedload movement, scouring, bank erosion, and downcutting in the higher, steeper transport reaches of these streams may also occur as a result of increased flows following high intensity fires. Sheet, rill, and gully erosion from upslope soils exposed by extreme burning conditions (steep slopes and heavy concentrations of fuels) may directly increase sediment delivery to streams. In-channel sediment storage capacities behind woody debris would either be quickly exceeded in the small intermittent headwater channels, or washed out due to increased flows. Bedload and fines would be deposited on the low gradient depositional reaches of these systems such as the lower reaches of East Fork Smalle Creek and throughout Trimble Creek. Mass wasting (slides, slumps, and debris torrents) may increase in size and frequency and that would further increase sedimentation in streams and wetlands.

The impacts of this scenario would indirectly affect downstream users. Fish habitat would decline as spawning gravels become embedded with fine sediments that decrease the intergravel dissolved oxygen. Water and soil impacts due to fire would decrease over time as vegetation becomes reestablished. The cumulative effect of large fires in these watersheds is uncertain. Streamflows and water temperatures may take up to 30 years to recover from the effects of stand-replacing fires. Effects from sedimentation would probably improve faster, while channel morphologies may remain altered for longer periods of time.

Not implementing the road reconstruction would continue to impact streams especially from the Forest Service road system and bankcutting. With the exception of a few limited locations on Winchester and Trimble Creeks, in most locations along the creeks, the existing vegetative buffer appears to be filtering out a majority of the sediment that is moving off the road system. An unknown amount of sediment would continue to enter the streams in the Analysis Area.

The habitat would continue to be dominated by a brook trout population, excepting a small population of rainbow trout in Winchester Creek and isolated pure westslope cutthroat trout in Graham and East Fork Smalle Creeks. Bull trout populations may return in larger numbers where brook trout dominance can be curbed. Refounding populations exist in the Pend Oreille watershed, and other salmonids have been found in all streams surveyed in the Analysis Area.

The primary impediments to refounding in the watershed are; passage barriers low in the Calispell system at Calispell Lake and another near the mouth of Trimble Creek, marginal summer water temperatures in the lower watershed, interbreeding (between brook and bull trout), and competition with brook trout reducing the success of native fish re-establishment.

In summary sedimentation from streambank instability would cause fish habitat to decline as spawning gravels become embedded with fine sediments that decrease the intergravel dissolved oxygen. Stream temperatures may also increase due to increased sediment loads and the removal of vegetative shade following high intensity fires. The fisheries population would decline due to degradation of habitat after such fires, but as the streams recover the fisheries population would increase.

Significant Effects - There are no significant effects to fisheries for the No Action alternative, as long as a stand-replacing fire does not occur. Maintaining the status quo, sedimentation and hydrologic alteration would not reach levels that would cause a detriment to fisheries. If a stand-replacing fire occurs, there could be a temporary drop in the fish population as the stream re-establishes equilibrium from alteration in sediment delivery and hydrologic changes, and as vegetation returns to the RHCA. Effects to R6 Sensitive fish, with the exception of pygmy whitefish and redband trout, which are not present in the Conger Analysis Area, are linked to habitat alterations resulting from high intensity fires. These effects are not expected to lead to Federal listing of these species.

Direct and Indirect Effects of Alternatives B and C

There is expected to be little difference to fisheries resources between alternatives B and C.

Road Management

Road reconstruction and use for haul can cause negative effects. Short-term (1-2 years) sedimentation is produced from ditch cleaning, cutslope rejuvenation for curve widening, culvert replacement, and drainage dip construction, etc. These effects would be especially pronounced in areas such as Trimble Creek and Winchester Creek where haul roads are near or within the RHCAs, and runoff released by the reconstruction may be less likely to infiltrate before reaching the stream. 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 revegetation.

Standard practices minimize or avoid adverse project impacts on the aquatic/riparian environment are described in the best management practices, which are excerpted from the Pacific Northwest Region General Water Quality Best Management Practices (USDA-Forest Service 1988). These standard measures are designed to minimize detrimental effects expected from the project, and have been deemed sufficient to minimize potential adverse effects from road management activities.

No new roads are proposed for construction under any alternative.

Vegetation Management

Some vegetation-modifying activity is to be expected on approximately 50% of the land surface of the Conger Analysis Area within a span of 2-3 years. All proposed harvest areas are located outside of RHCAs, and thus there would be no effect to trout or INFISH Riparian Management Objectives (RMOs) from harvest activities within individual area boundaries, except that the risk of stand-replacing fire is reduced.

For the harvest areas located adjacent to RHCAs, low intensity backburn would be allowed to creep through the riparian zone, rather than implementing highly disruptive fire abatement techniques within the RHCAs. This backburn is not expected to significantly change the composition or function of the riparian vegetation.

Timber harvest blocks outside of riparian zones typically do not result in sediment delivered to the stream system because the land surface is left irregular enough to trap eroded soil. However, care must be taken to avoid clearing intermittent or ephemeral drainages, or to track skid trails in a way that promotes gullying.

Timber canopy cover is expected to return nearly to current conditions over the long term, though more of the standing timber would be in large trees. This change in canopy cover can have several short-term impacts. Open areas tend to accumulate more snow, and lose snowpacks faster and earlier due to solar insolation, ablation from wind and—early or late in the season—more efficient melting during rain-on-snow events. In addition, opened areas also tend to have reduced rates of transpiration until a shrub or tree cover is well established. While it is likely that there would be increases in peak flows, they are not likely to be detectable without specific monitoring and localized data collection.

No quantitative means are available to estimate changes in low flow volumes. However, a recent literature review by Scherer and Pike (2003; summarized in Pike and Scherer, 2003) suggests that low flows can increase up to 31% with 30% forest removal in snowmelt-dominated areas and up to nearly 70% for more severe fire-related deforestation; however, it is likely that low flows would increase substantially less (on the order of 10% or less). Because riparian zones would remain intact, changes in low flow volumes may not even be detectable. Low flows have not been identified as a limiting factor for fish in the Conger Analysis Area (WCCD 2003).

Fire Management
The primary goal of the action alternatives is to reduce the risk of stand-replacing fire. One of the major landscape processes in this watershed is fire. Because of past fire suppression efforts, fuel loadings in the watershed are high. This increases the risk of stand-replacing fire. By reducing the risk, there is a beneficial effect to fisheries, INFISH RMOs, and fish habitat from all action alternatives.

The prescribed burns proposed as part of the action alternatives would not cause a detrimental impact to fisheries. They would not be ignited in riparian areas, nor would high intensity fire be allowed to backburn through RHCAs. Low intensity fire may be allowed into RHCAs where suppression efforts and the filtration capacity of the riparian forest floor would not decrease. For these reasons, it is unlikely that noticeable increases in sediment influxes to streams would be caused by the fuel treatments.

Nevertheless, the potential for prescribed fire to bare more soil than desired and to cause some increase in sediment production is recognized. With regard to water quality, the burning of slash and burning to restore open ponderosa pine--Douglas-fir forest 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 to be a significant influence.

Cumulative Effects
Alternatives B and C - Several projects have been identified that could contribute to the cumulative impacts of the proposed action to water resources in the Conger Analysis Area or in areas immediately downstream. Several of these projects are either downstream of or outside of the watersheds in the Conger Analysis Area and are expected to have no cumulative impact. These projects are the Calispell Creek grazing allotment and the Gardin-Taco timber sale.

Roads and Road-related Projects
The following projects are tied to maintenance of roads, trails, or other projects that have impacts similar to roads: two powerline corridors traverse the Conger project area, one on the eastern boundary and one (the Addy-Cusick powerline that went in during 1975) cuts east-west across the Conger Analysis Area in the Winchester Creek drainage; a portion of the Batey-Bould motorcycle trail is located in the north part of the project area as well as extending north of the

project area; County Road 9518 (Winchester Creek) in the south part of the project area; and general use and maintenance of National Forest System roads. Maintenance activities for these uses are expected to continue into the future. Best management practices (BMPs) can reduce, but may not be able to fully eliminate, elevated sediment delivery to streams in the Conger project area.

Past harvest and past reforestation/precommercial thinning activities
These actions, along with fire suppression, have resulted in the current landscape mosaic. Unused and inaccessible roads from these activities that are not necessary for the proposed action could continue to recover with respect to vegetation cover, or result in increased sediment loading as culverts are plugged and not maintained before failing. Regrowth in these areas of healthier forests may be able to reduce any hydrologic impacts of the proposed action.

An old irrigation ditch leading from Conger Lake that is still in private ownership
Water rights are still held for Trimble Creek. As long as rights holders abide by the low-flow restrictions, the presence of this ditch should not produce additional cumulative impacts.

The Winchester grazing allotment
This allotment included all the Winchester drainage west of the Forest boundary. Streambanks are heavily brushed in with alder in most places. Twenty-seven years of vegetation recovery has likely eliminated any cumulative effects associated with this inactive allotment.

Summary

There are no significant effects to fisheries for Alternative A, as long as a stand-replacing fire does not occur. The status quo would be maintained. Sediment would not reach levels that would cause a detriment to fisheries. If a stand-replacing fire occurs, there could be a temporary drop in the fish population until the stream heals as vegetation returns.

Alternatives B and C - The Preferred Alternative (Alternative B) is expected to result in a long term reduction in the risk of stand-replacing fire, and thus a reduction in the longer-term and more severe fire effects to fish habitat. Under this alternative overall habitat conditions would improve in the long-term. Short-term effects are expected to occur as a result of implementing either Alternative B or Alternative C. These effects are related to sediment delivery and hydrologic changes in the streams. A small amount of hydrologic change is expected to result from the reduction of canopy cover in the project area, and because much of this reduction would occur in a relatively short time period, longer recovery times are expected. Sediment delivery into streams may increase slightly over current conditions, but with the avoidance of any action in riparian areas (with the possible exception of low intensity backburn through RHCAs), the reconstruction of some roads on the Conger Analysis Area to reduce runoff, and the implementation of standard BMPs, sedimentation is not likely to cause adverse effects to fish and fish habitat.

Alternative C proposes a less aggressive approach to fire management, and would thus reduce the potential for high severity fire to a lesser extent than with Alternative B. Long-term habitat effects would be the same under Alternative C unless high severity fires do occur, and then effects would be similar to the No Action alternative.

Both alternatives propose road reconstruction efforts that would result in a slight long-term reduction in sediment delivery to streams.

Effects to R6 Sensitive fish, with the exception of pygmy whitefish and redband trout, which are not present in the Conger Analysis Area, are linked to habitat alterations resulting from high intensity fires, the risk of which would be reduced under Alternative B. Some short-term adverse effects are expected from hydrologic changes, though these effects are not expected to lead to Federal listing of these species. Cumulative effects identified for the project are not expected to significantly increase adverse effects to fish or fish habitat.

Hydrology

Direct and Indirect Effects

Prior experience with the impacts of timber harvest and silvicultural management activities demonstrate that direct impacts of the proposed actions could include changes in peak and base flows due to changes in snowmelt dynamics and transpiration, changes in water quality associated with altered streamflows, and changes in sediment delivery due to ground disturbance. Indirect effects are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. The following sections describe the analysis of these impacts for the proposed actions.

Water Quantity

No change in streamflow from present (baseline) conditions is predicted under the No Action Alternative.

Potential changes to the magnitude of peak and low flows on the Conger Analysis Area for each of the Action Alternatives were estimated on the basis of changes in short-term forest cover and target long-term cover as a result of the proposed actions. Timber basal area is expected to have a long-term target change of a 41% decrease (ranging from 38 to 47% reduction) over the entire Conger Analysis Area. Eventually, although timber basal area is reduced, timber canopy cover would be expected to return to nearly the conditions found on the forest today. More of the standing timber would be in large trees. Immediately after treatment, however, forest canopy cover would be reduced substantially, as low as 2-4 percent for the most aggressive treatments.[8] This change in canopy cover can have several short-term impacts. Open areas tend to accumulate more snow, and lose their snowpack faster and earlier than closed-canopy forest due to solar insolation, ablation from wind and—early or late in the season—more efficient melting during rain-on-snow events. In addition, opened areas also tend to have reduced rates of transpiration until a shrub or tree cover is well established.

For purposes of this analysis, there would be little difference in changes to water quantity, annual water yield, and peak flow volumes between Alternatives B and C. Modeled results suggesting a slightly lower impact on peak flows associated with Alternative C are consistent with a qualitative evaluation suggesting that direct and planned vegetation manipulation is slightly less with this alternative. Significantly, these estimated changes in peak flow volumes are all well within the standard error of the estimate for the regional regression equations. Longer-term field measurements of streamflow in paired watershed studies typically demonstrate substantial year-to-year variability in response to the peculiarities of climate, and even the most similar basins often respond somewhat differently due to peculiarities of the spatial distribution of rainfall, topography, elevation, soils and subsurface geological materials (Schoenholtz and Reiter, 2005). In addition, the probability of the larger events occurring while individual treated stands are hydrologically immature is relatively low. Therefore, while it is likely that there would be increases in peak flows following completion of treatments under either action alternative, it is not likely that these increases would be detectable beyond the Conger Analysis Area without substantially improved pre- and post project monitoring and localized data collection. In addition, RHCAs around larger streams, where interaction with the floodplain occurs, could serve to buffer this effect.

Water Quality

The No Action alternative, to the extent that it makes the Conger Analysis Area more susceptible to stand-replacing wildfires, could result in a sudden loss of substantial riparian shade, causing increases in stream temperature. In addition, such a fire could result in loss of in-channel large woody debris that serves to promote the development of local temperature refugia.

[8] This change in forest cover assumes the minimum stocking specified in each prescription is retained and an average effective canopy width per tree of 10 feet, which is typical of individual trees in the overly-dense stands now found in the Conger Analysis Area.

Because riparian conservation areas would remain intact with either of the Action Alternatives, it is not likely that either alternative would result in substantial changes in water quality, particularly of pollutants that currently are causing impairment in Winchester Creek (i.e., temperature and bacteria). Glacial deposits and a wide RHCA in Winchester Creek combine to insulate this channel from thermal impacts. Increasing the area and density of riparian shading in Winchester Creek is required to implement the TMDL[9] (Ecology, 2005a). A major exception to this could occur, however, if the riparian areas become extensively deforested as a result of wildfire. Local thermal impacts to streams could occur at detectable levels in this case. The risk of this occurring as a result of the proposed actions is very low, and would likely be equivalent with either of the action alternatives.

In the event that streamflow does change appreciably from current conditions (which is not predicted), streambeds and banks could undergo accelerated erosion until either flows return to closer to pre-European conditions or the channel bed and banks adjust to the new flow regimes. In this case, the indirect effect of the proposed action would be that turbidity levels could also increase, and remain elevated for longer in the season, until hydrologic recovery is complete.

No baseline information on nutrient or trace element water chemistry is available for the Conger Analysis Area. As noted by Feller (2005), these components of water quality are generally poorly understood, and affected substantially by the seral stage of streamside forests and underlying geology. Effects of timber harvest are even less well understood, and often result in confounding factors. For instance, rapid growth of vegetation during recovery from timber harvest would be expected to use the nutrients generated by decomposition of organic litter within harvest blocks, potentially giving rise to nutrient limitations. Prescribed burns that remove this organic litter also damage mycorrhizal fungi; therefore, while nitrate that remains could get transported to the stream network, little nitrate remains following fires. Therefore, the direct and indirect effects of the proposed action alternatives on nutrient or trace element concentrations in waters draining the Conger Analysis Area cannot be predicted.

Sediment Delivery

The No Action alternative would result in a gradual decrease in sediment yield as more of the existing unused road network becomes more vegetated. Road maintenance would be required to keep culverts from plugging. Grading of roads in riparian areas accelerates delivery of sediment to water courses; this has been observed along Winchester Creek and Conger Lake.
In addition to protecting an important component of habitat on the forest landscape, RHCAs are designed to eliminate major sediment contributions in areas of the landscape where the delivery of eroded sediment to watercourses is particularly efficient. By retaining the integrity of these riparian areas, both Alternative B and Alternative C would result in limited increased sediment delivery to water courses.

Indirect impacts of increased sediment delivery from the proposed actions include the potential for impairment of water quality (i.e., increased turbidity and suspended sediment) and degradation of stream channel habitats as the channels adjust to the increased sediment load (Gomi et al., 2005). Increased sediment load could result in increased embeddedness of larger streambed particles, deposition that impairs fish passage or reduces the geometric and hydraulic complexity of the stream channels, or deposition that results in channel widening (Hassan et al, 2005). The degree to which these indirect impacts would occur, if at all, cannot be quantified.

Cumulative Effects

Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. These actions include the proposed Action Alternatives, activities such as dispersed recreation/hunting and firewood gathering, and specific non-related projects or facilities. The cumulative effects from recreation/hunting and firewood gathering would be expected to be relatively low and related directly to improper vehicle use—e.g., off road within RHCAs.

[9] Total maximum daily load.

Several projects have been identified that could contribute to the cumulative impacts of the proposed action to water resources on the Conger Analysis Area or in areas immediately downstream of the Conger Analysis Area. The cumulative effects of these projects are not expected to differ between Alternatives B and C to any greater degree than the direct and indirect impacts vary between these two alternatives.

Two of these projects are either downstream of or outside of the watersheds in the Conger Analysis Area and are expected to have no cumulative impact: the Calispell Creek grazing allotment and the Gardin-Taco timber sale.

There are also potential cumulative impacts associated with maintenance of the two county roads in the Conger Analysis Area—Flowery Trail Road and the Trimble Creek/Conger Lake Road. Extensive reconstruction occurred over the last several years on both of these roads; erosion and sediment control BMPs on the Trimble Creek/Conger Lake Road were poor at controlling erosion, although the BMPs had managed to control sediment delivery when observed in October 2004. The county appears to routinely sidecast graded material, resulting in the delivery of sediment to the upper reaches of Trimble Creek at stream crossings.

Roads and Road-related Projects

The following projects are tied to maintenance of roads, trails, or other projects that have impacts similar to roads: two powerline corridors traverse the Conger project area, one on the eastern boundary and one (the Addy-Cusick powerline that went in during 1975) cuts east-west across the Conger Analysis Area in the Winchester Creek drainage; a portion of the Batey-Bould motorcycle trail is located in the north part of the project area as well as extending north of the project area; County Road 9518 (Winchester Creek) in the south part of the project area; and general use and maintenance of National Forest System roads. Maintenance activities for these uses are expected to continue into the future. Best management practices (BMPs) can reduce, but may not be able to fully eliminate, elevated sediment delivery to streams in the Conger project area. Some cumulative impacts in the form of accelerated sediment delivery could occur; these would likely be short-lived following the proposed actions, and be detectable for no more than a short distance downstream of the Colville National Forest boundary.

Past harvest and past reforestation/precommercial thinning activities: These actions, along with fire suppression, have resulted in the current landscape mosaic. Dense forest growth following fires in the early 20th century and regrowth following timber harvest likely reduced annual water yields over time. The effect of these conditions on peak flow volumes is more problematic, as construction of roads and relatively recent clearcuts (e.g., on northeast facing slopes of the East Fork Smalle Creek) could have increased peak flows. Measured data suggests that the hydrologic response of adjacent watersheds (e.g., Smalle and Winchester) varies substantially. Therefore, it is not likely that the cumulative effects of these confounding changes in the watershed of the Conger Analysis Area over the last half century could be detected beyond the Analysis Area (MacDonald and Coe, 2005; McDonnell, 2005). Regrowth in these areas of healthier forests may be able to further reduce any cumulative impacts on water quantity of the proposed action.

Unused and inaccessible roads from these activities that are not necessary for the proposed action could continue to recover with respect to vegetation cover, or result in increased sediment loading if culverts are plugged and not maintained before failing. Vegetation and sediment obscured many of the culverts observed during the field investigation associated with this analysis; although no failed and unrepaired culverts were found, several culverts (e.g., in Trimble and Graham Creek drainages) had been recently repaired or were in need of repair.

Forest Practice Applications: Two forest practice applications (FPAs) were submitted in mid-2004 for timber harvest in the Dorchester Creek drainage immediately south of the Conger Analysis Area. Like Winchester Creek, Dorchester Creek is a tributary of Calispell Lake. Both of these FPAs include timber harvest in outer riparian zones, no harvest in inner riparian zones, ground-based skidding on steep slopes and reforestation through a combination of leave tree/seed tree

rather than by active planting. As with all timber harvest on private lands, these FPAs are governed by state forest practice rules, which are designed to be protective of aquatic resources while allowing for economic use of timberlands. Watersheds in this portion of the Colville National Forest do not appear to be highly sensitive to well-conceived and executed timber harvest as measured by mass wasting potential. Riparian buffers have been effective at limiting sediment loading from skidding and road-building activities. Therefore, while there is a possibility of a slight increase in sediment loading or peak flows associated with these FPAs, it is not likely that these effects would be translated as far downstream as Calispell Lake (MacDonald and Coe, 2005).

Nearly all remaining checkerboard lands in private ownership east of the Conger Analysis Area to the drainage divide of the Pend Oreille River have experienced timber harvest in the recent past, and would not be expected to have timber harvest activities on them for several more decades. Timber harvest activities on these lands would be governed by state regulations in place at the time of harvest.

Culvert replacements to improve fish passage: Three culverts on Trimble Creek and one culvert on Graham Creek are barriers to fish passage that need to be replaced. Replacement of small-diameter circular culverts with open-bottom culverts can improve fish passage as well as passage of debris and sediment, but often requires disturbance of the stream to provide the additional grade control that the circular culvert provided. Culvert replacement also often results in minor to moderate short-term increases in stream turbidity due to construction and minor channel adjustments to the new culvert. These increases typically return to background within a year or two. Erosion and sediment control BMPs practiced on the Colville National Forest would limit, but could not exclude, a short-term increase in sediment loading associated with the actual construction of the replacement stream crossings. As long as the BMPs are appropriately installed to withstand storm intensities expected during construction and no incidental burning of the RHCAs occurs, no detectable or long-term negative cumulative impacts would be expected when culvert replacement is combined with the proposed actions.

An old irrigation ditch leading from Conger Lake that is still in private ownership: Water rights are still held for Trimble Creek. As long as rights holders abide by the low-flow restrictions, the presence of this ditch should not produce additional cumulative impacts.

The Winchester grazing allotment: This allotment included all the Winchester drainage west of the Forest boundary. Streambanks are heavily brushed in with alder in most places. Twenty-seven years of vegetation recovery has likely eliminated any cumulative effects associated with this inactive allotment.

Soils

Direct, Indirect, and Cumulative Effects of Alternative A

By deferring treatment at this time, alternative A poses no short-term impact to soil resources. Soil conditions and processes would remain essentially as they are. There is probably more forest floor material than occurred under historic conditions. This material would continue to build-up until it eventually burns.

Potential adverse effects of an uncontrolled wildfire

The location, size and intensity of future wildfires is difficult to estimate, though some generalizations can be made. Generally uncontrolled wildfires occur during the driest time of the year, yielding a more intense fire than would occur under prescribed fire conditions. The adverse effects of an intense fire – loss of forest floor material, increased erosion, changes in soil biota – would be more widespread in an uncontrolled wildfire than under a prescribed fire.

The primary impact of an intense fire on soil productivity is increased erosion. Increased erosion is due to increased exposure of mineral soils (litter and duff burned off), the development of water

repellent conditions, and destruction of soil aggregates[10]. Robichaud and Brown (1999) measured erosion rates for 4 years following a wildfire in eastern Oregon. Mean annual erosion rates were highest in the first year (mean average 38 Mg/ha). Erosion rates declined sharply through the following years (mean average 2.3 Mg/ha year 2, 1 Mg/ha year 3, 0 Mg/ha year 4).

If the organic matter of the mineral soil is reduced (as happens with a high-intensity, long-duration fire) the cation exchange capacity of the soil is also reduced and the ability of the soil to retain nutrients leached from ash decreases (Harvey *et al.* 1994). The soils in this Analysis Area have volcanic ash in the soil surface, which has a high cation exchange capacity. While removal of organic matter would reduce overall cation exchange capacity, these soils would retain more capacity than most forest soils.

High intensity fires may volatilize some chemicals that are plant nutrients – specifically nitrogen and sulfur.

Typically cation plant nutrients (e.g., potassium, calcium, etc.) do not volatilize at temperatures found in fires, they remain on the site in the ash (Downer and Harter, 1978). These cation nutrients may be lost through leaching. These nutrients would eventually be replaced from the decomposition of rocks.

Several researchers have suggested that fires, especially moderate and high intensity fires, can have a profound effect on soil arthopods, soil microbiology and nutrient cycling. Visser and Parkinson (1999) found that severe wildfires in the boreal forests of Alberta killed most of the fungi species studied, and that it took about 65 years for the fungal community to recover. Amaranthus and others (1994) found that fires killed mycorrhizal fungi. Hungerford and others (1991), in a review of literature, report that burning kills many kinds of bacteria, fungi and arthropods but the extent of this effect is dependent on the amount of heat generated by the fire and the moisture content of the soil. Also, the effect may be short-lived.

Direct and Indirect Effects of Alternatives B and C

The nature of the impacts are similar between the two alternatives, but the extent (number of acres impacted) varies.

The effects of construction of roads and landings

Ketcheson, Megahan and King (1999) noted that "Numerous studies have shown that most sediment resulting from timber harvest activities is caused by erosion on forest roads associated with the harvest rather than by erosion on the areas disturbed by tree cutting and skidding." Erosion from roads and landings may move into the fluvial system, impacting water quality and stream functions.

Regardless of soil type and site conditions, detrimental soil compaction and displacement always occurs on roads and landings. Alternative B would construct landings and about 1.5 miles of

Methods and Assumptions:

As available, existing roads and landings would be utilized before new areas would be impacted.
Landings-- Each harvest area would have at least 1 landing, in general that landing would be about ¼ acre in size. Tractor units would have 1 landing for each 20 acres. CTL units would have 1 landing for each 40 acres. If a suitable road is present, CTL units may have fewer landings. Helicopter landings are generally larger, about ½ acre in size. The number of landings for skyline units varies and depends on the terrain. In general, landings would not be placed within the powerline clearings. Each area was examined to see if an existing landing could be used. Areas were identified where landings would probably need to be constructed, and estimated the number and acreage.
Roads – The new temporary roads were estimated to be constructed to be about 20 feet wide (from top of cutslope to bottom of fill slope), which is about 2.5 acres per mile. The pre-sale forester provided the miles of temporary road construction. Temporary road construction on existing unclassified roads was not included, since it does increase total detrimental soil conditions.

[10] Organic matter is important in stable soil aggregates. High soil temperatures burn the organic matter in the soil matrix, leaving the soil in an 'ashed' condition. Ashed soil is a fine powder that has lost its natural cohesiveness and is highly erodible. This characteristic has been observed on the Leona Fire and Togo Fire, both on the Colville National Forest.

temporary road to access harvest areas. Alternative C is not expected to require any new temporary roads, but may reuse existing unclassified roads.

The construction of roads and landings is considered an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16. Roads and landings can be obliterated and some productivity restored; however, full productivity would not be restored for many years until organic matter is restored, soil tilth has redeveloped, an A horizon develops, and soil processes are restored (Brady, 1974).

The effects of commercial thinning, sanitation and salvage prescriptions using a ground-based logging system, followed by underburning or jackpot burning

For these stands, the effects of cutting commercial-sized trees and moving them to common decking areas (Alternative C) are the same as the effects of a commercial harvest (Alternative B). The primary impact from these treatments is compaction which is generally limited to designated skid trails. If a tractor is used, the skid trails are also subject to increased erosion.

The potential for compaction off of skid trails, erosion and changes in soil biology were analyzed as well.

Compaction - Compaction is an increase in the bulk density of a soil. Compaction occurs when ground-based equipment crosses the ground, vibrating and compressing the soil. Compaction adversely effects soil productivity and ecosystem processes by a variety of mechanisms including increasing the resistance to root penetration and elongation, changes in air and water movement through the soil, and subsequent changes in soil processes (e.g., soil microbiology, and nutrient cycling).

Definition: Detrimental compaction is defined by the Colville National Forest as an increase in bulk density of 15-20% over the undisturbed level, and macropore space reduction of 50% or more (Forest Plan FEIS glossary pg. 11).

The degree of compaction on skid trails can vary widely depending on –

1. logistics of the operations -- the number of times a piece of equipment passes over the same piece of ground,
2. the type of equipment used -- the size, weight, and type of wheels or tracks, and the
3. soil and site conditions -- rock content of the soil, soil moisture conditions, and the presence of ameliorating conditions such as frozen soil, snow or logging slash. (Alexander and Poff, 1985).

The impacts from skidding and falling equipment may not meet the criteria for a detrimental impact.

With tractor skidding, the main skid trails would experience detrimental compaction regardless of soil characteristics – unless ameliorating conditions exist such as snow or frozen ground. The project designates the minimum skid trail spacing. With 130 foot skid trail spacing, this project would detrimentally compact about 10% of the activity area. If few trees are cut, such as may occur during a commercial thinning, fewer skid trails may be needed and the skid trail spacing would increase. At this time it is not possible to determine if that would be the case for any of these stands.

Whether a cut-to-length (CTL) system would create detrimental compaction is not significantly related to soil characteristics. Soils with high compaction potential, like Newbell silt loam, would compact in the main skid trails about the same as soils with a lower compaction potential like Inkler loam. The compaction in CTL trails is strongly related to the amount of slash or snow buffering the trail and the number of times equipment uses the trail (number of passes). CTL systems, with proper slash buffering, do not create detrimental conditions on the entire skid trail.

Monitoring on soils that are easily compacted (Waits loam, Z-Slumber Timber Sale) found that about 40% of the main CTL trails were detrimentally compacted, and about 15% of the secondary trails were detrimentally compacted. The compaction in main trails occurred in broad strips roughly correlating to the tracks, but extending beyond the tracks. The compaction on secondary trails occurs intermittently in the tracks. It is likely that soils with a moderate compaction potential would experience slightly lower levels of compaction on secondary trails. Unlike a tractor, the number of CTL trails does not go down as the volume removed goes down, but the number of passes on individual trails does go down. Mitigation is included to prevent the use of a CTL system unless the area has sufficient slash or snow. With sufficient slash or snow, a CTL activity area would experience about 9-11% detrimental compaction.

Methods and Assumptions:
Existing detrimentally impacted areas would be utilized to the extent possible.
Tractor skidding—Minimum skid trail spacing would be 130 feet over 80% of the activity area. Skid trail spacing would be lower on about 20% of the unit, approaching the landings. Skid trail spacing in that 20% of the unit would be about 80 feet. Skid trails would be 12 feet wide. This would result in about 10% of the activity area in a detrimentally compacted condition.
CTL skidding– Minimum CTL trail spacing would be 40 feet. 70% of the CTL trail would have sufficient slash to prevent detrimental compaction. At 40-foot spacing, a 12-foot trail system would constitute about 30% of an Analysis Area. If 70% is not detrimentally disturbed, the activity area would be about 9% detrimental conditions overall. This value of 9% is consistent with McIver's 1998 findings in the Blue Mountains.
Units with insufficient slash would only be logged with a CTL system if snow were present.

Soils may remain compacted for a long time. Froelich and others (1985) found that surface layers decompacted in central Idaho tractor skid trails, but subsurface compaction in skid trails remained after 23 years. In a summary of the literature, Alexander and Poff (1985) noted that under natural conditions mild and moderate compaction can be ameliorated by shrink-swell due to wetting and drying cycles, frost action, and biotic activity. In summary, the main tractor skid trails are likely to remain highly compacted for a long time and probably constitute an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16. Secondary tractor skid trail are expected to decompact over a period of 30-50 years.

The common soils found in the proposed ground-based harvest areas are Newbell-silt loam, Aits loam, Bonner silt loam, Kiehl gravelly silt loam, Moscow silt loam, and Inkler loam. The compaction potential for these soils is "high" – but in this Analysis Area they typically occur in a rock outcrop complex. This results in soils with a moderate to high rock content – which reduces the compaction potential to "moderate". All or parts of the following stands have a "high" compaction potential 3017376, 3017486, 3017487, 3017493, 3017496, 3017501, 3017542 – because the rock content is lower in these areas.

A high compaction potential means that a single pass by a piece of equipment under dry conditions may cause detrimental soil compaction, and two or three passes under moist conditions would probably cause detrimental soil compaction. A "moderate" compaction potential means that a single pass under dry conditions is less likely to cause detrimental compaction – though several passes under moist conditions would probably cause detrimental soil compaction. This project requires heavy equipment to remain on designated skid trails; compaction would be limited to these trails and landings. The area impacted by trails and landings would be limited by the Timber Sale Administrator.

Erosion and Sedimentation - Surface erosion is the detachment and transport of individual soil particles by wind, water, or gravity. Surface erosion can occur as the loss of soil in a fairly uniform layer (sheet erosion, dry ravel), or as concentrated erosion (rills and gullies). Severe erosion removes nutrient-rich topsoil, thereby reducing soil productivity. Monitoring on the Colville National Forest has seldom found erosion in areas large enough or severe enough to meet the criteria for detrimental surface erosion (Nancy Glines, personal observation).

Definition: The Region 6 Soil Quality Standards define detrimental erosion as visual evidence of surface loss in areas greater than 100 square feet, rills or gullies and/or water quality degradation from sediment or nutrient enrichment. (See FSM 2532).

Tractors that cross the same ground many times eventually remove the duff and forest floor material baring the soil to erosion. The soil on these heavily used skid trails is generally also compacted and the soil structure is destroyed. Because of the slope limitations for tractor logging, none of the soils with high surface erosion potential would occur on skid trails. The project includes measures to minimize erosion on skid trails such as water bars and seeding. Because the erosion on heavily used tractor skid trails occurs on already degraded sites, this erosion does not add to the amount of ground with reduced soil productivity.
Cut-to-length machines that place a mat of slash before them do not bare the soil and subject it to erosion. Erosion is rarely observed on CTL trails.

The proposed underburning must be of a low intensity to avoid killing large numbers of overstory trees. Prescribed fire at all intensity levels burns the duff and soil litter layer. Complete duff and litter removal would cause surface erosion (Harvey *et al.* 1994). The surface soils in this analysis typically have a gravelly or stony silt-loam texture – a texture that is susceptible to raindrop impacts, surface sealing and increased runoff. In general, low and medium intensity fires burn only part of the duff and litter – leaving adequate soil cover over the majority of the site. The fires prescribed in both alternatives B and C are expected to burn the duff and litter in small, discontinuous areas throughout the prescribed burn areas. Because of their small size (<100 square feet) these areas are not expected to degrade long-term site productivity. Because of the discontinuous pattern across the landscape, these areas are not expected to contribute sediment to nearby streams.

Soil biology and nutrient cycling - It is unlikely the proposed thinning, sanitation/salvage would reduce crown cover enough to influence temperature or water regimes (Hermann, 1978).

Timber removal can result in both soil warming and an increase in soil moisture due to reduced evapotranspiration – the extent of the change is dependent on the amount and size of the timber removed. The soils warm in response to increased solar radiation, the more overstory trees removed the greater the effect (Hermann, 1978; Smith, 1986). Removing trees also reduces evapotranspiration because the total biomass of living plants is reduced. This effect typically disappears quickly as other plants reoccupy the site (Stone et al., 1978). Loss of canopy combined with increased soil moisture can create conditions favorable to decomposition of organic matter and increased biologic activity (Grier and others, 1989).

Timber removal can change soil microbiology through changes in stand density, soil temperature, moisture regime, species composition, and composition of the forest floor. The soil flora and fauna naturally changes as the vegetation changes – the flora and fauna that are present in a young stand is different than a middle-aged stand, and that is different from an older stand (Plitz and Molina, 1996). Changes in types of fungi have been documented in stands that have been thinned, but these stands have had about the same total biomass of fruiting bodies (Waters et al., 1994). Reductions in ectomycorrhizal fungi diversity is likely where vegetation is intensively used, composition simplified, or surface organic matter is removed or consumed (Amaranthus and Louma, 1995). Neither alternative proposes to simplify composition. Logging and tree removal alone does not remove the organic material on the forest floor. All alternatives retain the larger trees, which when they die and fall down provide the refugia needed especially on drier sites.

Hungerford and others (1991), in a review of literature, report that burning kills many kinds of bacteria, fungi and arthropods but the extent of this effect is dependent on the amount of heat generated by the fire and the moisture content of the soil. Also, the effect may be short-lived. To what extent these changes represent a degradation of soil and site productivity is not clear. Hungerford suggests that light to moderate intensity burns may have little long-term negative effect on soil micro-organisms. Harvey and others (1994) suggest that, if the forest floor material is not entirely destroyed, the effects of fire on soils are usually minimal. Tiedemann and others (1999) cautions against the adverse effects of prescribed fires which are too intense or too frequent. Several researchers recommend maintaining soil carbon to maintain biologic activity (Harvey et al., 1994; Stark and Hart, 1999), and recommend maintaining a lot of heterogeneity in

burned areas to provide the micro-flora and –fauna to reinvade burned areas (Moldenke, 1999). The prescribed fire proposed under Alternatives B and C would be light intensity with small areas of medium intensity, retaining unburned islands. This kind of burn would not have a long-term adverse impact on soil biota.

Nutrient loss from the removal of the boles of trees is typically small and can be replaced through the course of a rotation (Spurr and Barnes, 1980; Grier et al., 1989). Much of the nutrients in a tree are located in the bark, limbs and foliage (Grier, et al., 1989). High intensity fires may volatilize soil nutrients such as nitrogen and sulfur. The fire intensity proposed in Alternatives B and C would not be high enough to volatilize a significant amount of these plant nutrients. Typically cation plant nutrients (e.g., potassium, calcium, etc.) do not volatilize at the temperatures expected in these alternatives. They remain in the ash, where they may be leach into the soil (Downer and Harter, 1978). Because of the amount of organic matter to be left on the site, significant leaching is not expected to occur under Alternatives B and C.

Total Detrimental Soil Conditions - The primary detrimental soil condition would be from compaction. A small amount would occur from erosion on skid trails (if a tractor is used) and as a result of underburning. Overall detrimental soil conditions would be about 8-15%.

The effects of shelterwood and seed tree prescriptions using a ground-based system followed by jackpot burning or underburning

The effects of cutting commercial-sized trees and moving them to common decking areas (Alternative C) are the same as the effects of a commercial harvest (Alternative B). The primary impact from these treatments is compaction which is generally limited to designated skid trails. If a tractor is used, the skid trails are also subject to increased erosion.

Compaction - The definition and implications of compaction are discussed in the previous section, and are not repeated here. Since designated skid trails would be used, the amount of compaction is expected to be similar to that found in a thinning prescription. The following stands have a “high” compaction potential: 3017379, 3017399, 3017402, 3017464, 3017483, 3017485. Even though more volume would be moved, the number of skid trails would remain about the same.

If a CTL system is used, the greater the amount of timber removed the more slash is available to protect the soil in the trails.

Erosion and Sedimentation - The definition and implications of erosion are discussed in the previous section, and are not repeated here. If a CTL system is used, the greater the amount of timber removed the more slash is available to protect the soil in the trails.

Often, the amount of woody fuel is greater when more timber volume is removed. The higher levels of woody fuel on the forest floor increases the fire intensity and duff consumption. Some areas would probably experience complete duff and litter removal -- subjecting these areas to surface erosion. The surface soils in these stands are mostly Newbell silt loam and Inkler loam. The fires prescribed in both alternatives B and C are expected to burn the duff and litter in discontinuous areas throughout the prescribed burn areas. Because of the discontinuous pattern across the landscape, these areas are not expected to contribute sediment to nearby streams.

Soil biology and nutrient cycling - Shelterwood could leave a more open stand. On exposed south or western aspects, shelterwood treatments may increase stand temperatures, increase soil moisture, and favor decomposition of the duff and soil organic matter. The amount of duff and soil organic matter would decline slightly, consistent with the stand characteristics. Both alternatives propose some shelterwood treatments. The changes in soil temperature, moisture regime, and the amount of organic matter are not detrimental to long-term site productivity.

Total Detrimental Soil Conditions - The primary detrimental soil condition would be from compaction. A small amount would occur from erosion on skid trails (if a tractor is used) and as a result of prescribed fire. Overall detrimental soil conditions would be about 8-15%.

The effects of underburning as the only treatment
The primary impact would be erosion.

Erosion - Most of the areas proposed for underburning do not have a high erosion potential – they are too rocky.

The proposed underburning is low to moderate intensity. Most of the treatment areas are open grown timber, hardwoods, and moderately dense brush. Low and medium intensity fires burn only part of the duff and litter – leaving adequate soil cover over the majority of the site. The fires prescribed in both alternatives are expected to burn the duff and litter in small, discontinuous areas throughout the prescribed burn areas. Because of their small size (<100 square feet) these areas are not expected to degrade long-term site productivity. Because of the discontinuous pattern across the landscape, these areas are not expected to contribute sediment to nearby streams.

Soil biology and nutrient cycling - The general effects of underburning on soil biology were described in a previous section. The prescribed fire proposed under Alternatives B and C would be light intensity with small areas of medium intensity, and retaining unburned islands. This kind of burn would not have a long-term adverse impact on soil biota.

Total Detrimental Soil Conditions - The primary detrimental soil condition would be erosion from the burning. Overall detrimental soil conditions would be about 3-10% from these treatments.

The effects of precommercial thinning
Pruning and precommercial thinning do not disturb the ground, therefore these activities are not expected to impact long-term soil productivity.

Cumulative Effects Common to Alternatives B and C

Cumulative soil effects happen when multiple events, such as past logging, firewood gathering, or recreation, occur in the exact same area. The following past or on-going activities were used to analyze cumulative effects: past logging, recreation, U.S. Air Force Survival training, and firewood collecting. There are no other reasonably foreseeable activities proposed in this area at this time.

Existing detrimental soil conditions from past and on-going activities are generally very low. Every proposed timber harvest area was examined for evidence of detrimental soil conditions from past and on-going activities. Most of the stands have no existing detrimental soil conditions. The following stands have existing detrimental soil conditions between 5 and 10%, and the cumulative effects for these stands would be described individually.

Stand 3017356 - Existing detrimental soil conditions are about 5% (transects estimated the number as 1%, but the transects missed some unclassified user-created roads and a small homestead era clearing along the edge of the stand). The primary detrimental condition is compaction from unclassified homestead era roads that are currently used for firewood gathering. In Alternative B the proposed action is a shelterwood/sanitation salvage, followed by jackpot burning, using a ground-based yarding system. This stand is not treated in Alternative C. The unclassified roads are well-suited to be used for skid trails or skid roads. The homestead era clearing could be used for a landing, but that may not be allowed if it a heritage resource. Detrimental soil conditions in this stand are not expected to exceed 10-12% after treatment.

Stand 3017358 and 3017417 - These stands are adjacent to each other and are located between FR 9518101 and the Addy Powerline. Existing detrimental soil conditions are about 5-10%

(transects estimated the number as 1%, but the transects missed some user-created roads and firewood activity along the powerline). The primary detrimental condition is compaction from firewood gathering activities. The proposed treatment is a commercial thinning followed by an underburn. These stands are treated in both alternatives. It is unlikely the user created roads would be used for skid trails – they meander too much. But the existing level of detrimental compaction is low. Detrimental conditions are not expected to exceed 10-12% after treatment.

Stand 3017367 **-** Existing detrimental soil conditions are about 5% (two system roads go through the stand). The primary detrimental condition is the system roads. The proposed treatment is a seed tree harvest followed by a jackpot burn in Alternative B, and this stand is not treated in Alternative C. Most of the stand can be reached from the existing roads and the gravel pit next to the stand. Detrimental conditions are not expected to exceed 10-12% following treatment.

Stand 3017402 **-** Existing detrimental soil conditions are estimated to be about 5%. The primary detrimental soil condition is unclassified roads and user-created roads from firewood gathering activities. The proposed treatment is a seed tree harvest followed by a jackpot burn in Alternative B; this stand is not treated in Alternative C. All of the unclassified roads would be used for skid roads. The user-created roads would not generally be useful because they are mostly too short and scattered. Detrimental soil conditions are not expected to exceed 15% following treatment.

Stand 3017485 **-** Existing detrimental soil conditions are about 5%. The primary detrimental condition is compaction from firewood gathering activities along FR 3116073. The proposed treatment is a seed tree harvest followed by a jackpot burn in Alternative B, and this stand is not treated in Alternative C. The user-created roads would not generally be useful because they are mostly too short and scattered. Detrimental soil conditions are not expected to exceed 15% following treatment.

Stand 3017542 **-** Existing detrimental soil conditions are about 5-10%. The detrimental conditions arise from several causes – livestock trespassing from adjacent private land, the presence of an old gravel pit, several unclassified roads, and firewood gathering. Most of these detrimental conditions are located in the extreme southeast corner of the stand. The proposed treatment is a commercial thinning followed by an underburn. The gravel pit would probably be used as the landing, and the most significant of the unclassified roads would probably be used as part of the skid system. Detrimental conditions are not expected to exceed 15% following treatment.

The cumulative effects of the increased spread on noxious weeds on soil productivity can only be described in general terms because of the large number of unknown variables. As described in the Noxious Weed report, weeds are likely to spread regardless of the alternative selected. Using a rainfall simulator in central Montana, Lacey and others (1989) found that sites dominated by knapweed have more runoff and sediment delivery than adjacent bunchgrass grassland sites. It is likely that areas dominated by knapweed have higher erosion rates than similar areas dominated by grasses or covered by duff. It is not clear how noxious weeds compare to native forbs that naturally invade burned and disturbed sites. Alternatives B and C provide for a mechanism, through the timber sale contract, to seed disturbed areas. This seeding would reduce erosion and prevent the establishment of noxious weeds.

Considering cumulative effects, the total acreage of all detrimental soil conditions would not exceed 20% of the total acreage within any of the proposed activity areas, including landings and system roads. Both action alternatives meet the Forest Plan with regard to soil management.

Scenery Management

Direct and Indirect Effects of Alternative A

In general, no immediate change would occur in the quality of the scenic resource. The quality of the Conger Analysis Area as a scenic backdrop may not be sustainable. While no proposed activities would occur in this alternative, and consequently no immediate change in landscape

appearance, in the long-term due to the high risk of stand-replacing wildfire, this appearance may not be sustainable.

Direct and Indirect Effects of Alternatives B and C

The following activities/treatments would meet their respective Partial Retention and Modification Visual Quality Objectives (VQOs) (as seen from the critical viewing locations discussed in the existing condition section) in all action alternatives: Prescribed Fire/Natural Fuels; Single-tree Selection; and commercial thinning. These activities retain the mature forest canopy as seen in middleground or background with only textural changes in the canopy, thus allowing them to meet respective VQOs. Prescribed Fire areas would meet VQOs as overstory trees would screen middleground views of blackened ground surfaces; green-up would occur the following spring.

Alternative B would potentially introduce some skyline corridors, and color contrast, as viewed from several Concern Level One travel routes, however both alternatives B and C would retain the scenic integrity and the valued landscape character. This would occur through the use of broad scale treatment of the vegetation, without introducing negative visual elements. These alternatives would be consistent with the Forest Plan objective of Partial Retention. The nonroaded nature of the landscape would be preserved.

Cumulative Effects

Treatment of the vegetation within the Conger Analysis Area, at a broad scale, whether through timber harvest or non-commercial means, would serve to perpetuate the desirable attributes of the existing landscape character. From a scenery standpoint, activities that treat vegetation at the landscape scale, without the introduction of long term negative visual elements, would meet the objectives of the Forest Plan. With mitigation, the necessary temporary roads, skyline corridors, and harvest debris would not take away from the valued landscape character of the National Forest Lands.

The activities visible on private land, with the frequent use of evenage timber harvesting techniques, would continue to draw the attention of travelers in the area.

Recreation

Direct and Indirect Effects of Alternative A

Implementation of this alternative would result in no change in the types of recreation experience and opportunities in this area. In the short term the environment would remain much the same from a visitor point of view. Long term, the visitor could expect more tree mortality primarily from insects in the surrounding stands of timber including the trees at the dispersed sites. This could create a higher risk environment for the visitor. The dead and dying trees although increasing the safety risk would also increase the availability of firewood which may be desirable for some. There would also be the challenge of gaining access with motorized vehicles as visitors might need to cut trees out of the roads and trails they use the area. Some visitors may find this adds to the experience and some may find this detracting.

Fire return interval is approximately 50 -150 years in this area and the area has been without a major fire since the early 1930s so the potential for a large fire to disrupt the various recreational pursuits is increasing although the timeframe is not certain.

Long term visitors might notice a change because of extensive wildfires. Access could be curtailed as a result of concern about soil erosion and the threat of spread of noxious weeds. Visitor enjoyment also may change depending on direct wildfire impacts to various dispersed sites as well as the visual impact immediately following the fires. This may be offset by an increase in opportunity to pick mushrooms and an increase in huckleberries.

Recreation activities are affected by changes in road access, and no change in level of access is anticipated under Alternative A.

Implementation of this alternative would result in an overall no change in the types of recreation experience and opportunities in this area. This alternative is compatible with the Recreation Opportunity Spectrum (ROS) objectives and the management direction in the Forest Plan.

Direct and Indirect Effects of Alternatives B and C

Since both action alternatives propose similar levels of road reconstruction and fuel & vegetation treatments, both alternatives would result in similar effects. Implementation of these alternatives would result in minimal change in the types of recreation experience and opportunities in this Analysis Area. In the short term the environment would change from a visitor point of view. Equipment noise including helicopters, skyline machines, trucks and harvesters, and dust and smoke from prescribed burns, are all possible temporary conditions. There may be temporary interruption of recreational road travel within some portions of the area due to logging operations or other management activities. Generally this is a short term disruption of less than three months each year for three to five years. Hunting and fishing opportunities would remain much the same.

Proposed treatments in areas adjacent to Batey-Bould trail would reduce hazard trees through removal of dead trees that lean toward or could fall on the trail (generally located within 1 ½ tree lengths of the trail). Both alternatives would reconstruct closed Forest Road 3116078 and its spur (Road 3116074). The first quarter-mile of road 3116078 (up to the Trail 306 junction) is used as Trail 312. The subsequent 200 feet of roadway is used as part of trunk Trail 306, which also crosses spur Road 3116074. Trail 308 crosses Road 3116078 once.

The reopening and reconstruction of Roads 3116078 and –074 would require temporary closure of Trail 312 and the first 1.1 miles of trunk Trail 306. Trail traffic originating at the trailhead would be cut off from the rest of the trail system at a point only 1.1 miles from the trailhead. These roads would be reclosed following completion of timber harvest and fuel treatment operations. Depending on how the roads are reconstructed, trail approaches at the road crossings would have to be rebuilt or relocated to fit the reconstructed road prisms.

Approximately 2 ½ miles of system trails would be overlain by various thinning and burn activities. Heavy thinning, removal of undergrowth, or both may have the effect of opening up the vicinity of the trail system to cross-country travel by motorcycle or quad. It could provide new points of access to and from the trails, with subsequent damage to vegetation and soils as new travelways become established. This could be discouraged or prevented by leaving a heavily vegetated area of approximately 80 feet adjacent to the Batey-Bould trail.

Harvest and fuel treatment operations adjacent to the tail would cause temporary closures of sections of the trail for safety reasons, but use along the remainder of the trail would still occur. Road reconstruction would improve access on existing roads but no new access would be created. Project design criteria (see chapter 2, page 9) calls for treatment of skid trails to prevent expansion of OHV use. Vegetation around dispersed campsites would be treated, which means some sites may not be used for one or more seasons during project operations or users may move their camping site to a new location.

Cumulative Effects

Current recreation opportunities are the result of past actions in the area including past harvest and homesteading. Those activities developed the current road system which provides access into and through the Analysis Area. Other current and foreseeable activities (woodcutting, access to private timber land, harvest on private and public timber lands, management of the powerline corridor, and precommercial thinning activities) are not expected to change road access, use of Batey-Bould trail, or use of the area for current recreation activities.

Other foreseeable actions include road closures as the Forest Service continues to manage their road systems and designation of maintenance level I (closed roads) and Level II roads for use by

OHVs. This decision will be made in the next 1-3 years as the Forest Service is currently receiving comments on a proposed rule for OHV management. Any decisions concerning additional use and access will be made by a separate decision in the future.

Grazing

The Analysis Area only contains approximately 400 acres of the Calispell Creek grazing allotment. The portion of the allotment that is within the Analysis Area lies at the southwestern corner of the Analysis Area, south of Graham Creek. The USFS began management of the allotment following land acquisition in 1938. Much of the area had been partially cut before then. Upper portions of the watershed were grazed by sheep during the 1930s and '40s; permit file shows sheep still grazing in at least some years up through 1978. Cattle grazing was recorded back to 1940; from 1958 until at least the Allotment Management Plan was prepared in 1968, the permitted use was 16 head from June 1 through September 30. Twelve pairs of cattle grazed in 1977, which appears to be the last year the allotment was grazed, and the allotment has been vacant since 1978. Most forage is in the old homestead meadows (bluegrass) and old logging units; streambanks are heavily brushed in with alder in most places. There is a pine marten core area in the same place. The cattle rarely visit this area at all because there is little forage. None of the alternatives would have any effect on the grazing permittees use of the allotment or on permit administration. All alternatives would meet the Forest Plan standards and guides for range.

Heritage Resources

Direct and Indirect Effects of Alternative A

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 significantly damage standing or downed historical structures, affecting potential National Register eligibility characteristics of these properties.

Direct and Indirect Effects of Alternatives B and C

Four heritage sites have the potential to be impacted under alternatives B and C. Project activities have the potential to damage or destroy these sites directly by heavy machinery, falling trees, road building, fuels treatments, etc., or indirectly as a result of discovery through increased access to each site. The Forest Archaeologist or qualified Heritage Program personnel would identify sites on the ground and would coordinate with appropriate project personnel to provide location information to presale, roads, and fuels treatment crews.

For both action alternatives, Management Class 2 sites must be protected and preserved as if they were eligible to the National Register of Historic Places (NRHP). The State Historic Preservation Office (SHPO) concurs with these actions.

Cumulative Effects

Under Alternative A, the lack of vegetation management through thinning and fuels treatment could create a cumulative effect adverse to historic properties because a No Action exacerbates the potential for unmanaged wildland fire, thereby threatening historic properties.

Under Alternatives B and C, historic properties within the Analysis Area would experience minimal cumulative effects from this project. Effects may include increased accessibility to properties due to thinning of trees/shrubs near the site or the re-opening of forest service roads. Proper buffering and maintenance of confidentiality of historic properties would effectively reduce these possible impacts. The Forest Archaeologist or qualified Heritage Program representative would provide guidance on appropriate buffering distance to protect the site location.

There are no cumulative effects from adjacent landowners. Future activities associated with the above alternatives within the Analysis Area would have no foreseeable cumulative effects on the historic properties.

The Conger project with the design criteria (Chapter 2) provided 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).

Special Uses and Easements

There are currently three special use permits and two easements that are either within the Conger Analysis Area or rely on road systems that pass through the Analysis Area for access and management. One of the special use permits is for the U.S. Air Force Survival School, which is discussed below. There are no adverse impacts (direct, indirect, or cumulative) anticipated with regard to improvements authorized under special use permits, easements, or land use grant instruments within the project area.

U.S. Air Force Survival School

The USAF operates on the Colville National Forest under the terms and conditions of a Special Use Permit (SUP) issued to the 336th Training Group, Air Education Training Command (Survival School) located at Fairchild Air Force Base. The Conger Analysis Area is within the SUP training area boundary, specifically the Bartlett Training Area and the Tacoma Training Area. The Survival School has small portions of the Conger Analysis Area scheduled for training on their 9-year training area plan. The current SUP identifies locations, practices and methods of training that are consistent within the Standards and Guidelines of the Colville National Forest Land and Resource Management Plan (LRMP).

The activities proposed in all the alternatives in the Conger Analysis Area would have no effect on the Survival School activities as allowed under the SUP. The proposed action would not affect any training activities. The area scheduled on the Survival School 9-year plan is mostly to the north of the Conger Analysis Area.

Transportation

For Alternative A, no road reconstruction or maintenance beyond what is planned for other projects or standard Forest maintenance work would occur.

Alternative B proposes no new road construction and approximately 20.7 miles of road reconstruction. No decommissioning or obliteration of roads is planned.

Alternative C proposes no new road construction; however, approximately 18.7 miles of road reconstruction would be necessary if this alternative were selected. Reconstruction would be needed to move mechanized equipment into the area. No decommissioning or obliteration of roads is planned.

For both Alternative B and C, all presently closed roads used with this project would be administratively closed to the public while the project is active. Once project activities are complete, closed road entrances would be reclaimed/obliterated.

All proposed activities meet applicable laws and regulations, Forest Service direction and policy, as well as the Forest Plan.

Economics

Benefits There are several benefits that are accrued from this project. One benefit displayed in this analysis is stumpage received as a result of harvest of timber volume from proposed alternatives. This number is the advertised price of the sale. It is based on the value of the wood

when it is delivered to a mill that utilizes this wood minus the logging costs and other required sale costs. This is a rather conservative number as most sales on the Newport/Sullivan Lake Ranger Districts are bid up considerably above the advertised rate. This value is in dollars per hundred cubic feet[11] ($/CCF).

Another major benefit assumed by this project is the risk reduction from stand-replacing wildfire by doing fuel reduction activities. The benefits from this activity are hard to measure as they involve non-market values. The benefits included in the monetary value used in the analysis include: fire fighting costs avoided, fatalities avoided, facility losses avoided, timber losses avoided, regeneration and rehabilitation costs avoided, community value of fire risk reduction, increased water yield, and regional economic benefits. This analysis stayed somewhat conservative and assumed that all of the acres in the project area are at moderate risk instead of high risk. The assumption for moderate risk is that there is an equal probability that all acres would burn sometime in 60 years and that the average burn interval would be 30 years. In the Conger analysis, this benefit was only applied to acres receiving some sort of fuels or silvicultural treatment. The monetary amount input into the program is a future fire cost which is foregone due to planned treatments and is discounted to the present.

There are other benefits that result from treatment of vegetation, but are difficult or impossible to value in terms of dollars. Some of these benefits might include: moving stands toward late and old structure sooner, improved wildlife habitat, and protection of riparian areas.

Costs The costs used in this analysis include some estimated costs for specific project design requirements, road reconstruction, logging, natural and activity related fuel treatment, road maintenance, and some sale area improvement activities.

The cost of planning is not included in this analysis. The planning costs were considered at the time of project initiation to determine if the project was feasible. However, by the time the Environmental Analysis is finalized, most of the planning costs will already have been incurred and will not vary by alternative.

Logging contributes the most amount of the cost to the total alternative cost. The helicopter logging cost is the most expensive of the logging systems analyzed. Alternative B proposes commercial timber harvest as a treatment activity. This alternative has three logging system types, which are mechanical ground-based, skyline, and helicopter. Logging costs were determined by comparing this sale to a similar nearby recent sale, Gardin-Taco.

In Alternative A, No Action, it can be assumed that the benefits shown in the action alternatives for fire risk reduction would actually be costs in this alternative where the treatments are not carried out.

Alternative B is the only alternative that uses commercial timber harvest to meet the objectives of the project. Alternative B would treat more acres because the cost of expensive logging systems like skyline and helicopter would be offset by the ability to sell the removed material to a local mill.

Table 8. Present Net Value (PNV) Benefits and Costs by Alternative For Entire Conger Project

Alternative	Treatment Acres	Benefits	Costs	PNV ($)
A	0	0	($3,952,844)	($3,952,844)
B	3,268	$4,771,143	($795,859)	$3,975,285
C	3,082	$3,706,454	($1,999,461)	$1,706,993

[11] To convert hundred cubic feet (CCF) volume to thousand board feet (MBF) multiply the CCF quantity by 0.52.

Alternatives B and C are economically viable based on the PNV values shown in the Table 8. Alternative B has a considerably higher PNV because the timber removed would be sold, and the acres treated is more which results in a more positive effect on the Firefighting Cost Savings benefit.

If this project is implemented as a stewardship project, then the actual money exchange during the life of the contract should be examined. In alternative B, the receipts from selling forest products would offset the service work required to reduce fuels. In alternative C, appropriated money would have to be available to do the fuel reduction work required to meet the project objectives.

Forest-wide goals, objectives, and standards for economics are not specifically addressed in the Forest Plan. This issue is addressed indirectly in the discussion of community stability. Chapter II of the Forest Plan states, "Produce forest goods and services in the most cost efficient way consistent with providing net public benefits. Generate revenues from permits, leases, user fees, and product receipts," (Page 4-2, Objectives). All of the action alternatives meet the above Forest Plan direction.

Cumulative Effects

This project would reduce fuel levels, improve landscape resiliency to wildfire (reduce future fire-fighting costs), and provide additional timber to the local economic system.

Effects on Consumers, Minority Groups, Women, Civil Rights and Environmental Justice

This section is based on information in the U.S. Census and from personal communications with various ID team members. No adverse effects to consumers or civil rights were identified through the effects analysis.

The alternatives were assessed to determine whether they would disproportionately impact minority or low-income populations in accordance with Executive Order 12898. The Kalispel Tribe of Indians was consulted, and no impacts to American Indian social, economic or substance rights are anticipated. No impacts are anticipated related to the American Indian Religious Freedom Act. Approximately 18% of the people in Pend Oreille County have an income that is below the federal poverty level (U.S. Census 2000). Tribal members and low-income people no doubt use the National Forest for recreation and to gather forest products such as firewood and huckleberries. We have no evidence that tribal members and low-income people use this area of the National Forest disproportionately when compared to other people.

Since no new road construction is proposed under any alternative, an increase in motorized access to any portion of the Analysis Area is not anticipated. It is expected that effects of any alternative would affect all users of this area equally. Any alternative selected would not disproportionately affect minority communities or low-income people.

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