CHAPTER III EFFECTS OF IMPLEMENTATION

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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 Newport-Sullivan Lake Ranger District Office in Metaline Falls, Washington. This document incorporates by reference the recommendations from the Hanlon 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. The analysis was based on following regulations and requirements found in the 1960 Multiple-Use Sustained-Yield Act, the 1976 National Forest Management Act, the Organic Administration Act of 1897, the Aquatic Conservation Strategy/Inland Native Fish Strategy (INFISH), and the Direction for Neotropical Migratory Landbirds. 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.

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 2008), 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: the American Indian Religious Freedom Act (AIRFA), consumers, civil rights, minority groups, and women. The area does not contain, nor is it adjacent to, 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 woodland caribou or gray wolf.

Fire/Fuels (Purpose and Need Objectives #1 and #5)

Fire is a primary disturbance mechanism that has shaped the Hanlon analysis area for centuries. Fire has maintained and provided several critical functions in the ecosystem, including promoting structural and species diversity, the regulation of plant succession and regeneration, moderation of fuels and biomass, control of insect and disease populations, and the maintenance of biological and biogeochemical processes (Crutzen and Goldammer 1993, Keane et al. 2002). Since the early settlement period of the early 1900s, fire exclusion has been a leading cause of alteration in many of these key functions within the analysis area.

Observations from aerial photographs from the 1930s to 2000 suggest that fire exclusion has dramatically altered the composition and structure of the analysis area. Two primary effects of fire exclusion can be observed in the compositional and structural attributes of the landscape and the stand: *afforestation* and a species compositional shift. *Afforestation* is the establishment of forested lands in an area that was not historically forested, or is the process by which biomass increases beyond the historic range of the site.

The second major observed effect of fire exclusion is the shift in species composition away from dominance in fire-*resistant* species (ponderosa pine and western larch) to a substantial increase and co-dominance of fire-intolerant species, primarily western red cedar and grand fir. These shifts have substantially affected the warm-dry stand types with a relatively dense mid and understory component of grand fir, Douglas-fir and western red cedar.

Fire Regime-Condition Class (FRCC)

The Fire Regime-Condition Class (FRCC) is used to describe the degree of departure from the historic fire regimes that results from alterations of key ecosystem components such as composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire exclusion, high-grade timber harvesting, grazing, introduction and establishment of non-native plant species, insects or disease (introduced or native), or other past management activities. Table 3 describes the attributes of each FRCC.

Table 3 Fire Regime Condition Class Attributes

Condition Class	Attributes
Condition Class 1	• Fire regimes are within or near their historical range. • The risk of losing key ecosystem components is low. • Fire frequencies have departed from historical frequencies (either increased or decreased) by no more than one return interval. • Vegetation attributes (species composition and structure) are intact and functioning within their historical range.
Condition Class 2	• Fire regimes have been moderately altered from their historical range. • The risk of losing key ecosystem components has increased to moderate. • Fire frequencies have departed from historical frequencies by more than one return interval resulting in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape pattern. • Vegetation attributes have been moderately altered from their historical ranges.
Condition Class 3	• Fire regimes have been substantially altered from their historical range. • The risk of losing key ecosystem components is high. • Fire frequencies have departed by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape pattern.

FRCC was determined using stand exam data, Colville National Forest Plant Association Groups (PAG) imagery and local historical fire history records. It is important to note that the FRCC is highly variable across the Hanlon analysis area; as with vegetation structure and composition, minor changes in slope, aspect, or topographic position can have dramatic effects on the vegetation potential of the landscape. PAG imagery, a tool designed for landscape scale assessment does not always identify this variability at the project scale.

The majority of the analysis area is best described as FRCC 1 and 2, found mostly in the *mixed to high severity* western red cedar, western larch, grand fir, lodgepole pine and western hemlock community types. Stand structure is largely multi-strata[31], intermixed with relatively dense single strata stands of lodgepole pine. Fire frequencies are at or near their historical range or they have departed from historical frequencies by more than one return interval resulting in moderate changes to one or more of the following: fire size, frequency, intensity, severity, or landscape pattern. Vegetation, structure, and composition have also been moderately altered from their historic range (i.e. increasing ladder fuel component composed of fire intolerant species).

Approximately 30% of the analysis area is categorized as FRCC 2 and 3, found mostly in the *low to mixed severity* ponderosa pine, Douglas-fir and western larch community types. Fire frequencies have departed from historical frequencies by more than one return interval resulting in moderate to dramatic changes to one or more of the following: fire size, frequency, intensity, severity, or landscape pattern.

Effects of Alternative A

Taking no action would result in no improvement in stand vigor and related forest health. *Afforestation,* inter and intra-stand stocking levels and crown fire potential would continue to increase. No acres would be treated adjacent to communities in priority area #1B and 3, and would therefore not meet the objective of meeting the goals of the Pend Oreille County Wildfire Prevention Plan. No priority stands would be treated to manage fire risk. Kalispel Tribe interest of moving the Hanlon area toward historic fire regimes and promoting establishment of fire-tolerant species would not be met.

Effect on Fire Regime Condition Class (FRCC)
The shifts in composition away from the more open forest environment under the no action alternative would continue to stress the overstory fire-tolerant cohorts, and (at the landscape scale) would *not* move FRCC 2 and 3 stands to the FRCC 1 target. Overall, the drier stand types would continue to gain biomass and the understory cohorts would greatly increase ladder and crown fuel connectivity. A no treatment alternative would continue with fire exclusion as the dominant human-caused disturbance on the landscape. Due to afforestation and in-growth of primarily fire intolerant trees there is a relatively high conifer stocking creating high connectivity of both ladder and crown fuels. Approximately 30% of the analysis area is indicative of FRCC 2-3 with a relatively high crown fire potential.

Effect on Firefighter and Public Safety
Under the no action alternative, fuels accumulations would continue to shift away from grass, brush and hardwoods (FM[32] 2/5/9) to a condition favoring high levels of coarse woody debris, litter, duff and ladder fuels (FM 10). During a wildfire event, higher fuel loads and crown fire hazards would increase fire suppression costs and the associated risks to both firefighters and the public.

Effects of Fuels Treatments on the Residual Overstory
Under this alternative no fuels treatments would occur and no mortality would occur as a result of either mechanical fuel reduction or prescribed fire treatments.

Effects of Alternative B

This alternative proposes both mechanical and prescribed fire treatments within areas immediately adjacent to communities designated as priority areas 1B and 3 under the Pend Oreille County Community Wildfire Prevention Plan. Four thousand six hundred and forty seven acres are proposed for commercial harvest. Of this total 2,323 acres are proposed for jackpot and/or broadcast burning, and 2,324 acres are proposed for mechanical

[31] Strata are the layers or levels of stand structure, such as trees, shrubs, non-woody vegetation (grass and herbs), dead woody, litter/lichen/moss, and ground (duff).
[32] FM – 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.

treatments such as mastication and/or machine piling. This proposal also includes potential biomass removal and/or treatment of surface fuels in excess of Region 6 (R-6) down-woody requirements, (USFS R-6 Eastside Screens, Forest Plan Amendment #11). In general, units prescribed for broadcast burning contain a high percentage of fire-tolerant residual trees (western larch, ponderosa pine and Douglas-fir) while units prescribed for mechanical fuels treatments contain a high percentage of fire *intolerant* trees (i.e. lodgepole pine, western red cedar, western hemlock and grand fir). Up to 1,437 acres are proposed for jackpot and/or broadcast burning outside proposed harvest units.

The objectives of these treatments, which are also objectives of the Kalispel Tribe, are to:

1. Reduce the threat of severe surface and crown fire within the Hanlon area,
2. Reduce accumulated surface, ladder and crown fuels,
3. Improve Fire Regime Condition Class (FRCC). Move stands from Condition Class 2 and 3 to Condition Class 1,
4. Promote the stocking of fire-tolerant conifer species such as western larch, ponderosa pine, and Douglas-fir,
5. Stimulate the growth of hardwood species on which wildlife depend, such as aspen, birch and redstem ceanothus, and
6. Encourage old-growth habitat of fire dependent ecosystems.

Tables 4 and 5 below summarize the No Action and Proposed Action alternatives for proposed Hanlon area stands. Stands were stratified into one of five crown fire hazard and risk categories: Very Low, Low, Medium, Medium-high and High.

Table 4 Crown Fire Risk Potential for the Hanlon Analysis Area – Comparison of Alternatives

Alternative A: No Action					Alternative B: Proposed Action (post treatment)			
Crown Fire Risk	TI[a] (MPH)	CI[b] (MPH)	CBH[c] (ft)	Acres	Crown Fire Risk	TI[a] (MPH)	CI[b] (MPH)	CBH[c] (ft)
Very Low	78	32	18	1,186	Very Low	257	42	38
Low	11	51	5	253	Very Low	179	50	26
Medium	9	30	3	640	Very Low	259	46	40
Medium-high	64	21	15	1,662	Very Low	226	46	35
High	6	19	3	906	Very Low	242	46	35

[a]**Torching Index (TI)** is the wind speed at a height of 20 feet at which a surface fire is expected to transition into the crown fuels.

[b]**Crowning Index (CI)** is the 20-foot wind speed at which a fire is expected to move horizontally through the forest canopy.

[c]**Crown Base Height (CBH)** is the lowest height above the ground above which there is sufficient canopy fuels to propagate fire vertically through the canopy.

Table 5 Crown Fire Risk Potential for the Hanlon Analysis Area – Comparison of Alternatives

Alternative A: No Action				Alternative B: Proposed Action (post treatment)		
Fire Type[1]	Mortality 97th Wx[2]	Mortality 90th Wx[2]	Acres	Fire Type[1]	Mortality 97th Wx[2]	Mortality 90th Wx[2]
Surface to Passive Crown Fire	64%	40%	1,186	Surface	30%	29%
Passive Crown Fire	98%	27%	253	Surface	17%	16%
Passive to Active Crown Fire	94%	47%	640	Surface	26%	25%
Conditional to Active Crown Fire	97%	44%	1,662	Surface	28%	26%
Active Crown Fire	100%	61%	906	Surface	25%	23%

[1]Fire Types:

Surface Fire is one that spreads through surface fuels without consuming any overlying canopy fuels.

Passive Crown Fire is one in which the crowns of individual trees or small groups of trees will burn but solid flaming of the canopy cannot be maintained except for short periods.

Conditional Crown Fire is one in which crown fuels will support a sustained crown fire but the stand itself lacks the surface or ladder fuels necessary to initiate a crown fire.

Active Crown Fire is one in which the entire fuel complex is involved in flame. The crowning phase is dependent on the heat released from the surface fire (Scott and Reinhardt 2001).

[2]Percentile Weather:

Mortality 97th Wx: (Mortality at the 97th Percentile Weather) - 'Severe' mid to late summer weather parameters: 1-hr fuels: 4.3%; 10-hr: 6.6%; 100-hr: 7.3%; 1,000-hr: 9.9%; Duff: 15%; live fuels: 70%; Temp: 90F; 20-ft winds @ 25 mph (Tacoma Creek RAWS).

Mortality 90th Wx: (Mortality at the 90th Percentile Weather) - 'Moderate' early to mid summer weather parameters: 1-hr fuels: 5.2%; 10-hr: 7.2%; 100-hr: 8.9%; 1,000-hr: 11.2%; Duff: 100%; live fuels: 100%; Temp: 85F; 20-ft winds @ 10 mph (Tacoma Creek RAWS).

The proposed action should substantially reduce the risk to both crown fire initiation and crown fire spread. Alternative B proposes treating approximately 3,208 acres with medium to high crown fire potential. Treatment of these stands complement areas of private ownership identified by the Pend Oreille County Wildfire Prevention Plan as priority for treatment.

Effect on Fire Regime Condition Class (FRCC)

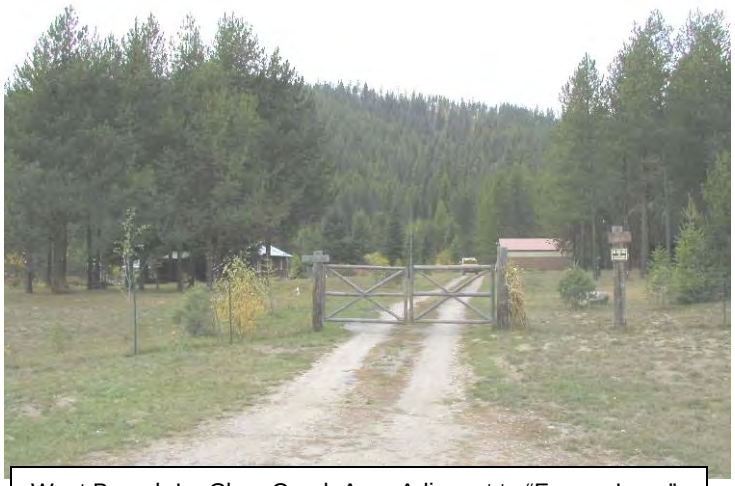
Jackpot and/or broadcast burning are proposed for 3,760 acres (approx 42% of National Forest System [NFS] ownership within the Hanlon analysis area). These treatments are expected to reduce surface and ladder fuels biomass within the drier stand types and (at the landscape scale) should move FRCC 2 and 3 stands to the FRCC 1 target. Subsequent regeneration should also shift to a more fire-tolerant cohort.

Fuels reduction through burning should result in a more open overstory and subsequent understory composed of a greater diversity of hardwoods, shrubs, forbs and grasses. Overall, this should improve forage quality for wildlife, minimize shade-tolerant encroachment, and promote a more fire-tolerant overstory. Historically, wildfires burned on the drier sites every 15-20 years, in patches ranging from 200–500 acres in size (Shellhaas 2000a and 2000b). With 70-80 years of fire exclusion, it may require several mechanical and/or prescribed fire treatments to successfully restore this area to its historic FRCC.

Effect on Firefighter and Public Safety
Fuels reduction treatments as proposed under the proposed action should effectively reduce surface fuel loads and crown fire hazards and thus decrease fire suppression costs and the associated risks to both firefighters and the public.

Structure Risk and Effect on State and Private Ownerships within the Hanlon Wildland Urban Interface (WUI)
Home and structure risk to potential wildfire is largely dependant on the following: 1) Flammability of building materials; 2) Adjacent wildland fuels; and 3) Firebrands.

- Flammability of building materials: The ignitability of building materials is the single most important consideration for determining structural risk during a wildfire event (Cohen 1999). Shake/shingle roofs, wood siding, decks and unscreened vents are especially vulnerable from both on and off-site ignition sources. There are over 60 structures and homes within the Hanlon analysis area; most all located on private property, outside the jurisdiction of the USFS and the scope of the proposed action. The Washington State Department of Natural Resources (WA DNR) and local county fire districts administer programs specifically designed to address this issue. Other than signs, fences and historical sites (i.e. remains of homesteads and tram towers), there are no known structures on NFS ownership within the analysis area.


West Branch Le Clerc Creek Area Adjacent to “Franco Lane”

- Adjacent wildland fuels: Convective and radiant heat energy from a high intensity surface or crown fire can ignite wood structures at distances up to 120 feet. Fuel reduction treatments specifically designed to reduce this kind of risk are most effective when applied within the immediate vicinity of a home or structure (Cohen and Butler 1999). Fuel reduction treatments proposed for this project are designed to reduce the threat of severe surface and crown fire on NFS lands, which in turn should reduce the threat of severe surface and/or crown fires on adjacent private ownerships. Unless similar treatments are initiated and maintained around homes and structures on adjacent private ownerships, proposed fuel reduction treatments on NFS ownerships would have little effect reducing this threat within the Hanlon WUI.

- Firebrands: Firebrands are a substantial ignition factor within the WUI. Flammable structures and vegetation can ignite from firebrands lofted a half mile or more downwind from a wildland fire (Cohen 1999). Proposed surface, ladder, and crown fuel reduction treatments on NFS ownerships should reduce this potential threat, particularly on those ownerships that are within ½ mile of proposed treatment units.

Effects of Fuels Treatments on the Residual Overstory
Mechanical and prescribed fire treatments should reduce fuels from a conifer ladder fuel/down-woody model (FM 10) to a more open, timber-litter/shrub model (FM 5/8). Proposed mechanical treatments including whipfelling, grapple piling, mastication, and/or biomass removal should result in little to no impacts to the residual overstory. Depending on the surface fuel load and size, species and distribution of the residual overstory, prescribed fire may result in mortality exceeding 10% of the residual basal area within a specific burn unit. Additional 5-10% mortality may be expected in subsequent years due to secondary stress factors such as drought, bark beetles and/or root disease (USFS, Colville NF 2008 post-burn monitoring surveys).

Cumulative Effects

Implementation of alternative B, combined with past and proposed activities on the adjacent ownerships, is expected to reduce the potential for severe, large-scale wildfires within and adjacent to the Hanlon project area.

Air Quality

The existing sources of particulate emissions within and/or near the Hanlon Analysis area include smoke from neighboring prescribed fire projects, including but not limited to forest residue burning on NFS and non-NFS ownerships; smoke from residential wood stoves and agricultural activities in the Pend Oreille valley (Blueslide, Tiger, Ione areas); and vehicular dust and exhaust.

Effects of Alternative A

The potential for substantial air quality degradation would increase in the long-term under this alternative. Without vegetative and surface fuel treatments designed to mimic the historical fire regimes, the trend will be for a large portion of the Hanlon landscape to be at high risk to uncharacteristically severe wildfires. Consumption of relatively high levels of surface fuels and forest biomass during severe wildfire events could produce smoke and CO2 emissions far greater and longer than historical norms. In comparison to scheduled ignitions, unplanned ignitions (i.e. wildfires) can result in smoke emissions that are larger, occur at worse times for adequate dispersal, and have greater impacts on areas of human habitation than prescribed fires (Huff et al. 1995).

Effects of Alternative B

Smoke has adverse effects on human health, affects visibility, and is otherwise a nuisance to humans. Current direction to protect and improve air quality on National Forest System (NFS) ownerships is provided by: 1) The Forest and Rangeland Renewable Resources Act of 1974 (16 U.S.C. 1601), as amended by the National Forest Management Act (16 U.S.C. 1602); 2) The Federal Land Management Policy Act of 1976 (43 U.S.C. 1701); and 3) The Clean Air Act amendments of 1977 and 1990 (42 U.S.C. 7401-7626). The Clean Air Act is administered jointly by the Environmental Protection Agency (EPA) and their designated state regulatory agencies. Three elements of the Clean Air Act generally apply to land management activities that produce emissions (1) Protection of National Ambient Air Quality Standards (NAAQS), (2) Conformity with state implementation plans; and (3) Protection of visibility in Class I airsheds.

The EPA sets limits on how much pollution can be in the air through the NAAQS. Areas that are in violation of the NAAQS may be designated as a non-attainment area by the EPA. Non-attainment status has numerous implications for an area, including increased controls and limitations on the sources and amounts of emissions allowed. Non-attainment areas that are relatively close to the Hanlon analysis area include Sandpoint, ID, located approximately 40 miles to the southeast, Spokane, WA, 55 miles to the south, Pinehurst, ID, 85 miles to the southeast and Libby, MT, 100 miles to the east.

Class I and II airsheds are also regulated by the EPA and their designated state regulatory agencies. Class I airsheds include all International and National Parks greater than 6,000 acres in size, National Wilderness Areas greater than 5,000 acres, and other areas as designated by the EPA. Class I airsheds that are relatively close to the Hanlon analysis area include the Cabinet Wilderness, located approximately 85 miles to the east, the Pasayten Wilderness, 225 miles to the west, and the Spokane Indian Reservation, 80 miles to the southwest.

The Hanlon analysis area is within a designated Class II airshed. Smoke originating within and/or potentially impacting this airshed is regulated by the Washington Department of Natural Resources (DNR) – Smoke Management Division.

The potential for smoke intrusion into a non-attainment area or Class I airshed from proposed activities would be negligible due to distance and the prevailing southwest winds. Smoke and other airborne particulates originating from proposed activities within the Hanlon analysis area would normally be carried to the northeast, away from Class I airsheds and non-attainment areas.

Smoke from prescribed fire activities may temporarily degrade air quality within the Hanlon analysis area and nearby Pend Oreille River valley (Blueslide, Tiger, Ione areas). Potential impacts to air quality from prescribed fires would be reduced due to reduced fuel consumption within a given area and by redistributing the emissions through meteorological scheduling and coordination with the WA DNR.

Proposed activities that would reduce potential smoke emissions over a given area include: 1) Prescribed burning in the spring and, to a lesser extent, in the fall when large woody debris and soil and duff moistures are relatively high. Burning when large fuels and organic layers are wet often result in reduced fuel consumption per unit area, less smoldering, and a substantial reduction in smoke emissions (Ottmar et al. 2001); 2) Prescribed burning when

conditions favor the optimum combustion of the 1, 10 and 100-hour targeted fuels (i.e. slash and woody debris under 3” diameter); and 3) Selective removal of the 1,000 and 10,000-hour fuels such as pulp, roundwood and sawlogs.

Meteorological scheduling is often the most effective way to minimize direct smoke impacts to the public (Ottmar et al. 2001). Prescribed burns would be scheduled and approved by the WA DNR during periods of good atmospheric dispersion (dilution), and when prevailing winds are forecasted to transport smoke away from sensitive areas (avoidance). In addition, total emissions from proposed activities would be spread out over a three to five year implementation period.

Along with existing airshed pollutants, smoke from prescribed fire activities may cumulatively degrade air quality within the Hanlon analysis area and surrounding Pend Oreille River valley. Coordinated meteorological scheduling would be used to regulate all prescribed burns within the regional area, thus minimizing the potential for cumulative smoke impacts to the public. Prescribed burns would be scheduled and approved by the WA DNR only during periods of favorable atmospheric transport and dispersion. To insure compliance with state and federal air quality standards, approved burning would be determined through monitoring and computer modeling of all scheduled and proposed emissions. Historically, less than 100 acres are ignited on the district on a daily basis due to cumulative smoke considerations and/or limited resource capabilities.

Socio-political considerations and/or unfavorable changes in transport winds may necessitate a curtailment in prescribed burning at the local level. This would be determined on a case-by-case basis with a change in forecasted burn conditions communicated to the WA DNR.

The Forest Plan has no special requirements for smoke management beyond those required by the Clean Air Act. Proposed activities meet or exceed the requirements of the Clean Air Act through compliance with air quality standards regulated by the WA DNR. Burn Plans, outlining required weather and fuel parameters for desired fire and smoke effects, would be prepared and approved for each prescribed burn. Prescribed burning would also be consistent with State laws requiring treatment of activity created fuels.

Silvicultural Treatments and Forest Health (Purpose and Need Objectives #2 and #5)

Existing Condition

In most cases the current vegetation is the result of past disturbances. These disturbances include logging, mining, homesteading and fires. Two timber companies, the Panhandle Lumber Company and the Diamond Match Company owned the majority of the land in this area in the 1920s and 30s when most of the original logging was done. Their major focus was on removing the white pine and cedar poles. In the summer of 1929 a major fire burned through the Le Clerc Creek basin. The 1936 map of Pend Oreille County Vegetation types shows most of the area dominated by “restocked” stands of small diameter trees. The areas typed with large trees are dominated by ponderosa pine, which likely were able to withstand fire. An interesting sidebar to this map is that many of the “restocked” stands were stocked with presumably naturally regenerated white pine. White pine blister rust was noted to have come into the area in the late 1920s, so it stands to reason that it would have taken a few years for it’s affects to become widespread through the area.

Historic photo of Diamond City

The niche within the landscape that would have been occupied by white pine is now occupied mainly with Douglas-fir. While Douglas-fir is an important and valuable timber species, it is more susceptible to root disease

and bark beetles than white pine. Since these early fires there have been no other major fires in the basin. Timber harvest on Forest Service land has been relatively minor and sporadic. The area can now be generally characterized as being densely stocked with a preponderance of shade-tolerant species growing under an overstory of medium to sparsely stocked seral species which came in immediately after the original disturbances, either logging or fire. Few remnant trees dating to presettlement remain. The ones that are present can be recognized by very large diameter and usually have fire scars on the bole near the base of the tree. Most of these remnant trees are either western larch or ponderosa pine, with an occasional western white pine or western redcedar being found in some of the creek bottoms.

Remnant Larch in Hanlon Analysis Area

Throughout the analysis area there are many flat terraces adjacent to the major creeks in the analysis area that are now dominated by a lodgepole pine overstory which initiated following the fires. Lodgepole pine is relatively short lived compared to other species. Most of the lodgepole pine in the analysis area is approaching 80 years of age. As these trees approach the end of their life cycle they become increasingly stressed, which is evident by their live crown ratios. A majority of the mature lodgepole pine have a live crown ratio of less than 30%. Stands containing a high proportion of mature lodgepole pine show high levels of mortality due to attacks by mountain pine beetle, moisture stress and competition from other trees. As these trees drop out of the stand, the species composition is shifting towards more shade-tolerant species such as grand fir, cedar, hemlock, and Douglas-fir. Engelmann spruce and subalpine fir are also in abundance in some areas that are cold air drainages.

The ridges that are adjacent to the major creeks in the analysis area support more mixed species stands. The south facing slopes favor stands dominated by Douglas-fir and ponderosa pine. The east and west facing slopes are dominated by Douglas-fir with scattered ponderosa pine, western larch and grand fir. Some of the scattered ponderosa pine are 25+ inches in diameter at breast height and were able to survive many past fire events. Small draws and sheltered benches have western redcedar, western white pine, and western hemlock in addition to the afore-mentioned species. The north facing slopes are dominated by cedar, hemlock and grand fir with scattered Douglas-fir and larch.

Several factors related to past management and introduced diseases have caused the analysis area to see an increase in insect and disease activity. Douglas-fir and grand fir have replaced stands which historically had a high component of western white pine due to past logging and the introduction of white pine blister rust. Douglas fir and grand fir are more susceptible to agents such as root disease and bark beetles. Also, a lack of disturbance, some which can be attributed to fire suppression, has allowed these stands develop highly stocked, multi-story conditions that did not occur historically.

Many of the stands of lodgepole pine in the analysis area are now reaching the conditions where they are most susceptible to mountain pine beetle mortality. This occurs when they exceed 80 years old, stands are stocked with 80+ square feet/acre basal area and average 8”+ diameter at breast height. Many of these stands occur on flat benches that are adjacent to the major creeks within the analysis area.

Another result of overstocked stands is a preponderance of suppressed trees. These trees, especially shade intolerant species such as larch, lodgepole pine and ponderosa pine, see a decrease in their live crown ratios due to being over-topped by the more dominant trees. Once the live crown ratio falls below 35%, there is a decreasing probability that the tree would release through thinning and gain its live crown back. Many of the suppressed trees also develop poor height:diameter ratios when they grow and can’t increase their diameter fast enough due to tight growing conditions. When the height:diameter ratio exceeds 100, the trees are more susceptible to windthrow and snow breakage. Overstocked stands also result in low levels of diversity in the understory tree and shrub species through light and nutrient competition. Many stands have little understory vegetation and, where there are small openings in the canopy, the pockets are filling in with shade-tolerant tree species such as grand fir.

There is an excess of young, multi-story stands and a deficit of late and old structure in the watershed. This is not surprising given the logging activity and subsequent fires during the early 20th century. Many of the timber

harvest activities that occurred from the 1960s through the early 1980s were designed to remove the large mature trees to release the understory trees. Structural stages are defined in the following table:

Stand Initiation	Structural Stages 1, 2, 3	These early stands are fully stocked by conifer trees that may range in size from seedlings through 15" diameter trees. The distinguishing characteristic is that all the trees are near the same age (same cohort), and all the trees are in the same canopy layer. A second canopy layer of shade-tolerant trees has not yet started to develop in the understory.
Understory reinitiation & multi-stratum without large trees	Structural Stages 4 & 5	A second cohort of trees is established under an older overstory in these middle stages. Openings start to appear in the canopy, and the amount of down wood increases. The trees in the overstory are typically early seral (larch, pine, Douglas-fir, etc.) while the trees in the understory are typically shade-tolerant (western redcedar, hemlock). The stand may contain many sizes of trees, but large trees are uncommon.
Multi-stratum with large trees	Structural Stage 6	These late and old stands contain two or more cohorts of trees, and trees of all sizes are present. The overstory canopy is discontinuous, and large trees are common (8 tpa[33] >21" dbh[34])
Single-stratum with large trees	Structural Stage 7	A single layer of large seral trees is present in this late and old stage. The understory may be absent or may contain sparse or clumpy seedlings and saplings. These stands are sometimes called park-like.

Climate change is a concern that would affect the health of stands and individual trees within the analysis area. Climate change can have a direct effect, such as many drought years in a row or a continuance of decreasing amounts of available water during the growing season over into the future, or indirect effects such as an increase in large fires or an increase in extreme weather events, which cause windthrow and breakage.

Effects of Alternative A

Stagnated stands within the proposed project area, left untreated, would lack adequate crown and diameter development. Structural development would be delayed due to the suppressed or non-existent understory. Development of wildlife habitat would be delayed for a long time if the stands are left untreated. No treatment would also delay moving stands toward the historical range of variability. In treatment areas that have the potential to be moved toward structural stage 6 or 7 (late and old structure stands) encroachment of more shade-tolerant species have created a hazard due to the increased fuel loading and ladder fuels. Distribution of structural stages across the landscape supports a diversity of overstory and understory plant species which, in turn, supports long-term sustainability of the area. Lack of treatment, and thereby not addressing the need to develop late and old structure, would result in lowered resilience of the landscape to fire, insects, and diseases.

Stands would continue to have a high risk of stand-replacing fires. If a fire was to occur, many of the preferred early seral leave trees (i.e., western white pine, western larch and ponderosa pine) may be killed by the fire and the site would be delayed in moving towards stage 6 or 7. Natural fires may or may not burn under conditions that would thin out the smaller trees and would have limited control over residual tree spacing and species selection. High intensity fires can reduce soil productivity drastically and cause major changes in the hydrological and erosion processes (Hessburg and others, 1999). Severe fires can also cause stand destruction and create potential brushfields that may last for many years.

There would be no silvicultural treatments to reduce stocking levels, improve stand vigor, improve the RHCAs[35] or improve diversity by planting early serals such as white pine, western larch, and ponderosa pine and encouraging development of other vegetation (e.g., shrubs and forbs). Conversion of stands to shade-tolerant species would continue, increasing the future hazard to insects and diseases. Hardwood trees would continue to be out-competed by conifers and continue to be eliminated from the landscape. The Kalispel Tribe objective of promoting

[33] Trees per acre.
[34] Diameter at breast height.
[35] Riparian Habitat Conservation Areas

establishment of early seral species and promoting expansion of hardwoods throughout the Hanlon project area would not be met.

This alternative would not treat stands that occur along the urban interface to reduce the risk of insect, disease, or wildfire. The areas of mature lodgepole pine would continue to build up surface fuels as the trees die out and fall to the ground. There would be no money generated from timber sales to aid in monitoring and stand improvement. Within the next ten-year period the risk of insect outbreak and the risk of increased levels of disease are moderate to high. In the long-term, the risk of insect outbreak in the next ten to twenty years would be approaching high. Forest health would decrease from no treatment.

Effects of Alternative B

Approximately 4,647 acres (52%) of the 8,996 acres in the proposed project area would receive some type of silvicultural treatment to improve stocking levels, stand vigor, move the stands toward target condition, and towards the historical range of variability of structural stages. Highly stocked stands would be treated to reduce the future hazard of insect and disease outbreaks and to modify the expected fire behavior if a wildfire were to occur.

The proposed treatments in alternative B would contribute to increasing the general health of the trees, resiliency of stands, and sustainability of the landscape, within the analysis area. The approximately 900 acres of shelterwood harvest that would occur in alternative B would have a substantial portion planted with rust-resistant western white pine seedlings. In addition, some of the smaller openings created in the selection harvest units could also be planted with some white pine seedlings. Some of these openings may be root disease pockets where white pine would be more resistant to the root disease. Western larch would also be planted in root disease pockets as this species is also quite resistant to root disease.

In general, thinning would keep the retained trees growing more vigorously and thus would allow them to be more resilient and more resistant to an insect or disease attack. Trees which would not live until the next entry, trees with live crown ratios less than 35%, trees with height to diameter ratios greater than 100, and trees with mechanical defects, are preferred for removal over trees with vigorous healthy crowns with relatively few defects. Removal of trees through thinning can also be used to control the species composition of the stand. Shade-tolerant trees that have a low tolerance for fire can be discriminated against, and shade intolerant seral species which are more fire-tolerant can be favored. There would also be exceptions to this such as in the case of developing thermal cover for big game and for providing shade adjacent to riparian areas.

Example of Thinning in the East Le Clerc Timber Sale, adjacent to Hanlon Analysis Area

When considering the effects of alternative B against the existing structural stages, there would not be any change in the currently identified late structural stage stands, since no harvesting is proposed in these stands within the watershed. Stands with a thinning or selection harvest prescription would develop structure relatively quickly as the larger trees are released and diameter growth can be increased. Most of the larger trees would be retained and small gaps that are created would encourage new trees to initiate. The areas dominated by mature lodgepole would be regenerated as the quickest way to move the stand towards late or old structure. In these areas, large existing seral species trees would be retained to maintain some structure. Seral species such as ponderosa pine, western larch, and western white pine would be planted. It is expected that some natural Douglas-fir and lodgepole pine regeneration would occur which would supplement the trees that were planted. During the development of these stands regular thinnings would occur to maintain the growth rate on these trees.

This alternative provides for reforestation with white pine, western larch, and ponderosa pine in the regeneration harvest units. Proposed treatments would promote establishment of early seral species and expansion of hardwoods which are objectives of the Kalispel Tribe to restore historic conditions in the area.

Treatments along the urban interface would aid in reducing the risk of insect, disease, and fires spreading from NFS lands onto private and other ownerships lands. Also these treatments would help to protect the NFS lands along the urban interface from these agents, which may spread from private or other ownership lands. As more acres of the slow growing or stagnant stands are brought under stocking level control, stand vigor would improve. Insects and diseases can be species specific in the range of hosts they would attack. By maintaining a species mix that contains multiple species within the stand, the risk of stand loss to any one single insect or disease is reduced. Therefore, by controlling stocking and species mix, stands would be more resilient to insect and disease attack, and recreation, scenic, timber and winter range goals are more likely achieved.

Alternative B allows the opportunity to increase diversity in the Hanlon area by releasing aspen trees and clones which are being suppressed by conifers; promoting establishment of early seral tree species; and creating openings in overstocked stands which would allow development of understory shrubs and forbs. There is a direct relationship with stocking level control and stand vigor.

Cumulative Effects

Throughout both alternatives, other ownerships would continue to have harvest activities. Past and proposed harvest activities on both private and public lands within the Hanlon analysis area would have an effect on the risk of insect and disease-caused mortality. The risk of insect and disease spread is generally reduced as more acres within the analysis area are managed by using a combination of commercial and noncommercial stand treatments, and reintroduction of fire. Some past management activities such as fire exclusion and high grading may have actually increased the risk for insects and diseases.

Proposed stand treatments on NFS lands within the Hanlon analysis area would move the analysis area towards being less susceptible to having large scale insect outbreaks. Reducing stocking, maintaining species diversity, and increasing species diversity with respect to early seral species and hardwoods would all have a positive affect to this end. These treatments would also help in reducing the risk of outbreaks originating on public land and spreading to private land or other areas outside the Hanlon analysis area.

Several factors over the last 90 years have caused a major shift in the dominant species within this area. Selective logging, large fires partially fueled by logging slash followed by 80 years of fire suppression and introduction of white pine blister rust have contributed to the analysis area changing from western white pine, western larch, and ponderosa pine domination to an area that is dominated by Douglas-fir, grand fir and lodgepole pine. Although *Armillaria* root disease has always been a part of the landscape, it occurred in somewhat of an equilibrium with the Douglas-fir and grand fir due to the more limited distribution of these species throughout the area. Most of the proposed treatments would initiate grand fir and Douglas-fir regeneration, the two species which are generally the most susceptible to *Armillaria*. To increase the successful establishment of less susceptible species an aggressive attempt during post sale activities needs to occur to reduce the stocking of grand fir and Douglas-fir. Treatments include whip falling, masticating, or prescribed fire with subsequent planting of desired species.

Increasing the amount of ponderosa pine and western larch in stands would move the landscape towards being more fire resilient. Western white pine, while not extremely fire-tolerant, is fairly resistant to *Armillaria* and the planting stock that is available today is increasingly more resistant to blister rust than the planting stock available in the past. These treatments would occur on areas with shelterwood prescriptions. In areas where larch, ponderosa pine and Douglas-fir trees are significant parts of the overstory, shade-tolerant species need to be reduced through thinning operations facilitated by logging. At this time the high fuel levels and existing species composition would result in excessive resource damage if fire alone was used to manage the stands.

The Le Clerc Creek watershed falls below historical conditions for late and old structure. This project is designed to accelerate the development of late and old structure and to conserve what late and old structure currently occurs. In addition, all live trees greater than 21 inches diameter at breast height and larger would be conserved except those needed to be removed to protect safety or for road construction.

Recent research (Mitchell et. al., 2009) (Hudiburg et.al. 2009) has shown that heavy thinning and fuels reduction can reduce the amount of carbon that these stands can store. The Hanlon project has many other objectives besides carbon sequestration. At the time of this report, the Forest Service has no policy direction to manage forest carbon sequestration, while the Hanlon project is designed to meet the purpose and need as specified in the environmental analysis.

Fish Habitat (Purpose and Need Objectives #3 and #5)

Existing Condition

Fisheries within the Le Clerc drainage are an important historic use for the Kalispel Tribe. One of their objectives both with the Hanlon project and with other projects within the drainage is to improve fish habitat and fish populations. The Kalispel Tribe is actively working with multiple adjacent landowners to improve fish habitat throughout the Le Clerc drainage.

Regional Existing Population Condition

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

Rainbow trout range throughout the Pacific Northwest. A subspecies, interior redband trout ranges from the east side of the Cascades to the Selkirks. Pure interior redband trout have not been found in the Pend Oreille subbasin.

Westslope cutthroat trout, a subspecies of cutthroat trout, range from the upper Kootenay River drainage of British Columbia and Montana; the upper Columbia and Fraser Rivers of British Columbia; the Pend Oreille, Clark Fork, St Joe, and Spokane River drainages; the Salmon and Clearwater drainages; the Lake Chelan drainages and the John Day River drainage, in Oregon. On the east side of the Continental Divide, the westslope cutthroat is native to the South Saskatchewan River and the upper Missouri River drainage (Behnke 1992).

Bull trout are native to the Pacific Northwest and are found in North America from the Oregon-California border eastward to Nevada, north through western Montana and western Alberta, westward through British Columbia, and north to at least 60 degrees N latitude in Alaska (Wydoski and Whitney 2003). Natural climatic warming and loss of coldwater habitat since the Pleistocene period exacerbated by effects of human activities have reduced their distribution (Cavender 1978).

Watershed Existing Population Condition

The analysis area contains portions of the Le Clerc Creek watershed. Limited historic information is available for the fish populations of Le Clerc Creek, the drainage within the analysis area. Smith (1935) mentions that members of the Kalispel Tribe fished for char at weirs in lower Le Clerc Creek. “[The weir] was built early in the spring and caught trout and char exclusively.” Rob Cole, a former resident, within the Le Clerc Creek watershed, stated that “in the early 1950s, there were heavy concentrations of whitefish and Dolly Vardens [bull trout] at the mouth of the creek. You could have loaded a pickup truck full of all the D. Vardens you could have caught at the mouth…. D.Vardens 5 to 15 lbs and as long as your arm here and elsewhere.” (personal communication with Rob Cole 1998).

The watershed has three branches, the West, East and Middle Branches as well as several fishbearing tributaries to two of the three branches.

The East and West Branches on NFS lands contain eastern brook trout (*Salvelinus fontinalis*)and westslope cutthroat trout (*Oncorhynchus lewisi clarki)* (USFS 2005-2007). Brown trout (*Salmo trutta*) and coastal rainbow trout (*Oncorhynchus mykiss irideus*) reside in the lower reaches of this watershed. The East and West branches also contain a very small spawning population of bull trout (KNRD[36] 1995).

The Middle Branch contains only eastern brook trout on NFS lands (USFS 2005) above an impassable culvert and brook trout, cutthroat trout, and brown trout below.

Individual bull trout (*Salvelinus confluentus*) have been found in Box Canyon Reservoir, a 55 mile segment of the Pend Oreille River from Box Canyon Dam to Albeni Falls Dam. Bull trout in the reservoir have been most recently captured and documented between 1988 and 2004. The total number of fish captured was 20 individuals. Fourteen of these individuals were spawning age migratory adults. The streams in the analysis area flow into this reservoir. Biotic surveys were completed by USFS personnel in branches of Le Clerc Creek (1992, 1994, 2004, 2005 and 2007) to determine fish presence. No bull trout were found during these surveys. However, juvenile bull trout have been found in the East and West Branches most recently by Kalispel Tribal biologists between 1995 and 2002. An adult female bull trout on her redd in the West Branch in 2000 (personal communication Todd Andersen, KNRD 2000). The size (20-22 inches in length) indicated that it had an adfluvial or fluvial life history.

[36] Kalispel Natural Resource Department.

Private lands in the analysis area on Le Clerc Creek are designated critical habitat for bull trout (USFWS 2004). Le Clerc Creek is considered to be core area habitat for bull trout within the Draft Bull Trout Recovery Plan (USFWS 1998).

The westslope cutthroat trout population, in the West and East Branches, has been genetically analyzed and, based upon assays at the Wild Trout and Salmon Genetics Lab of the University of Montana, 76% and 91% respectively of the cutthroat trout sampled contained only westslope cutthroat trout alleles with no evidence of introgression from rainbow trout. The remainder had genetic contribution from both rainbow and westslope cutthroat trout (BPA[37] 2001). Bull trout numbers are extremely low and no sampling for genetic purity has occurred.

River Basin Existing Habitat Condition

The Pend Oreille River between Box Canyon and Albeni Falls dams is a slow water reservoir. The water retention time is longer, water velocities slower, water temperatures slightly higher and channel width is wider than when the river was in its free flowing condition. The reservoir now supports much greater biomass of aquatic vegetation than in its riverine form. Eurasian water-milfoil, an aquatic noxious weed, and curly pondweed, a non-native plant, comprise a substantial portion of this aquatic vegetation. Former riffles, gravel bars, side channels and pools have been inundated by the present water levels behind the dam. Large woody debris is almost non-existent. The habitat is more suitable for spiny-ray fish than for salmonids due to lack of habitat complexity and increase in shallow water habitat.

Watershed Existing Habitat Condition

Introduction

The Le Clerc Creek watershed provides suitable fish habitat. Portions of the stream on NFS lands in this analysis area were most recently surveyed between 2004 and 2007 and the R6 Hankin-Reeves Stream Survey protocol was used for these surveys. Segments of the stream also lies within private lands and those reaches were not surveyed, hence only 5 of 10 reaches of the East Branch were surveyed for example.

There is one possible natural seasonal blockage presently preventing fish passage between Box Canyon Reservoir and a portion of the West Branch of Le Clerc Creek in this analysis area. The surface flow periodically goes subsurface in a section of the West Branch in the western quarter of section 5, T. 35 N., R. 44 E. It is presently unclear if the aggradation of streambed material in this stream section is due to past natural or human actions. There is also a historic diversion dam on the West Branch upstream from this section that is also a seasonal, if not year long, barrier to upstream fish passage in Section 8, T. 36 N., R. 44 E.

There are also 6 undersized and improperly placed culverts on the Middle Branch of Le Clerc Creek, in the analysis area, that prevent upstream fish passage permanently or seasonally.

Outside of the analysis area, a natural falls/cascade on lower Fourth of July Creek, a tributary to the East Branch of Le Clerc Creek, prevents upstream fish passage beyond the first 0.3 miles of this stream.

Large Woody Debris (LWD)

The INFISH riparian management objective is to have a minimum of 20 pieces of large down wood (12 inches in diameter at 35 feet from the large end) in each mile of stream. This is achieved through the standard of managing the riparian habitat conservation areas to provide these large pieces of wood to the stream channel (INFISH TM-1b). All reaches surveyed with the exception of reaches 8 and 10 on the East Branch, reach 1 of Fourth of July Creek and reaches 5 and 8 on the West Branch do not meet the INFISH riparian management objective (RMO) for LWD. A majority of the deficient reaches have some commonality in that low levels of LWD are most often related to these segments of streams with roads located within the riparian area. These roads have eliminated a portion of any potential contributing source of instream wood. In addition, the increased access to the remaining riparian area to cattle, dispersed recreation uses and firewood cutters for many years also has reduced contribution of instream wood. There are very few trees, in these valley floors, large enough to meet the INFISH standard for large wood if they were to fall in the stream. The lack of recruitment sources in these reaches is the reason there are low numbers of large woody debris.

[37] Bonneville Power Administration.

Bankfull Width Depth (BFWD) Ratio
The width to depth ratio as described in INFISH is for wetted width depth. This has been changed for this analysis to bankfull width to depth (BFWD). The reason for this change is that it is easier to take repeated measurements of bankfull width to depth. The BFWD RMO has been set at 13 for this analysis. In previous analyses on Hankin and Reeves data across the Forest, a BFWD ratio below 13 was found to be indicative of good bank and channel stability. This is being met in all reaches except for reaches 3 and 5 of the West Branch Le Clerc Creek. Dispersed recreation and livestock use of localized riparian areas in these reaches may be having an effect causing higher BFWD ratios. Excessive sediment entering the creek above these reaches also can cause the pools to fill and stream channels to widen.

Pools per mile (PPM)
The INFISH pools per mile RMO is not being met on any surveyed reach in the Le Clerc Creek watershed. However, it is more suitable to compare the pools per mile with the average for other managed watersheds. The ``A Characterization of Inventoried Streams in the Columbia River Basin'' (McKinney et. al.1996) lists the average pools per mile for managed watersheds in the Pend Oreille Subbasin. This data uses the pools per mile collected through the Hankin and Reeves Survey Method. This data gives a more appropriate indicator than the INFISH riparian management objectives. The average for streams that are between 10 and 25 feet wide in moderate gradient systems is 10 to 20 pools per mile. All but 3 of the surveyed reaches in the analysis meet the 10 to 20 pools per mile average. These exceptions are Reach 4 of the East Branch and Reaches 4 and 5 of the West Branch. The length of Reach 4 is 0.14 mile and pools per mile figure is not statistically substantial. Reach 5 of the West Branch is influenced by the presence of a historic diversion dam that has accumulated sediment over time. This accumulation could be the primary reason for the low numbers of pools per mile within this reach.

Water Temperature
Complete year round data is unavailable; partial data for the East, West and Middle Branches (May through October) exists for 1996, 2007 or 2008. Data was collected through the use of hydrothermographs.

Measured water temperature listed in the Le Clerc watershed analysis indicate that there are water temperatures during the summer months that exceed state water quality standards (60 Degrees F.). These areas include the uppermost reaches of the West Branch, the Middle Branch and the East Branch below the confluence with the Middle Branch. Water temperatures in a majority of the West Branch are within state water quality standards. Since sufficient information is not available, it is unclear if the East Branch above the confluence with the Middle Branch meets these standards. State standards notwithstanding, these water temperatures during the summer months, are at or above the tolerance levels of bull trout fry and juveniles. Temperatures in excess of about 15 Degrees C. (59 Degrees F.) are thought to limit bull trout distribution (Allan 1980; Fraley and Shephard 1989; Goetz 1991; Oliver 1979; Pratt 1985; Ratliff 1992; Shephard and others 1984b). Goetz (1989) believed that optimum temperatures for rearing were about 7 to 8 Degrees C. (44.6 to 46.4 Degrees F.). In Washington, Wydoski and Whitney (1979) reported spawning activity was most intense at 5 to 6 Degrees C (41 to 42.8 Degrees F.).

High water temperatures appear to be directly related to the elimination and reduction of riparian habitat particularly in the Middle Branch of Le Clerc Creek but also elsewhere in the larger Le Clerc Creek watershed. Riparian vegetation has been replaced by gravel roads in certain locations. In other areas, the native vegetation has been harvested or burned historically and replaced with smaller trees and brush. Many riparian areas, particularly in the Middle Branch, have been overgrazed with shrubs and forbs being replaced with non-native grasses.

Instream large woody debris numbers are low primarily due to past riparian harvest and fires. Historic and present increase in sediment over natural levels, as well as unstable, eroding streambanks, has widened certain segments of stream channels. This widening decreases water depth which may, in turn, increase water temperatures. This condition is especially important during the summer months.

The lower East Branch of Le Clerc Creek also had roads within its riparian areas. Restoration activities has obliterated approximately 2.5 miles of these roads and revegetated the former road beds. The effects on the modification of summer water temperatures are expected to increase as the reestablished riparian vegetation matures.

Summary

The watershed in the analysis area has been impacted in the past from homesteading, timber harvest, past fires, dispersed recreation and cattle grazing. The historic and present impacts, such as railroad and road construction, have simplified channel habitat and reduced or virtually eliminated portions of riparian vegetation along portions of this watershed within the analysis area. Most reaches have low numbers of large instream wood and pools per mile. As well, there are some reaches where channel width area higher than what might be expected considering the hydrologic and geologic conditions. Summer water temperatures are also at or above the tolerance levels of bull trout fry and juveniles. The current condition of the channel habitat is directly related to the existing condition and capability of the riparian habitat. Decreased function of the riparian vegetation to stabilize the streambanks, provide overhead shading and provide adequate recruitment of future instream large woody debris appears to be the primary factor. This is particularly apparent on the Middle Branch Le Clerc Creek but can be found throughout the analysis area.

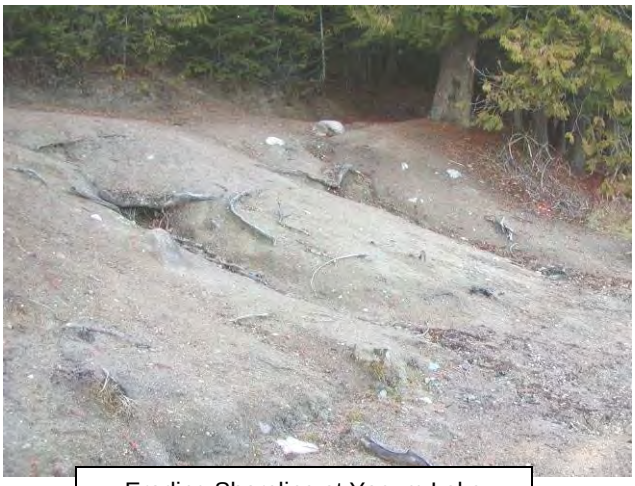
These poor habitat conditions, together with competition from non-native fish and habitat degradation in the Pend Oreille River, are responsible for the decline of native species within the analysis area and in the greater Pend Oreille subbasin.

Effects of Alternative A

No change in existing management would occur under this alternative. Therefore, the Kalispel Tribe objective of improving fish habitat within the Le Clerc drainage would not be met with this alternative.

Water Temperature

The water temperature regimes are expected to remain stable. This alternative would not increase the amount of open area in upland or riparian vegetation or increase the existing drainage pattern in any watershed in the project area through the construction of roads. The existing level of soil movement from streambank erosion and other sources into the stream systems within the project area is expected to continue. Existing stream and riparian habitat conditions are expected to remain stable or increase slightly as stocking levels and tree heights increase on areas of past timber harvest on federal and private timberlands.



Eroding Shoreline at Yocum Lake

Cattle grazing would continue at existing levels and seasons of use within the analysis area. Water quality is expected to remain at existing levels on streams within the analysis area used for grazing over the next 10-15 years. No changes to the state 303(d) list are anticipated for these streams during this time. Transitory range would continue to disappear as older regeneration harvest units become mature and shade out much of the understory vegetation. This would increase grazing pressure along roads, meadows and the accessible portions of streams and wetlands.

Off-highway vehicle (OHV) use would continue on and off forest roads. OHV use is occurring within riparian areas. Some level of degradation of riparian vegetation and streambank integrity has been occurring and is likely to increase.

Dispersed recreation sites would continue to increase along streams within the analysis area. The function of the riparian vegetation would continue to be compromised through the removal of trees and other riparian vegetation and the compaction and sloughing of streambanks.

The flow regime and the existing level of shading along streams in the project area would remain stable or slightly increase as regeneration harvest units and existing riparian vegetation matures where ungrazed. The anticipated increase in overall shading is anticipated to counter any localized decrease due to recreational use.

Timber harvest may continue on Stimson lands within the analysis area. Riparian vegetation and its functions, including overhead shading would be protected on fish bearing perennial streams.

Since the function of a majority of the riparian vegetation to provide shade is not expected to change, summer water temperatures should not noticeably change on stream systems on the forest.

Pool Frequency
The existing levels of soil movement into the streams from natural and other sources, such as roads (including OHV use) and overgrazing of riparian vegetation by livestock, would continue. Sediment entering the stream can fill pools, reducing their quality or eliminating the pool habitat altogether. Instream wood is an important factor in the formation of pool habitat. The function of the existing riparian vegetation to provide future large instream wood is expected to improve as riparian vegetation matures and decays.

Pool habitat is particularly important for winter rearing by trout species in perennial fish-bearing streams within the project area. Existing stream and riparian habitat conditions, including pool frequency, are anticipated to remain stable or slightly improve within the project area.

Under this alternative, pool numbers are not anticipated to noticeably change over existing levels. No new harvest units would be implemented on National Forest System lands. Logging would continue on private and state lands within and adjacent to the analysis area. The effects of sediment contribution from these activities may increase the filling of pools in low gradient segments of the streams in the analysis area. Use of the existing road systems, continued grazing in the riparian areas and recreational use of the area would continue to be a source of sediment in addition to natural level of erosion.

Since logging on state and private lands must comply with state Forest and Fish Rules, there is some level of protection of perennial streams to reduce the level of sediment entering the streams. Due to these rules and the lack of additional harvest and road construction activity on NFS lands within the riparian habitat, pool quantity should not noticeably change on stream systems in the analysis area.

Large Woody Debris
Existing riparian vegetation within the project area would not be affected. Riparian vegetation would continue to mature and continue to provide recruitment for future instream wood. Large woody debris numbers would remain stable as old instream wood is replaced by a continual source. The existing levels of instream wood, in surveyed streams within the project area, are expected to continue to meet this INFISH RMO in most reaches.

Large instream wood recruitment is not anticipated to noticeably change over existing levels except where riparian vegetation matures within fenced riparian areas and along the formerly obliterated East Branch Road. No new harvest units would be implemented on National Forest System (NFS) lands. Logging would continue on private lands in and adjacent to the analysis area. Since logging on private lands must comply with state Forest and Fish Rules, there is some level of protection of riparian habitat along fish bearing, perennial streams to ensure a source for future large wood entering the streams. However, riparian vegetation would continue to be harvested along non-fish bearing and intermittent streams and all stream crossings on private and state lands in the analysis area. This activity would continue to reduce available large instream wood recruitment in the future on private lands. No additional harvest and road construction activity in riparian vegetation would occur on NFS lands and numbers of large instream wood are expected to remain stable or slowly improve on stream systems on NFS lands within the analysis area.

Bankfull Width/Depth (BWD) Ratio
There are many factors affecting the bankfull width/depth ratio for streams within the analysis area including over utilization of its riparian vegetation and compaction of its banks from livestock grazing and dispersed recreation. Sediment that is eroded due to these activities can be deposited in the lower gradient stream channel reaches and widening these areas over time.

Existing information on the wetted width/depth ratio, which is an INFISH RMO, is not available. Bankfull width/depth ratios are better indicators of channel condition. The BFWD RMO has been set at 13 for this analysis. In previous analyses on Hankin and Reeves data across the Forest, a BFWD ratio below 13 was found to be indicative of good bank and channel stability. This alternative is expected to continue to meet the BWD ratio on most reaches. All reaches in the analysis area have ratios below 13 with the exception of 2 reaches in the West Branch Le Clerc Creek.

Channel morphology is anticipated to remain stable at existing levels. No new harvest units would be implemented on National Forest System (NFS) lands. Logging would continue on state and private lands within and adjacent to the analysis area. Since logging on state and private lands must comply with state Forest and

Fish Rules, there is some level of protection of riparian habitat along fish bearing, perennial streams to protect streambank integrity and reduce sediment input. Lesser protection exists for non-fish bearing perennial streams and no protection for intermittent streams on private lands. New road crossings and logging along on these other categories of streams on private lands would continue to maintain the existing bankfull width/depth ratios in the immediate reach and downstream reaches. The existing level of sediment input from existing road use and grazing on NFS lands would also continue to accumulate in the lower gradient sections of stream habitat in the analysis area.

Embeddedness
Sediment entering a stream can fill interstitial spaces within spawning gravels and other size substrate that is used for hiding cover for fry and juveniles and habitat for macroinvertebrates. Increased levels of sediment can reduce the quality of aquatic habitat or eliminate the habitat altogether.

High embeddedness levels exist in a majority of the reaches surveyed within the analysis area. The existing level of soil movement from riparian areas overutilized by livestock, roads and from other sources into the streams, within the analysis area, is expected to remain at existing levels. Existing stream and riparian habitat conditions are expected to remain stable or continue to stabilize (i.e. the East Branch Le Clerc road obliteration) within the analysis area. Certain road segments adjacent to streams and easy livestock and recreational access to riparian areas within the project area are expected to continue to have an effect on aquatic habitat.

This alternative is anticipated to continue to contribute to the level of embeddedness of Le Clerc Creek.

Use of the existing road systems, continued grazing in the riparian areas and recreational use of NFS lands in the analysis area would continue to be a source of sediment in addition to the present level of embeddedness of stream habitat on lower gradient sections of stream in the analysis area. The effects of sediment contribution from these activities on NFS lands, due to the filling of streambed substrate and pools in low gradient segments of the streams, is expected to continue within the analysis area.

Riparian Vegetation
The present function of the riparian vegetation would remain stable. A majority of surveyed streams within the project area meet the INFISH RMOs for instream wood and width/depth ratio indicating that the riparian vegetation is functioning well. Riparian vegetation is expected to continue to develop and mature where it was removed during timber harvest in the 1970s and 1980s or earlier riparian road construction. This alternative is expected to maintain the stable condition of the riparian vegetation throughout the project area except where riparian road obliteration and revegetation or riparian fencing has occurred. In these areas, the condition of riparian vegetation is expected to continue to improve.

Fish Populations
Existing stream and riparian habitat conditions are expected to remain consistent under this alternative. Fish populations would continue to be represented primarily by eastern brook and westslope cutthroat trout throughout the watershed. The lower reaches also support mountain whitefish, brown and rainbow trout. Bull trout have been observed in this watershed infrequently. Only one redd has been observed in the West Branch. Juvenile bull trout have been observed in both the West and East Branches indicating some level of reproductive success. All species are tolerating degraded instream conditions (low frequency of pools, high embeddedness level, high summer water temperatures). Westslope cutthroat populations are more populous in the higher gradient stream segments where stream and riparian habitat conditions are less degraded. The trend of these subpopulations is unclear. However, no long-term expansion of these subpopulations is expected under existing habitat conditions.

This alternative is anticipated to continue to affect the fish population of Le Clerc Creek primarily through the contribution of sediment which maintains the present levels of embeddedness of the spawning and rearing and overwintering habitat in this watershed and the condition of the riparian habitat which, along much of the Middle Branch Le Clerc Creek, is insufficient to filter soil movement or provide adequate overhead shading and large instream wood recruitment.

Sediment transported downstream from road use by OHVs and other vehicles and cattle grazing on NFS lands would add to the overall level of sediment levels found primarily in lower gradient sections of fish habitat. This additional sediment input continues, in part, to maintain high levels of embeddedness of streambed substrate. These levels of embeddedness can decrease reproductive success of salmonids species in the affected habitat through the filling of interstitial spaces between gravels and cobbles of spawning areas. This filling reduces the

flow of oxygen to and transport of metabolic wastes away from the eggs. Excessive sediment input can also fill existing pool habitat thereby reducing the quantity and quality of overwintering habitat.

Effects of Alternative B

Fish habitat improvement projects are proposed under this alternative along with fuel, vegetation, and road management projects. Restoration projects related to fish habitat include:

- relocating approximately 3.2 miles of the Middle Branch Le Clerc Road (FR 1935) to an upland area west of its present location, removal and replacement of culverts blocking fish passage, replacement of two culverts with a bridge, and obliteration of the existing riparian road;
- West Branch Le Clerc Creek diversion dam sediment reduction; and
- Diamond City stream channel restoration, which would include placing a section of the West Branch Le Clerc Creek back into its original stream channel and away from eroding streambanks and cultural sites.
- Riparian exclosures would be constructed to protect stream segments throughout the project area that exhibit over-utilization by livestock. Riparian vegetation would be supplemented with plantings grown from local seed sources or with cuttings from local stock.
- User-created trails at Yocum Lake would be closed and rehabilitated to improve sanitation, reduce sedimentation, and improve vegetation along the lake shore.
- Areas within riparian-influence zones (outside edges of RHCAs) would also be planted with spruce, or advanced regeneration of hardwood species, western redcedar or western hemlock would be released to encourage development of species that generally have longer life spans than lodgepole pine.

Water temperature

Limited timber harvest, new road construction, and system road reconstruction are proposed within the RHCAs of streams within the analysis area. Fuel treatment areas and rock sources for road construction would be located outside of existing RHCAs. Timber BMP PT-7 Riparian Habitat Conservation Area Designation and Protection would be implemented. Timber harvest is proposed in several units within the RHCA of the West Branch of Le Clerc Creek within the analysis area. No harvest would occur within the RHCAs of these units along any perennial fishbearing stream unless the area is either separated from the stream by a system road or a topographic break within the riparian area. The objective of harvest in these portions of the RHCA is to maintain the function of the riparian vegetation to meet INFISH RMOs through the conversion of decadent lodgepole stands to areas of greater diversity of species and size. Fuels treatments shall be located outside of RHCAs with the exception of where harvest is proposed in the units along the West Branch.

This alternative is not expected to prevent or retard movement toward achievement of the water temperature RMO on any of the streams within the project area due to proposed action. Proposed timber harvest would not diminish the overhead tree canopy that influences stream temperature along perennial streams. The effects of the limited new road construction in these subwatersheds, within the analysis area, is not expected to imbalance the existing flow regimes, lower summer flows and increase summer water temperatures due to their limited nature and the long-term reduction in overall road density. The effects of the addition of new road construction to the existing drainage network, in watersheds within the analysis area, are countered by the decommissioning of 13.4 miles of existing road.

Proposed road decommissioning would result, over time, in a return to natural vegetative shade conditions at all existing stream crossings and segments of those particular roads within the riparian area of the stream. This should add a substantial amount of shading over time in those drainages affected.

Stream channels and flows in the analysis area have adjusted to past management related created openings (i.e. harvest units and road corridors). The proposed harvest treatments, under this alternative, are anticipated to increase peak flows in the watershed in the short-term as more area is harvested. This alternative is anticipated, during the summer months, to contribute to lowering water temperatures of the Middle Branch and the East Branch of Le Clerc Creek below its confluence with the Middle Branch as riparian vegetation increases with maturity on the obliterated section of FS Rd 1935000.

No downstream cumulative effects to stream temperatures are anticipated to occur under this action alternative since the capability of riparian vegetation to shade the streams and modify water temperatures to some degree within RHCAs would remain intact and undisturbed except for limited riparian vegetation disturbance during the moderate reconstruction of stream crossings. Downstream cumulative effects of these combined with other ongoing activities to temperature would likely be beneficial using standard monitoring techniques.

Pool Frequency
The function of the riparian vegetation to provide instream wood recruitment, which is a major factor in the creation of pools, would slightly increase due to the miles of roads to be decommissioned and specifically approximately 3.2 miles of existing riparian road that would be revegetated with native riparian species during obliteration. As revegetation occurs in areas of road obliteration in the riparian areas within the analysis area, sediment levels should decrease from existing levels. As well, the proposed placement of large instream wood would increase the number and quality of pool habitat throughout the analysis area.

For these reasons, the effects of the proposed harvest, new road construction, reconstruction, and restoration activities within the analysis area is expected to increase the number and improve the quality of pools in the long-term.

Under this alternative, no activities within the riparian vegetation within the RHCAs of Le Clerc Creek are proposed except for some minor riparian vegetation removal at proposed moderate reconstruction of stream crossings. Road obliteration and the removal of culverts during decommissioning of roads, within the riparian area, may cause a temporary increase in sediment introduction into certain segments of streams within the analysis area. The replacement of culverts, dredging sediment from behind a diversion dam and the placement of instream wood and/or rock structure would all temporarily increase sediment input into streams within the analysis area. Pool habitat would be affected by the actions on federal, state and private lands as these activities would increase the sediment input in the short-term and the level of filling of pools on low gradient sections of streams located downstream of the activities within riparian areas. The action alternative is likely to have a short-term cumulative degrading effect to pool habitat on the lower gradient reaches of Le Clerc Creek within the analysis area for this reason. As well, the proposed introduction of instream structure that would create new pool habitat and improve existing through the action of scouring would also have a beneficial effect on pool habitat in the long-term.

Large Woody Debris
Proposed timber harvest, within a small portion of the riparian areas of a few units, is not expected to impact the function of the riparian vegetation. These proposed harvest areas, within the RHCA, are on gentle to almost level terraces on the outside edge of the RHCAs or above existing roads. These portions of the RHCAs are not anticipated to contribute large instream wood recruitment in the future due to their distance from the streams, gentle topography, and/or the existence of a road that would intercept any potential recruitment. These activities are not anticipated to diminish the overall function of the remaining riparian vegetation to provide a recruitment source for large instream wood for this stream in the analysis area. It is anticipated, therefore, that there would still be adequate instream wood to stabilize channel structure and provide fish habitat under this alternative. Fuel treatment areas would be located outside of existing RHCAs.

Due to these reasons, the effects of the proposed harvest and new road construction and reconstruction in this watershed, together with the proposed restoration activities, is expected to increase numbers of instream wood and the ability of the riparian vegetation to contribute large instream woody debris along approximately half the length of the Middle Branch in the future.

Moderate road reconstruction, within the riparian area on NFS lands, may cause a very slight decrease in potential numbers of available large instream wood recruitment into limited segments of streams on NFS lands. This decrease in wood contribution is considered in addition to the continuing decrease in potential large wood from logging on state and private lands. Additional placement of instream large wood would occur throughout the three branches of Le Clerc creek where needed under this alternative. Over time, other areas would mature and eventually start contributing to the overall numbers of instream wood (i.e. the East Branch Le Clerc road obliteration). The availability of large instream wood for cover, foraging, sediment collection, and pool formation should increase for fish populations on NFS lands within the analysis area.

BWD Ratio

Establishment of RHCAs, per INFISH, would adequately filter out soil movement from most of the proposed activities (timber harvest, fuel treatments, new road construction, and a majority of the road reconstruction). Compliance with road BMPs would reduce any potential sediment input as a result of the crossing reconstruction and therefore reduce the potential of project-related increases in bankfull width/depth ratios.

Aggradation of the channel is not anticipated to occur below the proposed moderate reconstruction of road crossings due to the initial increase in sediment levels. Any initial increase in on-site erosion is expected to pass through the stream system since these road crossings are not located within or immediately above a low gradient reach. Sediment input should decrease to a new baseline level when vegetation is reestablished on the crossing sites. Since this increase in sediment is not expected to accumulate in a low gradient section immediately below the activities but disperse further downstream, the bankfull/width ratio of the particular streams is not expected to increase.

There is an expected temporary increase in sediment spatially over many years primarily from the some of the proposed restoration activities. This sediment may settle in low gradient channels within Le Clerc Creek. This sediment is also expected to be flushed out during peak flows during the spring of each year. This flushing action would avoid any long-term accumulation of sediment under this alternative that would widen stream channels and increase the bankfull width/depth ratio.

In addition to producing temporary increases in sediment, the reestablishment of the riparian areas and instream structure placement along 3.2 miles of the Middle Branch Le Clerc Creek should narrow the current width and increase the current depth over time. This would occur as a result of an anticipated increase in bank stability and the redirecting flow away from the banks and towards the center of the stream through the use of instream structure. The same effect would be expected through the placement of structure on the other two branches and other restoration efforts to improve riparian condition within the watershed.

Bankfull width/depth ratios can also increase on segments of stream both upstream and downstream of new road crossings due to excessive livestock and/or recreational use that can breakdown streambanks and increase stream width and decrease stream depth. There are no new stream crossings proposed. Proposed harvest or fuel treatment actions would not open up access to riparian and channel habitat to either livestock or dispersed recreation. The reconstructed road crossing would not change access of livestock to riparian and stream habitat. Road decommissioning would limit access of livestock to 3.2 miles of existing riparian road where culverts would have been removed and the road would be obliterated. For these reasons, under this alternative, no increases in the ratio are expected in the short-term. Instead, the ratios are anticipated to actually decrease on the Middle Branch over time due to the proposed restoration actions within this alternative.

INFISH RHCAs would prevent any stream channel modification from upland timber harvest through the filtering of any overland soil movement and protection of streambank integrity. Under this alternative, moderate road reconstruction, within the riparian area on NFS lands, would not modify the segments of streams within the crossing corridors. This alternative should not, when considered with stream conditions affected by state and private logging and roadbuilding, detrimentally affect functioning channel habitat in Le Clerc watershed within the analysis area because of these reasons.

Embeddedness

Establishment of RHCAs, per INFISH, would adequately filter out any soil movement from most of the proposed harvest and fuels treatment activities. Direct sediment input may occur where moderately reconstructed road crossings and where restoration activities are proposed within riparian vegetation and/or the stream channel.

Any direct and indirect sedimentation from riparian road crossing reconstruction and restoration activities is expected to be reduced after the actual proposed activity occurs and sites are revegetated. Any increase in embeddedness is expected to be temporary as the proposed restoration activities would be scheduled so as to allow the streams to flush the introduced sediment through its system, lessening any localized short-term increase in embeddedness.

Many of the proposed restoration activities, in addition to producing a temporary increase in sediment, are expected to decrease embeddedness in the long-term. This decrease would be due to the reestablishment of riparian vegetation along 3.2 miles of an existing road along the Middle Branch Le Clerc Creek which would reduce the current erosion of the riparian road. The decrease would also be attributed to the proposed removal of sediment through the use of suction dredges behind the existing diversion dam on the West Branch Le Clerc

Creek. The placement of instream structures in all branches would be designed to divert current flow away from eroding streambanks and towards scouring areas of the streambed to provide for a less embedded condition that would increase the amount and/or quality of spawning and overwintering habitat for salmonids.

Moderate road reconstruction at stream crossings and the implementation of the suite of restoration activities within the riparian and channel habitat, would cause a temporary increase in sediment introduction into certain low gradient segments of streams within the analysis area. These sediment sources, in addition to any contribution of sediment from logging on state and private lands, may temporarily increase the embeddedness level of streambed substrate and filling of pool habitat on low gradient sections of streams located downstream of the proposed activities within riparian areas on NFS lands. Due to the proposed spatial separation of the different restoration projects and the long-term reduction of embeddedness, the watershed is anticipated to be able to handle this temporary degradation of the streambed substrate through annual flushing in the spring.

Riparian Vegetation
Along the proposed obliteration of the riparian road along the Middle Branch Le Clerc Creek (FS Rd 1935000), riparian vegetation would become reestablished along approximately 3.2 miles and at 3 present road crossings after culverts are removed.

This alternative is not anticipated to affect the function or quantity of riparian habitat within the overall analysis area. However, this alternative would improve both function and quantity of riparian habitat within the Middle Branch Le Clerc Creek subwatershed in the long-term.

Moderate road reconstruction at road crossings within the riparian area on NFS lands would cause a slight decrease in the amount of functional riparian vegetation along certain segments of streams within the analysis area. The effect of this decrease in riparian vegetation on NFS lands is considered minor when compared to the amount of remaining riparian vegetation and the riparian vegetation that would continue to mature and become more functional on past units with riparian harvest on NFS lands. The function of riparian vegetation for shade, bank stability, detritus, large instream wood, cover and to filter out soil movement should continue to be adequate for fish populations on NFS lands in the analysis area.

Fish Populations
Fish populations would continue to be represented by the present suite of species. Westslope cutthroat populations would continue to be located in the higher gradient stream segments where stream and riparian habitat conditions are less degraded. The Middle Branch has only brook trout throughout most of its length due to upstream fish passage barriers. The removal of these barriers and other habitat improvement work within this proposed alternative, complimented by the removal of other downstream barriers by Pend Oreille County Roads Department, would increase the current distribution of westslope cutthroat trout for another 5 miles and open this habitat for bull trout.

Under this alternative, road reconstruction within the riparian area on NFS lands would cause a minor decrease in the amount of functional riparian vegetation and a temporary increase in sediment introduction at a few sites within the analysis area. The proposed restoration activities would also temporarily increase the level of sediment input but also increase spawning, rearing and overwintering habitat through the introduction of instream wood and/or rock structure. The quantity and quality of riparian vegetation would increase and long-term streambank erosion would decrease through riparian road obliteration and revegetation. Upstream fish passage to quality salmonid habitat would be restored through the removal and replacement of impassable man-made barriers.

Riparian vegetation would continue to mature and become more functional on past units with riparian harvest on both private, state and NFS lands. The function of riparian vegetation for shade, bank stability, detritus, large instream wood, cover, and to filter out soil movement should continue to maintain adequate habitat for fish populations on NFS lands within the analysis area.

Bull Trout Habitat

Overhead canopy and shade has been reduced in riparian areas over time through past fires, road building, riparian harvest, recreational overuse, and grazing. The proposed action would not harvest trees in riparian areas that presently provide shade to Le Clerc Creek. In addition, the proposed action includes the obliteration of approximately 3.2 miles of road within the riparian area along the Middle Branch of Le Clerc Creek. This area would be obliterated and planted with native riparian species in an effort to improve riparian function and restore its floodplain. Overhead canopy in the long-term would increase as this riparian vegetation matures, particularly in

the obliterated road section of the RHCA adjacent to the Middle Branch. The present high summer water temperatures in the Middle Branch and the segment of the East Branch below the confluence with the Middle Branch is expected to lower the presently high summer water temperatures. The present water temperature regime is expected to continue to remain unchanged in the West Branch and the East Branch above the confluence with the Middle Branch during the summer months due to the open nature of the riparian communities further upstream in the watershed. The proposed action is expected to reduce present summer water temperatures on a portion of Le Clerc Creek.

Embeddedness of the spawning and rearing areas is expected to continue from sediment introduction as the result of over utilization of riparian vegetation among other factors within the watershed. The proposed action is not expected to increase the amount of sediment introduction over existing levels during harvest or fuel reduction since most of these activities are not located within RHCAs and appropriate BMPs and conservation measures would be followed. Any soil movement due to harvest is expected to be filtered out in the existing RHCA between harvest units and roads and the branches of Le Clerc Creek. However, a portion of the proposed action which includes the obliteration of portions of FS RD 1935000 (includes the removal of culverts at 4 sites, ripping and contouring of the existing roadbed), placement of instream wood and rock, replacement of twin culverts and realignment of a portion of the West Branch Le Clerc Creek would all temporarily increase the level of sediment input into the Le Clerc Creek drainage.

The action is expected to increase the present condition of the watershed in regards to this indicator in the short-term due to some level of increase in sediment input and movement during implementation of the restoration activities. While this is unavoidable, the proposed restoration activities are expected to reduce or eliminate some existing chronic sources of sediment such as segments of FS Road 1935000 and continuing erosion of streambanks at the Diamond City site over the long-term. The net effect is anticipated to decrease the level of sediment in a portion of the watershed that includes the Middle and lower East Branches.

The proposed action does not prevent fish passage within the watershed. The existing situation would be improved through the replacement or removal of 5 current barriers to upstream fish passage.

Large wood is proposed to be placed in portions of the watershed that are deficient in many other reaches due to elimination or reduction of the riparian areas by roads. The classification for this indicator is expected to be improved by the proposed action for this reason.

The proposed action is not expected to considerably change flow regime through the removal of volume on 4,647 acres and reduction of fuels on 2,324 acres due to stability of flows within the much larger watershed. The effect of the proposed action in this case would be to maintain the current condition.

The timber harvest and road construction/reconstruction portion of the proposed action would not take place within the RHCAs of Le Clerc Creek except in a few units along the West Branch. These units have some existing lodgepole pine stands that would be harvested to improve long-term stand health and diversity. However, no harvest would take place within the riparian zone of influence. Restoration activities are proposed within some of the existing RHCAs. These proposed actions would entail some short-term disturbances in the streambank when anchoring instream structures, and the present function and connectivity of the riparian areas would be maintained adjacent to the East Branch.

Bull trout have been found in the East and West Branches of Le Clerc Creek watershed. It has been determined that the portion of the proposed action of timber harvest, fuel reduction, and road construction/reconstruction “may effect - not likely to adversely affect” bull trout or their habitat. Adverse effects are not likely from these activities for the following reasons: most of the harvest activity is located outside of the adjacent RHCA; any timber harvest within the RHCA would occur above existing roads and above topographic breaks outside of the riparian zone of influence; fuel reduction activities would occur outside of the RHCAs of streams within the project area; no new road construction is proposed within the RHCA and limited light and moderate reconstruction of a few crossings within the RHCA would occur within the existing road prism and may remove a minor amount of vegetation and disturb a minor amount of soil through road grading within this area; and appropriate BMPs and conservation measures would be followed to decrease any potential effect of these actions on aquatic resources. Riparian and stream habitat adjacent to timber harvest and road construction/reconstruction are expected to remain functional.

The restoration portion of the proposed action is anticipated to have a temporary adverse effect on bull trout and their habitat primarily due to a temporary increase in sediment input to the streams within the Le Clerc watershed. However, these activities would create more complex instream habitat, reduce water temperature, stabilize

currently eroding streambanks and provide connectivity to currently inaccessible suitable habitat to bull trout within the watershed resulting in an overall long-term beneficial effect. The restoration components of the proposed action are covered under the 2007 programmatic biological opinion (PBO) for the USDA Forest Service, USDI Bureau of Land Management, and the Coquille Indian Tribe for Programmatic Aquatic Habitat Restoration Activities in Oregon and Washington That Affect ESA-listed Fish, Wildlife, and Plant Species and their Critical Habitats. The PBO concluded that short-term adverse effects associated with such activities would be diminished through compliance with the requirements outlined in the PBO whenever planning and implementing such activities at the local level. Compliance includes following conservation measures (CM) and project design criteria (PDC), within the PBO, focused on minimizing or avoiding adverse effects to listed species and their designated critical habitats including bull trout. The restoration activities included in the proposed action would be compliant with the requirements of the PBO.

Implementation of the projects proposed with alternative B would meet the Kalispel Tribe objective of improving fish habitat within the Le Clerc drainage.

Management Indicator Species (MIS)

Deer, elk, beaver, pine marten, barred owl, pileated woodpecker, primary cavity excavators, blue grouse, raptors, great blue heron, and land birds are the management indicators selected for the project based on their association with habitat present in the Hanlon project area and would be indicators of the project's effects on habitat. Full analysis for each species is located in the Management Indicator Species report located in the project file.

Deer and Elk Winter Range (Purpose and Need Objective #4)

Existing Condition

The objective for deer and elk winter range in the Forest Plan (page 4-106) is to "Manage for cover/forage ratios approaching 50:50 dispersed to provide for a maximum utilization of forage." At least 20 percent of the cover component should be thermal cover and the rest can be thermal or hiding cover. The project area contains about 4,006 acres of designated elk winter range (Forest Plan Management Areas 6 and 8). Within these areas, there are a few stands on more sheltered aspects that are providing thermal cover. The majority of the winter range is providing hiding cover for big game. The best foraging habitats are located in riparian shrub/forb fields, old homestead meadows, recently created plantations, and open forest stands. A few upland shrub fields exist in the area.

Table 6 displays the existing habitat components on designated big game winter range. Each stand was assigned the habitat component that *best* described the stand using the following criteria:

- Forage – meadows, wetlands, shrub fields, and forest stands in structural stages (SS) 1, 2, or 7. Forage plants are common.
- Thermal cover – stands in SS 3, 4, and 5 with at least 70 percent canopy cover.
- Snow-intercept thermal cover - stands in SS 6 with at least 70 percent canopy cover.
- Hiding cover – typically stands in SS 3, 4, 5.

Note that on the Newport-Sullivan Lake Ranger Districts, stands typed as thermal or snow-intercept thermal cover are also providing hiding cover as a rule. This may also be the case for some stands typed as forage.

Table 6 Existing Acres of Big Game Habitat Components on Designated Elk Winter Range (Management Areas 6 and 8) in the Hanlon Analysis Area

Winter Range Habitat Component	Existing	Forest Plan Goal
	Acres (percent)	Acres (percent)
Forage	973 (24%)	2003 (50%)
Thermal Cover	63 (2%)	801 (20%)
Snow-intercept cover	0	
Hiding cover	2967 (74%)	1202 (30%)
Other (e.g., rock)	3 (<1%)	NA
Total Winter Range	4006 (100%)	4006 (100%)

As displayed in Table 6, designated winter range in the project area is low in forage (24 percent) and exceeds cover goals (76 percent). Only about 63 acres (2 percent) of the designated winter range is providing thermal cover.

Recent research conducted in the Blue Mountains of Oregon and Washington has shown that there is “little justification for retaining thermal cover as a primary component of habitat evaluation models for elk” (Cook, et al, 2004). These authors stated that elk likely derive benefits from forest cover such as “enhanced security, reduced snow depth, and perhaps under some conditions, a better foraging environment.” However, the thermo-regulatory properties of dense tree canopies have much less importance to elk than was originally thought. Providing quality forage, hiding cover, and seclusion from human disturbance are now thought to be much more important management objectives. Deer are able to use cover patches down to about three acres in size. Dense pockets in some stands typed as hiding cover in the table above might also provide thermal cover for deer. Such inclusions are difficult to accurately map.

Effects to Big Game Cover and Forage

Alternative A

This alternative should have no immediate effect on big game or their habitats since no forest management would occur. Over time, certain younger stands of trees would mature and attain the necessary height and crown closure of thermal cover. Other stands that are over-stocked with trees are likely to stagnate and never develop a dense enough overhead canopy to provide thermal cover. Forage plants in plantations and open forest stands would slowly decline in vigor as growing conifers shade them out. Winter ranges in the project area would accumulate more cover, while forage would decline. Ground and ladder fuels would continue to accumulate in forest stands across the project area. The potential for a large, intense wildfire would increase over the long run. In the case of such an event, the resultant increase in sunlight on the forest floor would promote the growth of upland shrubs, grasses, and other big game forage plants. However, high-intensity fires have the potential to burn large expanses of forest and create very large openings. Forest edge associated species such as big game may under-utilize the interiors of such large openings owing to the absence of nearby cover.

Noxious weeds are most likely to successfully establish where there is full sun, bare soil, and few native plants. Large, hot wildfires may produce these conditions. Such fires can result in the wholesale removal of overhead canopy, understory vegetation, and duff. If weeds heavily infest these areas, native plants can be replaced, including those eaten by big game animals. Large weed infestations can effectively reduce the area of suitable forage habitat for big game, and could change the way animals use the landscape.

Alternative B

Timber harvest, mechanical fuels treatments, and prescribed fires would reduce surface and ladder fuels. Future wildfires that start in treated areas should burn cooler and be more likely to remain on the forest floor. The risk of a hot crown fire removing forest cover over large areas would be reduced in the project area.

In many harvest units, the Forest Service would use low-intensity prescribed fire to remove logging slash and reduce forest fuel loads. These fires would release a “pulse” of nutrients into the soil. The above-ground portions of many upland shrubs and grasses would be burned off. These plants evolved with fire and should respond with vigorous sprouting from their root systems. Thus, the quantity and quality of forage for big game animals should be improved in burned areas for several years following burning.

Noxious weeds could colonize soils that are exposed by logging equipment and prescribed fire. The design criteria listed in Chapter 2, the noxious weeds discussion in Chapter 3, and the noxious weed analysis report in the project file for this environmental assessment (EA) address methods to be used to reduce potential for noxious weed establishment and spread.

Most of the commercial timber harvest proposed with alternative B would occur during the winter in order to limit disturbance to grizzly bears using the area. Winter logging has the potential to disturb and displace elk and moose; indirectly impacting predators such as gray wolves. Several factors would help to ameliorate these potential impacts. Units located on the west side of Dry Ridge (outside recovery habitat for grizzly bears) would be logged outside the wintering period. The Hanlon project would be broken up into at least two major timber sales. This should have the effect of staggering the disturbance so that logging is not occurring in all drainages at once. Wintering big game animals could find secluded blocks of habitat in designated old-growth species habitat areas. WA Department of Natural Resources (DNR) lands adjacent to the Hanlon Project Area could also provide areas of wintertime seclusion. Winter harvest operations would not occur on those lands. Lastly, deer should not be appreciably affected by project-related disturbance. It is not unusual to observe deer foraging on lichens and conifer needles made available by timber harvest, while logging is occurring (personal observation and personal communication with J. Powell).

Effects of the Middle Branch Road Relocation

With alternative B, a 3.2-mile segment of the Middle Branch of Le Clerc Creek Road (Forest Road 1935) would be re-routed. Presently this road segment lies within close proximity to the creek and affects the drainage patterns of several adjacent wet areas. The existing roadbed would be ripped, seeded, and planted with native shrubs and trees. Old drainage patterns would be re-established. Six culverts which are presently barriers to fish movement would be removed. Both ends of the abandoned road segment would be blocked with boulders, earthen berms, or other means. Based on similar projects completed elsewhere on the Newport-Sullivan Lake Ranger Districts, the abandoned road would be effectively closed to all motor vehicles and would no longer function as a road.

The new road segment would be constructed on an upland area to the west of the creek. The majority of the new road segment would lie within 0.25 mile of the creek. Thus, elk foraging in the riparian strip along the creek would still be prone to disturbance from vehicle traffic on the road. However, the new road should be mostly, if not entirely screened from the creek by vegetation and topography. The present road location is entirely visible from the creek. This project should result in net gains in riparian shrub and sedge wetland habitats over time. Foraging opportunities for big game animals should be improved within the stream corridor. The potential for big game animals to use the riparian habitat along the creek for calving and fawning should improve.

The table below displays the changes in winter range habitat composition that would result from timber harvest in the project area.

Table 7 Acres of Habitat Components on Designated Elk Winter Range (MAs 6 and 8) by Alternative

Winter Range Habitat component	Alternative A (existing condition)	Alternative B
	Acres (percent)	Acres (percent)
Forage	973 (24%)	1,493 (37 %)
Thermal cover	63 (2%)	63 (2%)
Snow inter. cover	0	0
Hiding cover	2,967 (74%)	2,447 (61 %)
Other	3 (<1%)	3 (<1%)
Total winter range	4,006 (100%)	4,006 (100%)

Cumulative Effects

Since 1989, forest management projects on the Newport-Sullivan Lake Ranger Districts have adhered to Forest Plan standards and guidelines for big game winter ranges. The Hanlon project would contribute to the long-term objective of providing optimum amounts of forage and cover habitat on NFS lands. The project would compliment big-game habitat improvements the Forest Service has completed and proposes to complete such as prescribed burning to rejuvenate upland shrub fields, spraying noxious weeds on roadsides and in meadows, maintaining

meadows by removing encroaching conifers, and protecting/restoring aspen stands. Big game predators such as wolves could indirectly benefit from these projects.

Winter ranges on most private lands are unlikely to be managed with the needs of wintering big game in mind. Providing a mosaic of cover and forage blocks is unlikely to be a consideration. Noxious weeds are likely to increase on private lands over time, due to an apparent low level of commitment to prevention, treatment, and monitoring.

A summary of the other management indicator species for this project is provided in Table 8. Additional information can be found in the specialist report for Management Indicator Species located in the project file.

Table 8 Summary of Effects to Management Indicator Species

Common Name	Habitat and/or Species Groups Represented	Existing Condition	Effects of Alternative B
beaver	Low gradient streams and abundant hardwoods	Beaver colonies and water impoundments exist in the low gradient reaches of major streams in the Hanlon project area.	The project would release existing hardwoods within openings created by timber harvest and prescribed burning. These improvements in beaver forage resources would compliment habitat improvement projects the FS has recently completed or proposes to complete in the watershed, such as prescribed burning of upland shrub and hardwood stands, aspen protection from livestock browsing, and protection of riparian sites from over-use by livestock.
pine marten	Mature and old-growth forests. Marten require forested travel corridors to move across frag-mented forest landscapes.	The project area contains one designated MA-1 area and five grid points for pine marten core habitat areas. No observations of pine marten or their sign have been noted in the Hanlon project area to date. The project area is lower in elevation than sites where marten or their sign have normally been observed.	No commercial timber harvest within the designated MA-1 area or within any old-growth stands in the project area (none exist). The growth of large trees would be promoted on NFS lands through commercial thinning, selection harvest, and underburning. The risk of loss of over-story trees to insects and forest pathogens would be reduced from the present situation. The risk of an intense wildfire removing large trees would also be reduced.
barred owl	Mature or old-growth forests	No barred owl nests are known from the project area.	
pileated woodpecker	Species, especially cavity dependent species, using old-growth habitats in Douglas-fir and cedar/hemlock forest types.	Rectangular foraging excavations of pileated woodpeckers are present in many of the standing dead trees in the project area. No nests are known from the project area.	

Common Name	Habitat and/or Species Groups Represented	Existing Condition	Effects of Alternative B
primary cavity excavators	These species require dead and defective live trees for reproduction, roosting, and foraging. They also use down logs and stumps for foraging.	Snags are rare or absent in non-forest areas such as meadows, road and power line corridors, fields and yards. Most snags in the project area are lodgepole pine, Douglas-fir, and western larch, with smaller numbers of grand fir, western redcedar, and other species. Because large trees and snags are uncommon to rare in the project area, it is likely that larger downed logs are also in short supply.	Alternative B would contribute to reductions in dead wood habitats resulting from forest management activities. Most habitat lost with the Hanlon project would be of smaller diameter. Large snags and logs would be conserved to the extent feasible.
blue grouse	Mature, open forest with large trees or patches of trees on or near ridgelines for winter habitat; open foothills associated with streams, springs, and meadows for breeding habitat.	The project area contains little high-quality brood habitat, and is too low in elevation to provide quality winter roosting habitat.	Retaining large live trees, snags, and logs, and promoting the growth of large trees through stocking control would improve habitat. Timber harvest and underburning should result in stands with more open understories; potentially creating suitable brood habitat.
large raptors/ great blue heron	Tall, large trees in areas with suitable feeding and foraging habitat, especially riparian areas.	One active goshawk nest known from project area. The next was not active in 2009. No other active or historic nests are known from the project area.	Timber harvest Unit 53 would be located within the PFA[38] for the known goshawk nest. This unit would be harvested using a shelterwood/thin prescription and would essentially be an opening following harvest. Presently the stand is unsuitable for goshawk nesting. During project implementation, the FS would monitor the known goshawk nest stand. If nesting activity is documented or suspected, no project activities would be allowed within the PFA from March 1 to August 15, in order to avoid disturbing the nesting pair and young. Overall tree stocking levels should decrease, facilitating flight through forest canopies. More forest openings and edge habitat should be created, improving foraging conditions for those species that prey on small mammals.
landbirds	Mature, open forests with large snags.	Project area has the following priority habitats identified for the Northern Rocky Mountains Region (Altman, 2000): dry forest, mixed mesic forest, riparian woodland, and riparian shrubs.	Retaining large live trees, snags, and logs, and promoting the growth of large trees through stocking control would improve habitat. Riparian habitats would be protected mainly through avoidance.

The alternatives as proposed are consistent with Forest Plan standards and guidelines for MIS. Alternative B would move the project area closer to its historic condition with regards to tree species mix, stocking levels, stand

[38] Post-fledging area

structural stages, and fuel loading. Alternative B would reduce the risk of stand-replacement fires in the project area. Thus, this alternative would better meet the management goals for priority habitats for land birds in the Northern Rocky Mountains.

Threatened, Endangered, and Sensitive Species [TES]

The Hanlon project area contains habitat for several federally threatened or endangered species that were considered in the analysis. The following table briefly describes the effect of the proposed Hanlon Timber and Fuels Management Projects on threatened, endangered, and sensitive species, including the rationale for each determination. A more detailed discussion of effects to grizzly bears follows this summary table. A more detailed discussion of effects to bull trout is located in the previous section discussing Fish Habitat. Full analysis for each species is located in the Biological Evaluation (located in appendix D).

Table 9 Summary of Effects to Threatened, Endangered, and Sensitive Species

Species	Alternative	Determination	Rationale for Determination
Canada lynx (threatened)	A and B	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.
grizzly bear (threatened)	A	may affect, not likely to adversely affect	Increasing fuel loads would continue to elevate the risk of forest cover loss to future, hot fires. Such fires could promote forage.
	B		Project is within recovery habitat. Hiding cover blocks maintained in created openings and where it exists along open roads. Potential for local improvements in forage from burning and timber harvest. Project activities would mostly occur during the winter denning period. No motorized activities during the spring period. Project design would result in a net gain of core habitat. There would be no net increase in total road densities.
woodland caribou (endangered)	A	no effect	Project lies outside caribou recovery habitat. No impacts to essential habitats or animals.
	B	may affect, not likely to adversely affect	Presently no direction to manage habitat outside the recovery area. Project might indirectly increase mountain lion numbers due to improvements in big game (prey) habitat. Harvest levels apparently keeping lion numbers suppressed in the ecosystem.
bald eagle (FS sensitive)	A	not likely to cause a trend to federal listing	No immediate impacts to any existing habitats. Increasing fuel loads would continue to elevate the risk of large tree loss along the Pend Oreille River to future, high intensity crown fires.
	B		No large trees marked for harvest. Large tree habitat promoted through thinning. Project timing restriction along river would protect known nest.
common loon (FS sensitive)	A	not likely to cause a trend to federal listing	No change in human use of the Yocum Lake basin. Potential for disturbance/harassment of nesting birds unchanged.
	B		Forest habitats around Yocum Lake protected through avoidance. Recreation projects in the Yocum Lake basin intended to control recreational use and improve law enforcement. Projects would occur outside the nesting season.
fisher (FS sensitive)	A	not likely to cause a trend to federal listing	Small amounts of potential habitat. No immediate impacts to potential habitats but increasing fuel loads would continue to elevate the risk of habitat loss to future, hot wildfires.
	B		No impacts to presently suitable habitat. Reduction in canopy closure and horizontal cover in harvest units for at least 15 years. Large trees reserved from harvest. Large tree habitat promoted through thinning.
gray wolf (FS sensitive)	A	not likely to cause a trend to federal listing	Increasing fuel loads would continue to elevate the risk of forest cover loss to future, hot fires. Such fires could promote big game forage.

Species	Alternative	Determination	Rationale for Determination
	B		Project is outside recovery habitat. Hiding cover blocks maintained in created openings and where feasible along open roads. Reduction in ground and ladder fuels would lower the risk of fires removing big game cover over large areas. Potential for local improvements in green forage/upland shrub growth from timber harvest and under-burning. Potential for disturbance to wintering elk and moose. Any newly found wolf den/rendezvous site protected with timber sale contract provision.
great gray owl (FS sensitive)	A and B	not likely to cause a trend to fed. listing	Same as for fishers.
harlequin duck (FS sensitive)	A and B	no impact	Low habitat suitability in project area. Essential habitats (fast moving mountain streams) avoided.
northern leopard frog, eared grebe (FS sensitive)	A	no impact	Species not found during field surveys. No known records from the area. Essential habitats (wetlands, ponds, etc.) avoided.
	B	not likely to cause a trend to fed. listing	
pygmy shrew (FS sensitive)	A	no impact	No known records from the project area. Wetlands and other riparian habitats avoided. Ground vegetation reduced but should quickly re-grow in harvested units.
	B	not likely to cause a trend to fed. listing	
white-headed woodpecker (FS sensitive)	A	no impact	No known records from the project area. Low habitat suitability in project area.
	B	may beneficially impact	Essential habitat (open, park-like pine forests with mature trees) promoted through commercial thinning and prescribed burning.
wolverine (FS sensitive)	A and B	not likely to cause a trend to federal listing	Same as for gray wolves.
sensitive invertebrates	A	no impact	No known records from the project area. Wetlands, talus, and kettle lakes protected by avoidance.
	B	not likely to cause a trend to fed. listing	
Bull trout (threatened)	A	may affect, not likely to adversely affect	Increasing fuel loads would continue to elevate the risk of forest cover along riparian areas affecting water quality.
	B	vegetation management activities = may affect, not likely to adversely affect fish & water restoration activities = may affect, likely to adversely affect	Most of harvest activity is located outside of adjacent RHCA. Appropriate BMPs would be followed to decrease any potential effect of the actions on aquatic resources. Restoration proposals are anticipated to have a temporary adverse effect but long-term positive trends for bull trout & habitat.
westslope cutthroat trout (FS sensitive)	A	No effect	Soil movement into the streams would continue from use of the road systems and grazing in riparian areas.
	B		Conditions for cutthroat trout and their habitat in many portions of the watershed would improve through the expected reduction of sediment input, decrease in summer water temperatures, increased habitat complexity and access to previously inaccessible good quality habitat.
Interior redband trout (FS sensitive)	A	No effect	Soil movement into the streams would continue from use of the road systems and grazing in riparian areas.
	B		Overall improvement of fish habitat, in the long-term, within the analysis area. Pure interior redband trout are not known to inhabit the project area nor the larger watershed.
pygmy whitefish (FS	A	No effect	Soil movement into the streams would continue from use of the road systems and grazing in riparian areas.

Species	Alternative	Determination	Rationale for Determination
sensitive)	B		Improvement of habitat conditions for salmonids in many portions of the watersheds through the expected reduction of sediment input, decrease in summer water temperatures, increase in habitat complexity and access to previously inaccessible good quality habitat. However, pygmy whitefish are not known to inhabit the project area.

Grizzly Bears - Existing Condition

The majority of the Hanlon project area lies within the Le Clerc Grizzly Bear Management Unit (BMU). The Forest Service receives occasional reports of grizzly bear sightings in the BMU. It is difficult to positively confirm most sightings. In the early 1990s there was a confirmed sighting of a grizzly in the Hanlon project area by a Forest Service employee. In 2006, a radio-collared grizzly utilized the East Branch of Le Clerc Creek and Molybdenite Ridge for several weeks. In 2008 a grizzly bear track was photographed in the same drainage.

Forage - Diets of grizzly bears change with the seasons as different food sources become available. Grasses, sedges, and herbs provide important spring forage for grizzly bears. Within the project area, these resources exist in riparian habitats along major streams, in small wetlands, and in homestead meadows such as Fourth of July Meadow. Shrub fields that provide berry crops are important late summer/fall foraging sites for bears. There are a few acres of discrete berry-producing shrub fields in the project area. Many forest stands in the Hanlon project area contain modest amounts of buffaloberry, huckleberries and other berry-producing shrubs. Rotting tree stumps and large down logs often provide bears with ants and other insects. These are uncommon in the project area. Occasional winter-killed deer or elk might be available in early spring.

Within the Le Clerc BMU, high percentages of the available habitat types important to bears are located within 1/4 mile of open roads (USDA, 1997). For example, 80 percent of the wet meadow habitats and 64 percent of the riparian shrub fields lie near open roads. Bears may not be able to use these food resources as effectively as habitat lying further from open roads.

Den Sites – Dens are typically “dug by bears, or occur in natural cavities in subalpine, montane, and rock community groups” (USDA et al, 2000). Timbered habitats above 4,000 feet or so could also be used for denning. The Hanlon project area lies at lower elevations and does not contain any habitats that appear particularly suited for grizzly denning.

Road Densities/Core Habitat – Table 10 displays the existing condition of the Le Clerc BMU relative to road densities and core habitat for grizzlies. Only 64 percent of the BMU is public land. Most of the private land in the BMU is owned by Stimson Lumber Company, but there are other forestland owners and private residences. Because less than 75 percent of the BMU is public land, forest management projects on public lands should not result in a net increase in open and total road densities, or a decrease in core habitat.

Most of the Hanlon project area is well-roaded. One larger block of core habitat exists in the Fourth of July Creek drainage. This area contains the upper reaches of Fourth of July Creek and associated riparian shrub fields. Fourth of July Meadow is located in this area. Another block of core habitat extends down into the northern portion of the project area in the West Branch of Le Clerc Creek drainage. This area contains a 0.75 mile long segment of the West Branch itself, but only modest amounts of bear forage plants. Other small islands of core habitat exist in the area. All of these are less than 200 acres in size.

Effects of Alternative A

Forage - Within the Hanlon project area, existing berry-producing shrubs in forest stands would continue to provide some fall foraging opportunities, so long as enough sunlight reaches them under the forest canopy. Spring forage would continue to be available for the foreseeable future within discrete wetlands, and in the alder/willow shrub fields associated with major creeks. By the time trees growing in plantations are 15-20 years old, spring forage plants would be increasingly shaded out on those sites.

Ground and ladder fuels would continue to accumulate in forest stands across the project area. The potential for a large, hot fire to occur in the area would increase. Such a fire could consume entire forest stands, resulting in a dramatic increase in sunlight on the forest floor. Most of the existing shrubs, grasses, and forbs in burned over

areas would quickly re-sprout from their root systems. The quantity and quality of green forage would be improved for several years following the burn. Berry-producing shrubs would take additional years to bear fruit, but could become more vigorous and productive than their present condition.

High intensity burns are the most likely to provide good growing conditions for noxious weeds. Hot wildfires remove more overhead canopy, consume more duff, and consume more living vegetation that could provide competition for newly established weeds. In areas of heavy weed infestation, existing native plants could be replaced, including those eaten by bears. Large infestations could reduce the area of suitable foraging habitat.

Hiding Cover - Hiding cover would slowly increase in extent and quality throughout the project area as young confers continue to grow. Fuel loading and ladder fuels would continue to build up in the project area over time. The potential for a large, intense fire to remove conifer cover would continue to increase over the long run. In such an event, hiding cover would be removed in areas of high intensity burns and degraded in mixed or low severity burn areas. Bears moving through an area where fire has removed forest cover could be vulnerable to human-caused disturbance or mortality, particularly near open roads.

Effects of Alternative B

Forage - Timber harvest proposed with this alternative would reduce the overhead tree canopy in many stands that are typically densely stocked with immature trees. Russet buffaloberry and other shrub species growing on these sites should benefit from the increase in available sunlight. Harvest prescriptions that create openings (such as shelterwood harvest) have the greatest potential to benefit berry-producing shrubs. There would be roughly 912 acres of openings created with alternative B.

Alternative B would employ low-intensity burns to reduce forest fuel loads. Treated areas would be a mosaic of burned and un-burned sites, relative to the amount of surface fuels present. Prescribed fires would thin out dense areas of conifer regeneration and consume litter and down wood on the forest floor. A “pulse” of nutrients would be released into the soil. As a result, green forage should become more palatable and productive for a few years following burning. It would take a number of years for burned, berry-producing shrubs to bear fruit again. Over the long run, berry production could be enhanced in burned areas.

Timber harvest and prescribed fire could expose soils and provide opportunities for the expansion of noxious weeds. New roads could provide pathways for the spread of noxious weed seeds. If weeds become locally established due to this project, they could out-compete existing bear forage plants (particularly native grasses and forbs). This risk would be greatest along new road and equipment corridors, and where there is a nearby seed source.

A number of factors would work to minimize the potential for noxious weed spread in the project area. Almost all of the timber harvest proposed in recovery habitat would occur in the winter. Winter logging minimizes the exposure of forest soils. Prescribed burns would be completed during optimum weather and fuel moisture conditions in order to ensure low-intensity fire behavior. Thus, most of the forest duff should be maintained in burned areas and very little soil should be exposed. The project would incorporate routine weed control measures such as seeding exposed soils at log landings, skid trails and burn piles. Herbicides would be sprayed on roadside noxious weed infestations prior to the project. In addition, the Newport-Sullivan Lake Ranger District would continue to use herbicides to combat weed infestations in meadows and other openings.

Hiding Cover - All forest cover would be removed within new rock pits and within the new forest road (FR) 1935 corridor. This new infrastructure would impact roughly 12 acres of forest habitat with the Hanlon project, and up to 24 additional acres as the rock pits reach their full development after many years. Rock pits would be located on open roads. They would be reclaimed with stockpiled topsoil, and re-vegetated once the rock is played out.

Within equipment corridors and areas proposed for shelterwood harvest, hiding cover would be mostly removed for perhaps 10 - 15 years. If necessary, forested cover blocks would be left uncut within created openings (shelterwood harvest) to ensure that no point in the opening is further than 600 feet from hiding cover. These cover blocks would be at least 600 feet wide. Thus, a bear traversing or foraging in the newly created opening would have concealing cover nearby to move into, if disturbed. Where the opportunity exists, patches/strips of shrubs, seedlings, saplings, and pole-sized trees would be maintained within created openings adjacent to open roads. These roadside “buffer strips” have been very effective in maintaining existing line-of-sight distances from roads into harvest units on the Newport-Sullivan Lake Ranger Districts.

Hiding cover would be degraded (but not removed) within areas proposed for thinning or selection harvest for five or more years. After that time, stand understories should have grown to the point where good horizontal cover is restored. Precommercial thinning would have negligible impacts to hiding cover.

Post-project fuels treatments would occur within harvest units. Mechanical treatments would use rubber tired or track-mounted machines and would occur on slopes < 35 percent. In units that are grapple piled, the impacts to hiding cover should be small since this treatment would mostly impact smaller diameter down material. Hiding cover would be reduced in units that are masticated or where biomass is removed, since these treatments would remove whips and other small trees. However, thrifty regeneration would be retained, and shrubs in the understory are likely to become more robust in a few growing seasons. Cover patches left along open roads and in the center of larger created openings would be left intact.

Low-intensity prescribed fires should have mostly minor, short-lived (1-5 years) impacts to hiding cover. Owing to discontinuous fuels at the stand level, there would be many areas of unburned, “fire skips”. Even in areas that are well blackened, some degree of horizontal cover would be provided by the skeletons of shrubs and young trees, partially burned logs, and live and dead tree boles. Upland shrubs, grasses, and forbs would quickly re-sprout from the roots and regain much of their above-ground biomass in one or two growing seasons. Efforts would be made to keep fire out of cover patches reserved from harvest.

Effects of the Middle Branch Road Relocation - With alternative B, a 3.2 mile segment of the Middle Branch of Le Clerc Creek Road (Forest Road 1935) would be re-routed. Presently this road segment lies within close proximity to the creek and affects the drainage patterns of several adjacent wet areas. The existing road bed would be ripped, seeded, and planted with native shrubs and trees. Old drainage patterns would be re-established. Several culverts which are presently barriers to fish passage would be removed. Both ends of the abandoned road segment would be blocked with boulders, earthen berms, or other means. Based on a similar project recently completed on the Newport-Sullivan Lake Ranger District, the abandoned road would be effectively closed to all motor vehicles and would no longer function as a road.

The new road segment would be constructed on an upland area west of the creek. The new road would permanently remove roughly 5 acres of forested habitats including minor amounts of berry-producing shrubs and green forage. The majority of the new road segment would lie within 0.25 mile of the creek. Thus, grizzly bears foraging in the riparian strip along the creek could still be prone to disturbance from vehicle traffic on the road. However, the new road should be well screened from the creek by vegetation and topography. The present road location is entirely visible from the creek. This project should result in net gains in riparian shrub and sedge wetland habitats over time. Foraging opportunities for bears should be improved within the stream corridor.

Project-Related Disturbance - *Spring* - Following den emergence, bears must quickly replenish body fat lost during hibernation. From about April 1 to July 1 it is important that animals have access to key spring foraging sites, free from human disturbance. With the Hanlon project, no timber harvest, road work, or other heavy equipment operation would occur from April 1 to July 1 in the Le Clerc BMU. It might be necessary to complete some post-harvest work such as prescribed burning or tree planting during the spring. These activities would be managed to minimize vehicle entries on restricted roads.

Summer/fall - Some Hanlon project activities would occur after July 1. Construction of the new segment of the FR 1935 must necessarily occur during the summer/fall months. Rock pit development must necessarily occur during the summer/fall. Mechanical fuels treatments (mastication, grapple piling, bio fuel) could occur on up to 2,482 acres during the summer/fall. Bears are likely to avoid areas where any of these loud, heavy equipment operations are occurring. However, a number of factors would reduce the potential for the project to disturb and displace grizzly bears:

- There would likely be at most two machines completing mechanical fuels treatments at any given time in the sale area. Disturbance would be localized to one or two harvest units at a time.
- Rock pit development would occur directly adjacent to open or restricted roads. Blasting would take a few hours; drilling would take a few days; crushing would take up to one month to complete.
- Bears are increasingly likely to be found at elevations higher than the Hanlon project area from about mid-August on, as they follow the progressive green-up of forage plants and the ripening of berry crops up slope.

- There would be no net loss of core habitat in the BMU. Core areas would be free from motorized disturbances .

Effects to Road Densities/Core Habitat - Prior to the Hanlon project (summer/fall of 2009) the Forest Service would make several restricted roads within the Le Clerc BMU undrivable. The Forest's backhoe operator would excavate earthen berms on the road entrances. Hand crews would plant the berms with grasses, shrubs, and trees. Slash might be pulled into the road prism behind the berms. The intent of this work would be to create additional acres of core habitat in the BMU. About 432 acres would be added to the largest existing block of core habitat within the BMU, in the northern portion of the BMU.

Alternative B was designed to minimize impacts to core habitat. Virtually all of the timber harvest proposed in the BMU would occur from November 15 to April 1; the period when bears should be in the den. Temporary road construction or reconstruction of brushed-in roads would occur in the winter as well. The Forest Service would render these roads undrivable prior to April 1. These winter operations would not impact grizzly bear core habitat.

Roughly 83 acres of core habitat would be permanently lost with the re-location of FR 1935. This area of core habitat is a small, isolated island that has much less value to grizzlies than the large blocks of habitat that exist in the BMU. The relocation of FR 1935 would result in a 1% increase in open road densities in the BMU during the life of that project. This is because the old road must remain open to the public while the new segment is under construction.

Table 10 Le Clerc BMU - Grizzly Bear Habitat Data with Alternative B

Time Period	Open Roads >1 mi/sq. mi.	Total Roads >2 mi/sq. mi	Core Habitat
present	29,790 acres 38%	45,820 acres 59%	20,570 acres 26%
Pre-project – with road entrance obliteration work in the BMU	29,765 acres 38%	45,331 acres 58%	21,002 acres 27%
During project – reflects re-location of FR 1935	29,997 acres 39%	45,548 acres 59%	20,919 acres 27%
Post-project – reflects road closure work	29,263 acres 38%	45,098 acres 58%	20,919 acres 27%

Cumulative Effects

In 1975 grizzly bears were listed as a threatened species under the Endangered Species Act of 1973. At that time, grizzlies persisted at very low numbers in the Selkirk Mountains Recovery Area. The population has slowly increased to the present level of 40–50 bears (personal comm. with W. Wakinnen). Biologists evaluate and monitor habitat for grizzly bears at the scale of individual grizzly bear management units (BMUs). The BMU is the appropriate analysis area for cumulative effects.

Hiding Cover – Forest management projects on all ownerships in the Le Clerc BMU have permanently removed hiding cover within new rock pits and road prisms. Recent timber harvest on private lands has removed or degraded large acreages of hiding cover. The Hanlon project would add to these reductions in cover in the BMU. However, there is constant recruitment of hiding cover across all ownerships in the BMU as young trees in harvested areas grow with each passing year.

On February 1, 2000, Stimson Lumber Company, the Colville National Forest, and the USDI Fish and Wildlife Service entered into a conservation agreement that prescribes guidelines for forest management in the Le Clerc BMU. The intent of the agreement is to conserve habitat for grizzly bears and other listed species on both Stimson and NFS lands in the BMU. On both ownerships, hiding cover must now be maintained according to guidelines in the conservation agreement. Vegetative or topographic screening must be maintained along open roads. No point in a created opening can lie further than 600 feet from cover. Hiding cover should be maintained around streams courses, wetlands, shrub fields, and other important foraging habitats for bears. At least 40 percent of the BMU should be in hiding cover at all times. The Hanlon project would adhere to these practices. These practices should ensure that enough cover exists in the BMU to keep the landscape highly permeable to dispersing bears over time.

Forage - By the early 1940s, virtually all the main roads within the Le Clerc BMU were in place. In the following decades, many miles of secondary roads were built to access stands of timber for harvest. As was commonly the case, new roads were often built in prime bear habitats such as riparian areas. The main road network in the BMU closely parallels the major branches of Le Clerc Creek. Construction of these roads directly removed some riparian habitat along the creeks. The presence of these roads (and associated human disturbance) reduced grizzly bear access to substantial amounts of spring forage in the BMU that were once readily available along the creeks. The Hanlon project would relocate a portion of FR 1935 (Middle Branch of Le Clerc Creek Road) onto an upland area, away from the creek. This action should improve riparian habitats over time, as well as the ability of bears to forage along the creek.

Recent timber sales on all ownerships in the BMU have improved growing conditions for sun-loving green forage plants and berry-producing shrubs. These benefits are usually greatest in areas of regeneration harvest that are subsequently broadcast burned. However, even partial harvests (thinning, selection prescriptions) can improve growing conditions for existing forage plants. The Hanlon Timber and Fuels Management Projects would contribute to these effects. Broadcast burning is not normally prescribed on non-federal ownerships in the Le Clerc BMU.

As described earlier, the Hanlon project could contribute to the spread of noxious weeds in the Le Clerc BMU. To minimize this potential, the Forest Service would spread grass seed on soils exposed by equipment, and effectively close some existing roads. Contractors would use herbicides to kill weeds growing on roadsides and other areas, prior to the project. These actions have been very effective in many areas of the Newport-Sullivan Lake Ranger District. Active weed spraying programs would be necessary so long as forest management, grazing, and forest recreation continues in the BMU. Noxious weeds are likely to increase on private lands in the BMU over time, due to an apparent low level of commitment to prevention, treatment, and monitoring.

Habitat improvement work proposed with the Hanlon Timber and Fuels Management Projects would compliment recent projects the CNF has undertaken to improve forage habitats. These projects have included using prescribed fire to rejuvenate upland shrub fields (East and Middle Branches of Le Clerc Creek), removing small conifers encroaching into old homestead meadows (Fourth of July Meadows), and fencing riparian sites over-used by cattle (Middle Branch of Le Clerc Creek).

Seclusion – In the first several decades of road construction in the BMU, opportunities for human/bear encounters, and the risk of bear mortality increased. In 1979 a grizzly bear was shot by a black bear hunter on an open road in the area. By the mid 1980s the open road density was about two miles per square mile over large portions of the BMU. Core habitat for bears was greatly fragmented and reduced in acreage compared to pre-settlement times.

Only since the late 1980s/early 1990s has the open road density decreased in the BMU. During that time, the FS gated most of the secondary roads in the area, to provide seclusion for grizzly bears. Almost all new roads built on all ownerships in the BMU have been similarly closed. Starting in the mid 1990s, the FS replaced many gates on restricted roads with earthen berms/boulders, and plantings. This was done to make more effective closures, and increase the area of core habitat in the BMU. In spite of these management actions on NFS lands, the total road density (open and closed) in the BMU has increased substantially since the early 1990s, and the total acres of core habitat has decreased, due to road building on private lands.

The Hanlon project would not contribute to any cumulative reductions in core habitat resulting from forest management across the BMU. In fact, the project would increase core habitat in the BMU by installing earthen berms on several closed road entrances. Projects on private or state lands are not bound by the “no net loss of core habitat” constraint. The Hanlon project would not increase total road densities in the BMU. Projects on private or state lands are not bound by this constraint.

Some Hanlon project activities would occur during the active bear season. Thus, the Hanlon project could cumulatively contribute to the risk of bears being disturbed and displaced by forest management occurring in the BMU. However, the potential for the Hanlon project to disturb bears during the critical spring period would be small, due to project timing restrictions. Most activities that would occur during the active bear season would be outside core habitat areas, where animals are already prone to human disturbance. From about August 15 on, bears are increasingly likely to be found at elevations higher than the Hanlon project area.

Effects Determination

Timber harvest and prescribed burning proposed with alternative B could improve the forage resources for bears in the short to mid-term. Alternative B would move the project area towards a more historic fire regime. Forage could be maintained at more stable levels over time.

The project would not cause a net increase in total road density in the BMU. Open road density would increase slightly (1%) for the life of the project with the relocation of FR 1935. However, moving the road out of the creek bottom would reconnect old drainage patterns and increase the extent of riparian habitats along the creek over time. The ability of bears to access spring forage plants along the creek would be enhanced, since the relocated road would be screened from the creek by vegetation and topography. These permanent habitat gains should offset the impacts of the temporary increase in open road density. A small patch of core habitat would be permanently lost with alternative B, due to the relocation of FR 1935. This loss would be more than offset with the gains in core habitat resulting from proposed road entrance obliteration work in the BMU.

Most project activities proposed with alternative B would occur during the period bears are in the den. No motorized activities would occur during the critical spring period. During the life of the project, individual bears discovered in the area would be protected according to direction in existing management/recovery plans, and by a standard timber sale contract clause. Based on this discussion, the alternatives as proposed may affect, but are not likely to adversely affect grizzly bears.

Hydrology

Scope of the Analysis and Cumulative Effects Area

The watershed resources section considers physical processes such as watershed condition, sediment yield, channel morphology, water quality, and water yield.

The geographic scope of the analysis for watershed resources includes one 5th code watershed, Le Clerc Creek (1701021602). This watershed contains seven 6th code subwatersheds (also known as prescription watersheds). Project activities are located in only four of the seven 6th code subwatersheds. The Watershed Boundaries Map (Hydrology Project File) shows the project area watersheds. The affected area for cumulative effects analysis includes West Branch Le Clerc Creek, East Branch Le Clerc Creek, Maitlen Creek, and Yocum Lake subwatersheds.

The time period for the water and sediment yield analysis from project activities is 10 years. Most effects from timber harvest should be manifested within 10 years. Water and sediment yield effects from logging activities have been considered since the late 1950s (King, 1989; Elliot and Foltz, 2001) which corresponds to the period when timber harvest programs on National Forests expanded to help the nation meet the lumber needs for the post World War II housing market.

Sediment yield effects from project activities are expected to be recovered within that time period if no new permanent roads are being constructed. If new permanent roads are being constructed, then sediment yield effects from project activities would be permanent. Roads are considered to have sediment yield effects throughout their life (Beschta 1978; Bilby et al. 1989; Burroughs and King, 1989; Elliot and Foltz, 2001).

Analysis Methods and Key Issue Indicators

The assessment of existing condition describes the current condition of the project area, and provides a basis for comparing the effects of management alternatives. Existing condition synthesis was obtained from historical and current fieldwork, GIS-generated reports, historical hydrology files, historical records, aerial photographs, published scientific literature, model outputs, roads analysis and current on-going research and monitoring. The analysis compares the effects of management proposals on five watershed resource indicators, (detailed below) for the West Branch Le Clerc Creek and East Branch Le Clerc Creek watersheds. Though discussed independently, there is considerable interaction between these indicators within the watershed and stream channel system.

The watershed key issue indicators used for this project are:

- Watershed Condition,
- Sediment Yield,

- Channel Morphology,
- Water Quality, and
- Water Yield

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

West Branch Le Clerc

With regards to road density, West Branch Le Clerc Creek is in the moderate risk watershed condition category[39].

There are approximately 3.2 road miles/square mile, and 60 road/stream crossings in the West Branch Le Clerc Creek watershed. Risk at stream crossings is a combination of two factors – probability of failure, and the cost (in terms of sediment delivery) of failure. Risk is managed by reducing the probability of failure, and the cost (in terms of sediment delivery) if a failure were to occur.

Overall, the main channel of the West Branch Le Clerc Creek is considered to be in fair to good condition. Stability is fair to good, and the four reaches range from properly-functioning-condition to functioning-at-risk. West Branch Le Clerc Creek is currently the only stream listed for impaired water quality in the West Branch Le Clerc Creek Watershed. It currently has six category 2 listings, two category 4a listings, and three category 5 listings.

The analysis of the four other watershed condition indicators suggests West Branch Le Clerc Creek Watershed currently supports stable water yields.

Rosgen Classification System (Stream Type): A classification of a stream that assigns an alphanumeric designation (e.g. C3a) to a stream reach based on observable physical features that depict dimension, pattern, and profile of the channel.

The third descriptors (i.e. a, b, or c) describe a very high gradient or a very low gradient. If the stream has an average gradient for that stream type, then no third descriptor is needed.

Rosgen Stream Type Example: **E4b**

E - explains the entrenchment, which initially designates the stream type. In this example, E means slightly entrenched.

4 - explains the substrate size. In this example, 4 means gravel.

b - explains the stream gradient. In this example, b means 2% to 3.9% slope, which is considered high for an E4 stream.

East Branch Le Clerc

There are approximately 4.8 road miles/square mile, and 104 road/stream crossings in the East Branch Le Clerc Creek watershed.

Overall, the main channel of the East Branch Le Clerc Creek is considered to be in fair to poor condition. It should be a B stream type with no F-segments. Reach 3 is over-widened and deeply incised, thus it is unable to reach its floodplain. This reach is in poor condition. Stability is fair to poor for the main channel, and the four reaches range from properly-functioning-condition to functioning-at-risk to not-properly-functioning. A substantial amount of logging and road building have taken place along this channel in the past. Tree stumps from the earliest logging operations were seen well within the riparian zone, in some places within a few meters of the main channel. Several small clearings left over from logging operations are still present. Skid trails are still accessible, and logged clearings are still open with some brush vegetation present. Road density is high throughout this watershed, specifically along the main channel of East Branch Le Clerc. Road effects and cattle effects are considerable along the stream.

The main channel of the Middle Branch Le Clerc Creek is considered to be in fair to good condition. It shows signs of over-widening in certain sections. Stability is fair to good and the five reaches range from properly-functioning-condition to functioning-at-risk. The main channel of West Monumental Creek is considered to be in fair condition. Stability is fair and the two reaches range from properly-functioning-condition to not-properly-functioning. The main channel of East Monumental Creek is an E5 stream type and is considered to be in fair

[39] The Dept. of Ecology's Integrated Water Quality Monitoring and Assessment Report classifies all of the state's waters into one or more of five different categories, which correspond to the five categories of the report: Category 1: Waters of the State Attaining Standards tested for; Category 2: Waters of Concern; Category 3: Waters of the State with Insufficient Data and Information to Determine if Any Standards are Attained; Category 4: Impaired or Threatened for One or More Standards and has a TMDL; 4a indicates water bodies with completed and approved TMDLs that are being implemented; Category 5: TMDL Needed (This is the 303(d) list).

condition. Stability is fair and the two reaches range from properly-functioning-condition to functioning-at-risk. The lower reach of Fourth of July Creek is a B4 stream type and is considered to be in fair to good condition. Stability is fair to good and the reach surveyed is in properly-functioning-condition.

East Branch Le Clerc, Middle Branch Le Clerc, and Le Clerc Creek are currently the only streams listed for impaired water quality in the East Branch Le Clerc Creek Watershed. It currently has eight category 2 listings, two category 4a listings, and five category 5 listings. The analysis of the four other watershed condition indicators suggests East Branch Le Clerc Creek Watershed currently supports stable water yields and have not been drastically altered.

Effects of Alternative A

The natural ecosystem processes and existing management activities would continue. Both aspects of No Action have been considered.

In terms of the watershed and hydrology in the project area this means:

- There would be no direct effects to the watershed/hydrology because no roads would be constructed and no roads would be decommissioned.
- None of the proposed road improvements would be implemented and the risk of sediment delivery would increase over time.

➢ Watershed Condition – would not improve.

➢ Sediment Yield – No Action would result in the greatest long-term negative effects to the values at risk because the road improvements would not occur and timber stand conditions would continue toward conditions that are favorable to stand-replacing wildfire. The effects of which would include increased sediment yield and increased road and culvert failures.

➢ Channel Morphology – would not be directly affected since this alternative would not conduct silvicultural treatments or road work; however, neither would any of the proposed improvements occur. Current trends (negative or positive) would continue.

➢ Water Quality – None of the proposed road improvements or fuels reduction treatments would occur. However, in the event of a wildfire, there would be increases in water temperature, sediment and peak flows, thus negatively affecting water quality.

➢ Water Yield – In the absence of a future stand-replacing wildfire, the current levels of water yield and peak flows would be expected to continue. If a stand-replacing fire were to occur, water yield and peak flows would increase until vegetation reestablishes.

Effect of Alternative B

In terms of the watershed and hydrology in the project area this means:

➢ Watershed Condition – Overall, the greatest amount of road conditions would be improved under this alternative because it would improve more miles of road (19.6 miles) than alternative A (0 miles). The road reconditioning would reduce the potential for stream crossing failure and road related sediment production and delivery even if a severe wildfire (stand-replacing) does occur. Road reconditioning includes road reconstruction (Holt, 2009), and follow-up maintenance and repair after haul. Beneficial uses, should such an event happen, would be impacted to a lesser extent and they would recover more quickly compared to the scenarios for alternative A.

➢ Sediment Yield – There would be an immediate short-term increase in sediment, but an overall reduction in sediment risk and a net decrease in sediment yield in the long-term. The short-term increase is small compared to the long-term reduction in sediment yield and risk of sediment delivery. Beneficial uses would not be impaired by this project. Proposed treatment units have been specifically designed to avoid or reduce the potential for sediment production and delivery. See Chapter 2 for information about design criteria. Road reconditioning (19.6 miles) would also result in reduced potential for sediment yield and delivery. Prescribed burning activities would not have negative impacts to sediment production and delivery. While some localized sediment production is anticipated from the mechanical slash disposal

treatments and site preparation for planting, the untreated vegetation and Riparian Habitat Conservation Areas (RHCAs) between the treatment areas and the streams would help prevent sediment delivery to stream channels. Anticipated effects of the work on Road 1935000 (the longest road length to be decommissioned-3.2 miles), is predicted to be within the capabilities of the East Branch Le Clerc Creek watershed.

- Channel Morphology – There would be short-term changes to channel morphology; however, overall morphology would be maintained and somewhat improved since many of the known sediment delivery sources would be rehabilitated (for example, improving road crossings).
- Water Quality – In both West Branch Le Clerc Creek and East Branch Le Clerc Creek watersheds, risks to beneficial uses would be reduced, water quality issues associated with TMDLs[40] would be addressed with improvements striving to benefit the TMDL process and reduce pollutants of concern. The proposed road improvements and decommissioning would have a net beneficial effect and work toward the TMDL Desired Future Condition.
- Water Yield – Proposed activities are expected to result in immediate short-term increases in peak flows that would be within the capabilities of West Branch Le Clerc Creek and East Branch Le Clerc Creek watersheds. Culvert work on haul routes would reduce the risk of road failure and the associated risk of affecting water yield.

Cumulative Effects

Some of the predicted effects of the alternatives would be essentially the same for each alternative. Common effects for this analysis involve reasonably foreseeable timber management on private lands, and road maintenance. The activities and expected effects are as follows:

- Private land timber management activities. Washington State Best Management Practices as stated in the Forest Practices Act would be applied and the amount of ground disturbance would be limited, thus no significant issues for sediment production and delivery is anticipated even though there could be short-term site-specific sediment increases and short-term peak flow increases. There may also be a reduction in the overall fuels-related risks to the watershed.
- Forest Service and County road maintenance work would continue which would contribute to reduced compaction, improved water infiltration, and reduced surface runoff.
- Road construction on private land. This would negatively contribute to the watershed condition (by increasing road density) and sediment yield (by creating a permanent source of sediment).

For basins within the transitional zone, Grant et al. found that the detection threshold for changes in peak flows occurs at 20% of watershed area harvested. Thus, changes in peak flows cannot be detected at harvest levels of less than 20% (Grant et al 2008). Based on the hydroregions developed by Grant et al., the project area would be located in the transitional hydroregion. The proposed project would be implemented over 16% of the Le Clerc Creek 5th field watershed. The percent of the watershed treated would be much less than the percentage determined by Grant et al. to detect any increase in peak flow due to harvest. Further, most of the existing studies examined clearcut harvests, thus, evaluating this type of treatment would interpret the maximum likely effects of the harvest practices proposed for the Hanlon Timber and Fuels Management project. Gordon et al. also concludes that partial cutting and thinning should result in peak flow changes that are commensurately lower than those indicated and may be undetectable in some basins (Grant et al, 2008). Therefore, due to the small amount of the watershed affected and the types of treatments proposed (density management, prescribed fire, and surface fuels treatment), no increase in peak flows would be expected and there would be no effect on cumulative effects in this watershed.

Noxious Weeds

A variety of noxious weeds are found in the Hanlon analysis area. Documented weed infestations within the project area are addressed in the Colville National Forest Environmental Assessment for Integrated Noxious

[40] Total maximum daily load.

Weed Management (USDA 1998). The State designates categories for each weed, based on its prevalence in the County. Table 11 shows the weeds present in this analysis area, and their category.

Table 11 Noxious Weeds in the Hanlon Analysis Area

Category	Weeds	Definition
A	None found	Class A weeds are non-native species whose distribution in Washington State is still limited. Preventing new infestations and eradicating existing infestations are the highest priority. Eradication of all Class A plants is required by law.
B-designate	plumeless thistle (on National Forest land) leafy spurge (on private land) common bugloss (on private and National Forest land)	Class B weeds are non-native species which are presently limited to portions of the state. These species are designated for control in regions where they are not yet widespread. Preventing new infestations in these areas is a high priority. In areas where Class B species are already abundant, control is decided at the county noxious weed control board level with containment as a primary goal. For species listed as Class B Designate, control is required. For species listed as Class B Non-Designate, control is required in vehicle corridors and areas of limited distribution and encouraged in areas of large infestations.
B	spotted knapweed dalmation toadflax yellow hawkweed orange hawkweed oxeye daisy sulfur cinquefoil	
C	Canada thistle common St. Johnswort (also known as goatweed and Klamath weed) houndstongue common tansy	Class C weeds are species that are already present and widespread across the state and control is encouraged in areas of large infestations, but not required.

Houndstongue, particularly in the Middle Fork, has exploded in the last few years. Seeds are being carried by livestock, wildlife, pets, vehicles, and people from the road and stream corridors to adjacent meadows, timber sale units and even under some open-canopied forest stands. Because the dried plants with sticky, Velcro-like burrs stand for several years after they go to seed, the seed available to spread multiplies exponentially. Control measures would be expensive and to be effective would need to include backpack spraying in areas not accessible to OHVs and mechanical removal of old plants and burrs.

The other weed that is present in large numbers in certain areas is yellow hawkweed. Although orange hawkweed does occur in the analysis area, yellow hawkweed is, by far, the most abundant of the non-native hawkweeds. In some areas where roads have been closed to vehicle traffic for most or all of the year, particularly in moister areas, hawkweed has formed mats on most of the roadbed. In almost every case the weed has not spread to adjacent undisturbed stands, but in areas where the canopy has been opened it is spreading rapidly.

Effects of Alternative A

Based on current trends and the Colville National Forest's ability to treat noxious weeds, it is expected that most noxious weed species and infested acres would likely increase slightly within the project area despite the Colville National Forest currently treating noxious weeds that occur.

Plumeless Thistle would likely increase slightly in the amount of acres infested due to its ability to move away from areas of disturbance, such as road corridors and landings, and establish in semi-open forested areas which are more difficult to locate and treat. Due to the plant's wind blown seed, it could likely spread where suitable habitat exists.

Houndstongue would continue to persist and increase. The Velcro type seeds of this plant attach themselves to passing livestock, wildlife, horses, pets and people and establish in new areas where they fall off. This plant has the ability to establish in open meadows and open canopy forests in the area.

Yellow hawkweed infestations would likely increase slightly within the project area, but with a limited distribution, control is achievable. Yellow hawkweed invades deep soils in forest openings such as meadows and is also common in roadbeds on roads that remain closed to motorized use most of the year. Usually the plants establish in disturbed areas, but once established can spread to dominate entire openings and move into the forested environment. Populations of yellow hawkweed have not spread to undisturbed canopies within the project area

but are common in areas of prior harvest activity that has opened the canopy. Orange hawkweed is limited in distribution in the project area, especially as compared to yellow hawkweed.

Common bugloss is expected to re-establish in small populations due to known populations on private lands adjacent to the analysis areas and former infestations on NFS lands. These populations should be able to be effectively controlled and spread prevented.

Knapweed, Dalmatian toadflax, sulfur cinquefoil, St. Johnswort, and oxeye daisy are all well established throughout the project area. Emphasis would be placed on controlling large infestations with spot treatments along roadways, dispersed recreation sites, and meadows as needed. These plants would continue to persist in the project area as seeds and plant material are dispersed by domestic livestock, wildlife, vehicles, OHVs and people.

Effects of Alternative B

Vegetation Management

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

Roads

New road construction, road reconstruction and road decommissioning produce areas that have the greatest risk for noxious weed establishment. These activities create substantial and often continuous areas of disturbance where nearly all native vegetation is removed and mineral soil is left exposed without desirable vegetation to colonize the area. Disturbed areas create a seedbed readily susceptible to noxious weed invasion. Within the Hanlon project area, there is an anticipated 24.4 miles of road construction, reconstruction or decommissioning, which has the potential to become infested with noxious weeds.

Since noxious weeds are often spread by motorized vehicles, effective road closures and/or decommissioning are very important in limiting the extent of noxious weed infestations. Temporary roads and those scheduled to be decommissioned and/or closed would need to have effective closure methods employed to ensure that vehicle traffic cannot access these areas. If roads do not have effective closures in place that effectively limit motorized access, these types of roads and the areas they service have the potential to become infested with noxious weeds. This is especially true when off-road vehicles are able to breach barriers and transport noxious weed seed to the areas behind closure devices, thereby establishing noxious weeds populations. Areas such as this are often very difficult and expensive to treat because truck mounted boom-type sprayers cannot go beyond earthen berm closures.

Treating noxious weed infestations along Forest roads within, and leading to, the project area would greatly reduce the amount of noxious weed seed that would be available to germinate in areas of soil disturbance. Treating noxious weeds prior to ground disturbing activities would result in their seed and reproductive parts not being transported by vehicles and equipment involved in road construction and vegetative treatments.

If minimal noxious weed seed is available to be transported to disturbed sites resulting from the project, revegetation efforts are more likely to succeed and function as intended. In the absence of noxious weeds, desirable seeded vegetation would be allowed to germinate, colonize and function to protect disturbed areas from future noxious weed infestations.

Monitoring and post-project treatments would help to prevent noxious weeds from becoming established in the project area as a result of the project. This should occur until revegetation efforts have been determined to be successful.

Fuels Treatments

Fuels treatments that utilize fire to achieve management goals pose a slight risk to noxious weed establishment. Given the types of fuel treatments proposed for this project it is expected that exposure of mineral soil due to fire would be widely scattered, the areas of bare soil would be small in size, and that re-colonization by native plants

would occur rapidly. Satisfactory recovery of native vegetation following prescribed fire is likely to occur within one growing season of treatment for underburn units. Fuel treatment methods that would use prescribed fire to eliminate piled vegetation would generate more heat in the localized areas that are burned. Because of the greater heat involved in burning these areas, recovery of native vegetation is expected to be slower than that anticipated in underburns. Smaller piles of vegetation typically burn with less heat than large piles do. Therefore, in order to reduce the amount and severity of ground disturbance from pile burning, piles less than 9 feet in diameter would be beneficial.

Timing of fuels treatments that utilize fire would also affect noxious weed spread. If areas are burned after noxious weeds with wind blown seeds have reached maturity, greater spread of noxious weed seed can be expected. This is attributable to wind blown type seeds that occur on such plants as thistles and hawkweeds, being carried by upslope winds and smoke columns produced by fire. If units are treated with prescribed fire in the spring prior to plants producing mature seed, risk of noxious weed transport would be reduced. Burning in the fall would favor desirable cool season plants, such as deep rooted bunch grasses and would be desirable for vegetative recovery (Wright, 1974). Quicker recovery of native species in burned units would be beneficial as it would reduce the available areas for noxious weeds to establish.

Restoration Activities

The proposed restoration activities of the Hanlon Project all pose minimal risk to the establishment of new noxious weed populations. The West Branch Diversion Dam Sediment Reduction project proposed in T. 36 N., R. 44 E., NW ¼ of Section 8 reduces the risk of new populations establishing through planting and seeding of the materials dredged from the creek. The site should be monitored for a period of 3 years after the planting has occurred to ensure that undesirable species do not develop on the site. The Hanlon Meadows (Racetrack) Riparian Protection project proposed in T. 36 N., R. 44 E., NE ¼ of Section 19 poses a slight risk until seeding or planting of desirable vegetation is completed. This area should be monitored after the fence has been constructed until such time that natural recovery has progressed to a point that noxious weed infestation is unlikely. The Le Clerc Creek Instream Habitat Improvement project and Diamond City Stream Channel Restoration project pose minimal risk to noxious weed establishment because of the lack of ground disturbing activity within the riparian zone and proposed revegetation of disturbed areas.

Effects Summary

Effectively closing roads to motorized vehicles would lessen the potential of noxious weeds becoming established. If closures are ineffective or become breached by off-road vehicles, noxious weeds may become established in areas accessed by closed roads within the project area. If this were to occur, additional effort would be required to monitor and additional expense would be required to treat noxious weeds if they occur behind earthen berm type closures in the project area. In the past, road closures in this area have not been particularly successful. If motorized vehicles access areas behind road closures, noxious weed populations may become permanently established in areas where they do not currently exist, thereby acting to increase the amount of acreage infested with noxious weeds within the project area.

The Proposed Action could add an additional 668 acres of soil disturbance within the project area. This amount of soil disturbance could potentially allow noxious weeds to establish in areas where they do not currently exist despite best efforts to prevent such establishment. Noxious weeds produce a large amount of seed and are well adapted to quickly establish in favorable habitat where opportunity exists. This amount of potential noxious weed habitat resulting from the project is not likely to create a substantial increase in the amount of acres infested with noxious weeds if prevention standards are followed and continued weed treatment occurs.

Constructing roads and aggregate source sites would have little impact on the overall amount of noxious weeds in the project area if disturbed areas are properly treated to limit the risk of noxious weed establishment and spread. Inspection and pretreatment of noxious weed contaminated fill sources by qualified district personnel will help to ensure the spread of noxious weeds is kept to a minimum.

Cumulative Effects

Noxious weeds have occurred within the project area for many decades, and the Forest has been treating noxious weed populations in the area since approximately 1992. New noxious weed threats continue to advance onto NFS lands as they have for many decades, and the Forest continues to treat these areas based on priority. Noxious weed populations are continually evolving because new invader species are becoming established and transportation of noxious weed reproductive parts allows for the infestation of other areas.

Routine road maintenance occurs on all county roads and maintenance level 2 and 3[41] roads on the Forest. Road maintenance consists primarily of spot surface blading, ditch cleaning and culvert cleaning, which produces areas of bare soil that could become infested with noxious weeds.

Road systems are the primary vectors for noxious weed spread because they are areas that have bare soil, continued disturbance, and concentrated use from vehicles that have the ability to transport noxious weed seeds over great distances. Noxious weeds are often spread by vehicles traveling forest roads. If drivers travel through noxious weed infested areas, seeds can be transported to sites where new infestations could begin.

There have been and would continue to be harvest activities, recreational use, livestock grazing, prescribed burning, wildfire, noxious weed treatments, road decommissioning, road maintenance and firewood gathering in the foreseeable future. These activities equate to a constant threat of noxious weeds becoming established within the project area due to noxious weed seeds being transported by vehicles, equipment, and livestock to disturbed soils.

Noxious weeds on the Forest are rather insignificant when viewing them in conjunction with much of the adjoining private property. Private property near the Forest appears to have a much greater area infested with noxious weeds and a higher density of noxious weeds. This is partly due to the amount of open, un-forested, areas on private property. It is also partly due to the Forest Service having an ongoing noxious weed treatment and prevention strategy, which appears to be effective.

Developing three rock pit sites for the project does pose some risk for increasing the extent of noxious weed populations by removing desirable vegetation and creating soil disturbance. Once established these pits would be routinely treated to keep the aggregate free from noxious weed seed and reproductive parts as part of the current and on going Forest noxious weed program. This should ensure that material from these pits would not create an ongoing threat of spreading noxious weeds.

An alternative to not creating these rock source sites would be hauling in rock material from other Forest Service pits or commercial pits. Bringing fill and borrow material into the Hanlon project area from an outside location would increase the likelihood of new noxious weed species establishment. Therefore, by using fill and borrow material from within or near the project area, there is lower risk of introducing new noxious weeds to the project area from rock sources.

Activities such as recreational use, firewood gathering, driving for pleasure, hunting, off-highway vehicle use and livestock grazing within the Hanlon project area are likely to continue in the future. Many of these types of activities are what spread noxious weeds onto Forest lands. Therefore, these activities equate to a constant threat of noxious weeds becoming established within the project area as noxious weed seeds are easily transported by vehicles, equipment and livestock to disturbed soils.

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

The activities in the proposed action would not cumulatively negatively affect noxious weeds within or outside the Forest Boundary. The acres of noxious weed infestations are not likely to increase substantially as a result of the project, but there is a risk of noxious weed establishment for roads that would be closed following treatment if road closure devices are compromised and/or breached thereby allowing motorized access.

The history and nature of the noxious weed situation on the Colville National Forest suggests that noxious weeds would continue to exist on the landscape within the Hanlon project area after completion of the project as it does prior to the proposed action. Noxious weeds would be treated and monitored within the project area, but they would not likely be eliminated as a result of the activities and efforts proposed for this project, nor by the continued Forest noxious weed treatment program. Noxious weed monitoring and treatment efforts required by the project would likely act to reduce the level of noxious weed infestations that currently exist within the project area, but would not eliminate them because of the continuing threat of noxious weed establishment resulting from seed transportation on the level 2 and 3 roads open to travel and the infestations on adjoining private property.

[41] Maintenance Level 2 is assigned to roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Maintenance Level 3 is assigned to roads open and maintained for travel by a prudent driver in a standard passenger car.

Sensitive Plants

No federally listed threatened or endangered plants or plants proposed for federal listing are known to occur in the analysis area (USDI Fish and Wildlife Service 2009).

Fifty-four vascular and non-vascular plants included on the Regional Forester's Special Status Species Plant Lists (UDSA Forest Service 2008) are documented or suspected for the Colville National Forest. Of these, three are known from the project area in one occurrence each: *Astragalus microcystis*, *Botrychium hesperium,* and *Dryopteris cristata*. Within two miles of the project area, *Astragalus microcystis* is documented from an additional site.

Effects of Alternative A

There would be no new management related changes to the existing management activities. Natural processes would continue to dominate. On-going activities such as fire prevention and suppression, dispersed recreation, mining, road maintenance, noxious weed treatments, and established special use permits would continue. No new activities would be initiated to accomplish proposed project goals. Changes in stand condition and/or progression toward old-growth conditions would be slow. The risk of losing much of this area to stand-replacing wildfire would increase over time.

Effects of Alternative B

Four sensitive plants occur in seven units proposed for harvest or fuels treatment and within 100 feet of four other units. Two of the four plants are shade dependent, *Dryopteris cristata* and *Nephroma bellum*. Decreasing the canopy through timber harvest or fuels treatments would negatively affect them. Medium road reconstruction, where all ground disturbances during reconstruction would occur within the existing template of the road, is proposed within 300 feet of three sensitive plant sites. One sensitive plant site is within 15 feet of a temporary road. These four sensitive plant sites should be flagged to avoid negatively impacting them. No sensitive plant sites are known to occur in any of the proposed borrow pits.

Cumulative Effects

The combined effects of timber harvest, prescribed fires, cattle grazing, and noxious weeds, could negatively affect sensitive plant species over their ranges. With the addition of the design elements listed in chapter 2, no negative cumulative effects are anticipated from this project. No reasonably foreseeable activities, combined with Forest Service activities, are anticipated to result in a cumulative negative impact to plant species or populations included on the Region 6 Special Status Species Plant Lists.

If the mitigation measure listed in chapter 2 is implemented, the Hanlon project may have an impact on individual plants, but is not likely to cause a trend to federal listing or loss of viability. Adherence to Forest Plan standards and guidelines would prevent adverse effects to sensitive plants. There are no irreversible or irretrievable effects associated with the Hanlon project.

Soils

Existing Condition

At a landscape scale, the existing detrimental soil conditions are very low. Most of the detrimental soil conditions that have occurred are limited in extent; intense, but widely scattered; and do not occupy a large percentage of the analysis area.

The Diamond City area is an area of detrimental soil conditions associated with the historic development. This area makes up about 1% of the analysis area.

Each proposed treatment area was examined for existing detrimental soil conditions. Transects were conducted in all proposed harvest areas that had been logged in the past (93 units). Transects were done to assist in estimating existing detrimental soil conditions. Ocular estimates were done for all units, including units that did not receive transects.

Units with existing DSC greater than 10%
The detrimental soil conditions (DSC) found in these units are mostly from past logging -- roads (both specified and unauthorized), skid roads, skid trails and landings. In many cases the remnant logging features are suitable for reuse. The higher the level of existing detrimental soil conditions, the more features are generally available to be reused. Where these are reused, total detrimental soil conditions would increase by something less than the 8-10% increase from the direct effects. Each proposed harvest area was reviewed to consider whether existing landings, roads, skid trails, etc. would be likely to be reused during this entry.

Units where the existing detrimental soil conditions exceed 10% were reviewed on a case-by-case basis.

Effects of Alternative A

Detrimental soil conditions due to road construction, the construction of landings, and ground-based timber harvest would not occur.

Continued fire exclusion would allow fuels to accumulate on the forest floor – creating thick duff layers that probably affect soil microbiology, chemistry, and nutrient cycling. Site nutrients would continue to migrate from the soil and high canopy to the forest floor and low canopy trees (Harvey, 1999). This shift in nutrient pool and organic matter load could make sites more vulnerable to nutrient losses from an uncontrolled wildfire.

Potential adverse effects of an uncontrolled wildfire
The location, size, and intensity of future wildfires are 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[42]. 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).

The Water Erosion Prediction Project (WEPP) model was used to model potential erosion from a high intensity wildfire in this area[43]. Table 12 displays the amount of soil that would be removed from the burned area, based on slope length and slope percent. Soil will redeposit when the slope flattens, behind objects on the ground (e.g., slash), and in areas where the forest floor and duff are more intact.

If the organic matter of the mineral soil is burned (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 will reduce overall cation exchange capacity, these soils will retain more capacity than most forest soils.

Table 12 WEPP prediction of potential soil loss due to erosion from a wildfire

Slope Percent	Slope Length	Average soil loss from a High intensity Wildfire (tons/acre)[44]
30	100	0.2
	200	0.7
	500	10.4
50	100	0.30
	200	0.70
	500	14.4

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, 1979).

[42] 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.
[43] WEPP for Windows version 2008.9070; 50 year simulation; climate generated using rockclime for Lat. 48.63, Long-117.14 elevation 2100 ft. (ridge south of Hanlon Mtn.). Soil is from the forest soil selection – silt after a high intensity fire.
[44] High intensity = 25% soil cover post-fire. Soil = high severity fire silt loam

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 Louma (1995) 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.

Effects of Alternative B

Roads

The effects of roads, landings, and rock pits

The construction of landings and rock pits is considered an 'irreversible effect' on soil productivity as described in 40 CFR[45] 1502.16.

New Construction of Specified Roads: In order to construct roads, the ground is shaped using tractors and other heavy equipment. Measurable declines in site productivity are common where soil is excavated to construct the road prism. On open roads most vegetative growth is suspended on the tread. Vegetation typically re-grows on closed roads, but productivity is severely diminished on the road tread, and often on the cut slope46. Productivity on the fill slope is variable, and may be enhanced better than surrounding forestland (Gucinski, 2000).

The proposal would construct about 3.2 miles of new specified roads[47], impacting productivity on about 24 acres.

New Construction of Temporary roads: Temporary roads are constructed in a similar manner, but because the sideslopes are gentle little cut or fill is required. Temporary roads are typically scarified and seeded to restore productivity for shallow rooted plants and some tree species. Since all of these units would be logged in the winter, it is likely that temporary road construction would occur in the fall or early winter before significant snowfall.

The proposal would construct about 4.4 miles of new temporary roads, impacting productivity on about 11 acres.

New Construction of Landings: In order to construct landings, the soil is typically bladed to flatten the site, and highly compacted, substantially reducing site productivity for deep rooted plants. To the extent reasonable existing landings would be used.

The proposal is expected to construct about 160 new landings, including 4 helicopter landings, impacting about 45 acres.

Rock Pits: Rock pits (aggregate sources) are developed by taking a tractor and piling the topsoil (overburden). Equipment is then used remove the underlying rock and gravel. Blasting and ripping may be required. Vegetation productivity of rock pits is suspended through the time the pit is "open". Restoration by replacing topsoil would restore productivity when the material is exhausted and the pit is "closed".

Three locations for new rock sources are being considered, and would be located on NFS lands. The development of these rock sources for this project alone would impact about 5 acres. The proposed rock sources would be used for many years and, when fully utilized, would impact about 30 acres.

Reconstruction of Specified Roads: Changes in road drainage, addition of surfacing, etc. do not change the basic road 'footprint' and do not impact soil productivity.

Use of Existing Unauthorized Roads: The proposal would utilize about 3.6 miles of existing unauthorized road. About 1.2 miles would be used as temporary road; after the timber sale and associated activities are completed

[45] Code of Federal Regulations.
[46] Loss of productivity is related to soil depth, texture, and the height of the cut slope. Productivity is better on short cut slopes with deep, fine to medium-textured soils.
[47] Not specified roads that are 'built' on existing roadways.

these roads would be closed to vehicle use, scarified and seeded: about 2.2 miles would be added to the Forest road network. Use of these roads would not increase the amount of detrimental soil conditions.

Decommissioning of Existing Specified Roads: Road obliteration would be a first step in restoring soil productivity on roads. If accomplished correctly, ripping can reduce erosion and increase infiltration. If organic mulches are used, these are important first steps in restoring site productivity

To decommission a road means to close the road to use, to remove all drainage structures that require maintenance (e.g., culverts), to install cross-drains or outsloping the road so it drains well, and to allow the road to revegetate. The road surface may be scarified and seeded depending on the current vegetation. Decommissioning without ripping does not fully restore soil productivity.

Decommissioned roads can still produce sediment until they have stabilized (Luce *et al.* 2001). Saturated infiltration of ripped roads does not return to those found in undisturbed sites. Rocky soils with a high percentage of fine material resulted in lower rates of infiltration than sandy granitic material (Luce 1997). These roads are located on sandy and gravelly soil, and are expected to respond to ripping moderately well.

The proposal would decommission about 13 miles of existing roads. Of these roads, about 4 miles are currently closed to motorized use. Many of the closed roads are substantially overgrown with vegetation. Decommissioning these roads would move about 40 acres toward a more productive soil condition. Full productivity for deep-rooted species would probably not be restored.

The project would decommission about 3.3 miles of FR 1935. FR 1935 is located adjacent to the Middle Branch Le Clerc Creek. The road provides access to the riparian area for livestock and recreation – both activities have adversely impacted riparian conditions.

Effects of Prescribed Burning

The effects of fire on soils are numerous and highly variable depending on the type and intensity of the fire and the amount of surface fuels consumed.

High temperatures impact soil by removing soil cover and organic matter, volatilizing some chemicals, killing organisms, and dehydrating some clay minerals[48]. These impacts appear as increased erosion, and changes in soil biology and nutrient cycling. Soils that are rocky, coarse textured, and shallow are considered ‘sensitive’ to prescribed fire because they have low soil organic matter and erode easily when bare.

Most of the heat generated by a fire goes upward. Soil temperature is impacted by fuel load on or near the ground, and fire residence time. In general, the more fuel close to the ground, the higher the ground temperatures. Larger material has a longer fire residence time than smaller material. The prescribed fires would occur under weather conditions to yield a low to moderate intensity fire – not wildfire conditions. Practices are included to minimize the risk of medium-high intensity fire on sensitive soils.

The primary detrimental soil condition would be erosion, because the fire would consume some of the duff and forest floor material. These areas are expected to be small and scattered. Overall detrimental soil conditions would be about 1% from proposed treatments.

Effects of Logging

The primary adverse impact of logging is compaction caused by ground-based yarding systems.

Effects of logging on soil biology and nutrient cycling

Timber removal can change soil microbiology through changes in stand density, soil temperature, moisture, species composition, and composition of the forest floor.

Timber removal generally warms the soil and increases soil moisture. How much depends on the amount and size of the timber removed. Cutting trees can increase solar radiation, warming the soil. The more removed, the greater the effect (Hermann, 1978; Smith, 1986). Removal of vegetation reduces evapotranspiration, increasing the soil moisture. This effect typically disappears quickly as other plants reoccupy the site. Warmer, wetter soil increases decomposition of organic matter and increases overall biologic activity (Grier and others, 1989).

[48] These soils have little clay; clay dehydration is not a problem.

Thinning from below removes smaller trees and keeps most of the overstory shade. It is unlikely thinning or selection harvest would reduce crown cover enough to substantially influence soil temperature or water regimes (Hermann, 1978).

Shelterwood removes more trees and creates a more open stand. Summer soil temperatures would be warmer following a shelterwood harvest. Decomposition rates would increase and the amount of duff would decrease somewhat over the next 3-10 years. As the stand re-grows, duff would increase again commensurate with the overall stand density.

Soil biology 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). Changes in species composition, both tree and understory, result in changes in soil biology.

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). The proposal would not simplify composition. Logging and tree removal alone does not remove the organic material on the forest floor. The proposal retains the larger trees, which, when they die and fall down, provide the refugia needed, especially on drier sites.

Much of the nutrients in a tree are located in the bark, limbs and foliage (Grier, et al., 1989). 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).

Skyline and Helicopter yarding

Hanlon proposes to log about 489 acres using a helicopter and 95 acres using a skyline. Skyline and helicopter yarding generally impacts the soils less than ground-based systems. Excluding the landing, compaction generally does not occur under these yarding systems (Alexander and Poff, 1985; Fredrickson and Harr, 1979). The primary type of detrimental disturbance found in these yarding systems is displacement, disturbance of the duff, and mixing of the duff and surface soils. In general, helicopter yarding produces fewer disturbances than skyline yarding (Dryness 1972). The soil disturbances caused by skyline and helicopter yarding systems are generally not substantial enough to be considered detrimental soil conditions under the Forest Plan.

Ground –based yarding systems

About 4,063 acres of ground-based logging is proposed. Commercial logging is typically done with a small to medium sized tractor, skidder, or cut-to-length. The most common impacts from tractor activities are compaction, displacement, and erosion.

Compaction

Compaction occurs when heavy 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 other soil processes (e.g., soil microbiology, nutrient cycling).

Variation in growth due to compaction is believed to be because compacted soils do not always reach a growth-limiting bulk density. Growth limiting bulk density is a function of soil strength[49] and plant species.

> **Definition**
> Compaction is an increase in soil bulk density. The Colville National Forest Plan defines detrimental compaction 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 compaction potential of the areas proposed for ground-based yarding is generally ‘high’, but varies with rock content. A ‘high’ compaction potential means that these soils would reach a higher percent increase in bulk density with less compactive effort (fewer passes, less weight).

[49] Soil strength may be a better indicator of growth limiting conditions. Root elongation generally ceases at about 1,500 to 2,000 kPa (215-280 psi) (Gracean and Sands, 1980). Soil strength decreases as water content increases: root growth can occur even in moderately compacted soil when the water content is right. In some cases, compaction may effectively shorten the root growing season, but does not completely preclude root growth.

Observations on the eastern part of the Colville National Forest suggest that light to moderate compaction lessens within 10-20 years, primarily due to biotic activity. Deep compaction appears to last for a longer time, and some homestead era compaction is still evident.

Tractor yarding: With tractor yarding, the skid trails would experience detrimental compaction regardless of soil characteristics – unless ameliorating conditions exist such as snow or frozen ground. This compaction is expected to be deep enough that it would remain for a long time and is considered an 'irreversible effect' on soil productivity as described in 40 CFR 1502.16. The project designates the minimum skid trail spacing. The number of skid trails is generally independent of the timber volume to be removed. The number of passes on each trail would increase as the volume removed increases. On tractor trails, maximum compaction typically occurs in the first 1-3 passes, so the amount of compaction would not generally increase as the volume removed increases. With 130-foot skid trail spacing, this project would detrimentally compact about 10% of the activity area. This project would require all heavy equipment to remain on the designated skid trails. By limiting the extent of these trails, the project would limit the extent of detrimental soil conditions.

Cut-to-length yarding: Compaction on CTL trails is related to the amount of material buffering the trail, and the number of passes by the heavy forwarder. CTL systems, with proper slash buffering, do not create detrimental soil conditions on the entire trail. The compaction in main trails occurs in broad strips roughly correlating to the tracks, but extending beyond the tracks (about 40% of the track). On main trails, the compaction is expected to be deep enough that it would remain for a long time and is considered an 'irreversible effect' as described in 40 CFR 1502.16. The compaction on secondary trails is not as deep and occurs intermittently in the tracks. Shallow compaction is expected to ameliorate in 10-20 years. On secondary trails, soils with a moderate compaction potential would experience slightly less compaction. The more timber volume removed means more trips on each trail by the forwarder – increasing compaction of the secondary trail. CTL activity areas would experience about 8-10% detrimental compaction.

Winter logging: Most of the units in this project require winter logging. Over snow logging can reduce detrimental compaction substantially. Compaction is generally limited to the main trails right around the landings – the trails that receive the most traffic. Over snow detrimental compaction is expected to be around 1-3%.

Soils with imperfect drainage

All or parts of units 19, 20 and 21 are located in an area where soil drainage is impeded. The surface is silt loam ash-admix with about 5-10% glacial gravel and cobble. At about 10 to 20 inches depth the texture changes abruptly to sandy clay, forming an aquatard. The soil is slow to drain, and mud puddles tend to linger in the spring.

Logging on similar soil[50] has found that winter logging is generally sufficient to prevent excessive compaction of the surface horizons. Winter logging is required due to wildlife requirements.

Displacement

Displacement is the movement of surface soil from one location to another with equipment like a tractor. Detrimental displacement is defined as the removal of more than half of the A horizon from an area greater than 100 square feet, which is at least 5 feet in width. Most displacement occurs on temporary roads, excavated skid trails and landings. While displacement may add to the overall detrimental conditions of these trails, it does not increase the extent of detrimental conditions.

Erosion

Surface erosion is the detachment and transport of individual soil particles by wind, water, or gravity. 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 (FSM[51] 2532). Reviews of past harvest units in this analysis area did not find areas of erosion large enough or severe enough to meet the criteria for detrimental soil conditions. Post-harvest reviews and post-project monitoring seldom find evidence of erosion that is large enough to meet the criteria for detrimental soil conditions.

Tractor yarding: Tractor skid trails are typically bare, because the tractor drags the logs on the trail[52]; the soil in the skid trails is compacted, and the soil structure destroyed. Because erosion is occurring on areas that already

[50] Browns Lake Timber Sale.
[51] Forest Service Manual.
[52] Logging over snow does not bare the skid trail.

have detrimental compaction, erosion on skid trails does not contribute to the extent of detrimental soil conditions in the harvested area. Erosion from skid trails was modeled using WEPP. Waterbars are used to break up the slope. Slope limitations, waterbars and seeding are the primary means of limiting erosion from skid trails.

Cut-to-length yarding: 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.

Logging over snow: If soil cover remains largely intact, and the soil is not compacted (no increase in runoff), then no erosion would occur. Over snow logging often yields this result. Logging over snow is not expected to cause erosion.

Firelines: A small amount of erosion may be generated from firelines, especially tractor firelines. This amount is typically very small (for example, if you put a 5-foot wide fireline around a 40 acre unit, the fireline would increase detrimental soil conditions by less than 1%). Firelines are subject to the same measures to control erosion as are skid trails – slope limits, waterbars and seeding.

Summary
The primary detrimental soil condition would be from compaction. Overall detrimental soil conditions would be about 8-12%. Winter logging would reduce detrimental soil condition by about 80%. Minor changes in soil biology may occur; however, these are consistent with the changes in stand conditions and are not detrimental soil conditions.

Effects of grapple piling and mastication

The primary affect of these mechanical treatments is additional compaction, especially on skid trails. The proposal has about 1,230 acres of grapple piling and 1,100 acres of mastication.

Compaction
The equipment used for grapple piling and mastication is generally smaller than logging equipment, and has lower ground pressure. The equipment generally only makes one pass over the ground [53].

If they stay on existing trails, these activities do not increase the amount of detrimental soil conditions in tractor yarded units.

In CTL trails, this pass has the potential to increase the amount of compaction. Whether this occurs, and to what extent, depends on the amount of slash on the trail. CTL operations may experience a small increase in detrimental soil conditions due to mechanical fuel treatments.

Masticators and grapple piling equipment often leave the established skid trails. Because they are very light, under good conditions (single pass, dry conditions, slash on the ground) they may not increase compaction to a detrimental level. Units with moderate compaction potential (8 and 12) would be able to withstand this equipment with less likelihood of causing detrimental compaction. (Moghaddas and Stephens, 2008).

Nutrient Cycling
Grapple piling and mastication rearrange the location of nutrients and organic matter on the site. Mastication leaves a lot of new organic material on the forest floor. If the material is more than about 2-4 inches deep, it can keep the soil cooler; slowing seedling establishment including noxious weeds. The influx of new organic material tends to increase the decomposition process which may reduce nutrient availability for plants in the first few years. This is expected to last about 2-4 years. In the long-run mastication increases the nutrient pool in the soil and forest-floor.

Effects of biomass removal

Depending on economic conditions, biomass may be removed from up to 2,200 acres of harvested units. Biomass includes both removing landing piles and removing material from the unit. Removal of material from landings would have no impact on soil or site productivity.

Within harvest units, material would generally be removed instead of grapple piling. Many of the impacts are similar to grapple piling.

[53] This equipment generally uses some kind of ‘go-back’ trail to get to the landing for refueling, and grapple piling equipment may reposition itself some. Masticators generally go over once.

1. Equipment is used with the potential to increase compaction. As with grapple piling, the equipment is generally limited to the existing trails. As with grapple piling, the operator is instructed to leave some material for ground cover.
2. With biomass removal, the material is generally removed from the site along with its nutrients. The long-term impact of this nutrient loss is not clear. Early research is Europe found that continued removal of small material led to site degradation (Baule and Fricker, 1970). In the United States and Canada, long-term forest productivity studies did not find a decline in productivity 10 years after removing much of the above ground organic matter from the site (Powers and others, 2005). Repeated intensive removal of above ground organic material is expected to reduce productivity in the long-term.

Effects of combined logging and fuel treatments

Most of the treatment areas would experience more than one treatment. Typically commercial timber harvest includes both the harvest and some fuel treatment. Compaction/erosion/displacement on skid trails is far and away the most common detrimental soil condition associated with the proposed actions. Mechanical fuel treatments generally do not increase the amount of detrimental soil conditions because it involves light equipment, making a single pass under dry conditions. Burning after harvest often increases detrimental soil conditions slightly.

Effects of activities that have minimal impact on soil

Cutting saplings – Hanlon proposes about 625 acres of precommercial thinning in older conifer plantations, and about 20 acres of meadow encroachment in Fourth of July Meadow. All of this work is done by hand and does not disturb the soil.

West Branch Dam sediment reduction – Hanlon proposes using a suction dredge to remove sediment from behind an old dam and place the sediment on a adjacent terrace located above the high water mark. The material would be revegetated. This is coarse sand and gravel and would add to the coarse sand and gravel that already dominates the terraces. The proposal would cover some soil, but would have little long-term impact on soil productivity.

Diamond City stream channel restoration – Hanlon proposes to put about 0.1 miles of the West Branch into an old channel. The relocation would preclude the stream from eroding the toe of landslide, and would be a benefit to soil resources. This project is located within and adjacent to timber harvest unit 32.

Le Clerc instream habitat improvements – Hanlon proposes to place wood and rocks in the streams at various locations to improve fish habitat. This would have no impact on soil productivity.

Road closures – Hanlon proposes 6 road closures. None of these road closures impact soil resources in the short-term. In the long-term, these areas would move into a more productive soil condition.

Forest Road 1934 – Hanlon proposes to sign the southern end of obliterated road 1934 and pull knapweed along the road. This has no impact on soil productivity.

Yocum Lake – Hanlon proposes to confine motorized access, restore degraded camping areas, create hardened camping areas, remove docks and other lake debris, and install signs. Confining access and restoring degraded campsites would improve long-term soil productivity by reducing compaction. The other aspects would have no impact on soil productivity.

West Branch Le Clerc Meadow – Hanlon proposes to construct fence to keep campers away from the streambanks, improve the campsites and roads, and remove the OHV “racetrack” (rip the meadow, level the meadow, treat for weeds and seed with desirable species), and block or obliterate other OHV trails. This project is located within and adjacent to timber harvest units 26, 27, 28, 32 and 33. The road obliteration proposed would obliterate most of the OHV trails in this area. Other trails located within units 32 and 33 would be made unusable through the project. Ripping the meadow would reduce compaction and improve soil productivity on about 1 acre. If successful, the reduction in OHV activity has the potential to improve soil productivity on these old roads and trails.

Cumulative effects

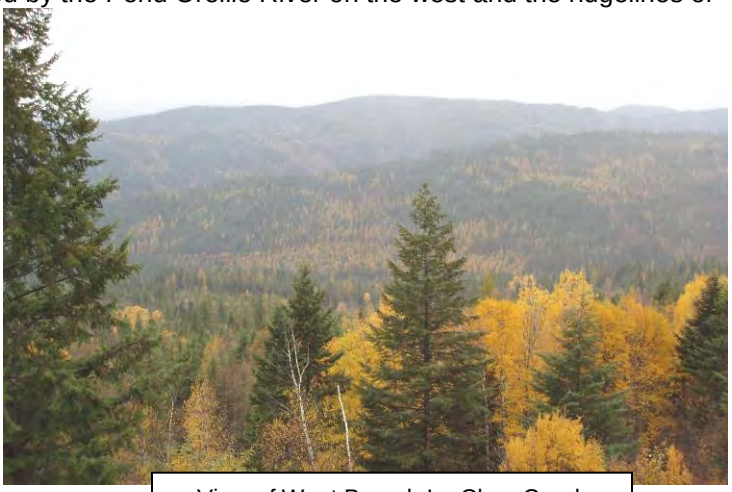
Warila and Boyle (1995) think that cumulative effects may follow from forestry practices if the practices are repeated closely enough in time that effects of previous practices have not fully recovered, and/or practices that occur closely enough in space so that the extent of the landscape area affected increases. For soil productivity, cumulative effects are derived from multiple actions and activities occurring over a timeframe of decades, and in the precise same location. This cumulative effects analysis for soil productivity is limited to NFS lands.

At the landscape level, the creation of roads is the soil impact with the greatest potential for cumulative effects. Permanent system roads are a long-term commitment of land to a non-productive use. The Forest has no limit or standard for the amount of an analysis area that can be encumbered in the road system. Upon completion of this project including road decommissioning, about 2% of the analysis area would be committed to roads.

At the activity area (unit) scale, cumulative effects may include the full array of detrimental soil conditions identified in the Forest Plan, however, compaction is the impact that is most likely to accumulate, because it can last for decades. The Forest Plan standard applies to the cumulative effects of these detrimental soil conditions. In this analysis area, compaction from past logging is the most common type of existing detrimental soil condition.

Scenery Management

The Hanlon analysis area is part of the Okanogan Highlands character type, which is described as generally rolling terrain of moderate slopes with broad rounded summits. The broader landscape includes a series of north-south mountain ranges separated by river valleys. The Hanlon analysis area lies among the slopes and mountain summits of the Selkirk Mountain Range. It is bordered by the Pend Oreille River on the west and the ridgelines of far eastern Washington. Hanlon Mountain sits roughly in the middle of the analysis area at over 4000 feet in elevation. Streams within the area flow into the Pend Oreille River at a point south of the analysis area. The area is dotted with several small lakes, most on private land. Yocum Lake is located partially on Forest Service lands within the analysis area. Many homes and small farms are found on private land along the Pend Oreille County roads that bisect the analysis area.



View of West Branch Le Clerc Creek
From Hanlon Mountain

The Forest Service has provided the primary management of vegetation and recreation throughout the area, occurring after the transfer of lands from homesteading and logging interests of the past. The Hanlon analysis area is valued by locals as a backdrop to their lives. Recreation centers on access along Forest Service and Pend Oreille County travel routes to high the country for year-round activities.

Visual Quality Objectives (VQO) were used in the Forest Plan to describe a desired level of scenic quality, and diversity of natural features, based on physical and sociological characteristics of a specific Management Area. The Visual Quality Objectives relating to proposed activities within the Hanlon analysis area are defined as follows:

* Retention – Human activities are not evident to the casual Forest visitor. Activities may only repeat the forms, lines, color, and textures, which are frequently found in the characteristic landscape. Management Areas 5 and 6.
* Partial Retention – Human activity may be evident, but must remain visually subordinate to the characteristic landscape. Management Areas 5 and 6.
* Modification – Human activity may dominate the characteristic landscape but must at the same time utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in middleground or background. Management Areas 7 and 8,

Effects of Alternative A

In general, no immediate change would occur in the quality of the scenic resource. In those portions where the scenic integrity is Very Low within the analysis area the landscape does not have a natural appearance and this would not change. Where the scenic integrity is Very High, primarily those portions viewed from Pend Oreille River, State Highway 20, and Pend Oreille County Route 9325, the analysis area as a scenic backdrop would not appear to change in the near future.

While no proposed activities would occur in this alternative, and consequently no immediate change in landscape appearance, implementation of this alternative would result in the deferral of activities which could improve the resiliency of the landscape, and the quality of the Hanlon analysis area as a scenic backdrop may not be sustainable.

Effects of Alternative B

Road Construction/Reconstruction Activities

In general, alternatives that propose road construction in visible zones would not preserve the natural appearing landscape character due to the un-natural linear feature imposed on those slopes. The contrasting elements of color and line would not be subordinate to the natural appearing characteristic landscape and therefore not meet Forest Plan direction for the area.

In the Proposed Action the reconstruction of road 1900096 has potential to be seen briefly in middleground and foreground from State Highway 20, and foreground of County Route 9325 (Le Clerc Road). The visual quality objective is Retention next to County Route 9325 and Partial Retention along the slopes facing toward the river, however, the primary concern is where the road passes through private land and vegetation screening is uncertain. The proposed selection harvest treatment on land managed by the Forest Service would produce only a textural change to the vegetation, with little potential for openings where the road would be visible from the Concern Level One viewing locations.

Proposed construction on road segment n1935a would not be seen from any of the Concern Level One Travel Routes or User Areas. A portion of the route has a potential to be seen at the background distance zone from FS 1936 (Concern Level Two route).

Proposed construction on segment n1935b would not be seen from any of the Concern Level 1 or 2 Travel Routes or User Areas.

There are several proposed pit developments in the analysis area, and all fall within Management Area 8 and a VQO of Modification. While any pit development would have to be designed respective of visual concerns, the location identified in the Transportation Specialist Report as being within the SW ¼ Sec.18 T. 36 N., R. 44 E., and along road 1933112 in Unit 29, has the best potential for being topographically screened.

Timber Harvest Activities

The following activities/treatments would meet their respective Retention, Partial Retention, and Modification VQOs (as seen from critical viewpoints discussed in the existing condition section) in the action alternative: Selection Harvest 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.

The following activities remove more of the forest canopy than those described above, thus creating greater textural changes, sometimes exposing ground surface to viewers where we are unable to retain understory and overstory elements: Commercial Thin, Commercial Thin/shelterwood; and Shelterwood. Examples of site-specific factors that aid in meeting VQOs include: opening size and placement that is consistent with the landscape character of the area, topographic screening, and vegetative screening. These activities would meet their respective VQOs of Partial Retention and Modification when designed and mitigated as suggested. Within the Hanlon analysis area the placement of no-cut areas, and over-storey removal areas adjacent to the roadway, designed to be responsive to wildlife issues (grizzly bear habitat) would serve to breakup the created openings and provide more natural appearing landscape patterns.

Proposed vegetation treatment within the Hanlon analysis area would create openings adjacent to the private lands. These treatments should provide sufficient textural change within the stand to breakup the wall effect that has been perpetuated by the vegetation management within the “checkerboard” ownership situation. Where these

harvest openings are placed in such a way as to break-up the contrasting line between private and Forest Service lands, the long-term effect would be positive and would meet the VQO of Modification.

The Proposed Action treats units within the foreground of the Pend Oreille River and County Route 9325. Where skyline corridors are aligned at, or near 90 degrees to the line of sight, and stands are fairly uniform, there is a possible long-term effect due to the introduction of the unnatural vertical lines and color contrast from soil exposure and vegetation removal. This effect is especially visible in the winter months when snow creates a strong visible contrast to the adjacent vegetation. The units of primary concern are Units 1, 2, and 3. Helicopter logging would leave a pattern of textural changes without the linear contrast that can occur with skyline corridors.

Fire Management Activities
The Visual Quality Objectives were developed for forest management activities that are defined as human activity imposed on a landscape for the purpose of harvesting, traversing, transporting, or replenishing natural resources. They are not well suited to the temporary effects of under-burning. In addition, fire is a natural process regardless of whether ignition is by human intervention or natural causes. The goal of the Visual Management System has been to strive to maintain a natural-appearing landscape. Since it is a natural occurrence, fire, even prescribed under-burning in moderation, is consistent with a natural-appearing landscape. On the other hand, a heavily burned-over landscape from a stand-replacing wildfire is generally considered aesthetically unattractive even though it may be natural appearing. The moderate use of jackpot or under-burning proposed by the action alternative may help to diminish the risk of wildfire and the resulting negative visual impacts.

Post stand treatment, through the use of jackpot or under-burning, may be necessary to reduce activity debris and the risk of wildfire. While, due to the length of contiguous activity, there would be short-term noticeable changes, the long-term appearance would be of a healthier, more open, and natural appearing landscape.

Prescribed Fire areas would meet the VQOs for views from County Route 9325 and State Highway 20, as overstory trees would screen middleground views of blackened ground surface, and in the foreground, green-up would occur the following spring.

Stream Channel Restoration Activities
The proposed work in West Branch Le Clerc Creek to restore the stream channel would be a positive effect from the stand point of meeting scenic integrity objectives by reducing impacts at the existing cultural site and restoring natural stream function.

Biomass Removal Activities
Removal of biomass material from treated units and landings would likely assist in lessening the visual impacts from logging activities.

Meadow and/or Riparian Protection Activities
The proposed fencing along West branch of Le Clerc Creek to restore riparian vegetation and streambanks currently impacted by public users of the area, would meet scenic integrity objectives by reducing the degree of direct human-caused deviation in the landscape.

Thinning the vegetation in and around the dispersed camping area called the Ballpark, would enhance the visual condition of the site. The efforts made to move campers away from the riparian zone would be more successful since the original campground area would be opened up and more attractive to users.

Other Proposed Activities
Noxious weed treatment, Le Clerc instream habitat improvement, road closure management, aspen restoration efforts, and the removal of encroaching conifers within meadows would work to retain the valued landscape character.

Cumulative Effects

Treatment of the vegetation within the Hanlon analysis area, at a broad scale, whether through timber harvest or noncommercial-commercial means, would serve to move the stands towards the desirable 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 careful design and mitigation, the necessary temporary roads, skyline corridors, and harvest debris would not take away from the positive attributes of the landscape character of National Forest Lands.

The contrast between public and private land management practices would continue to draw the attention of travelers in the area.

The proposed vegetation treatment activities within the Hanlon analysis area are potentially seen in middleground and background from multiple viewing locations. Foreground views of concern are from County Route 3503 and County Route 9325.

The Proposed Action could potentially introduce some skyline corridors and color contrast, as viewed from Concern Level 1 and 2 travel routes; however the general stand condition would be improved and therefore the sustainability of the valued landscape character. This would occur through the use of broad scale treatment of the vegetation, without introducing long-term negative visual elements.

The vegetative treatment would also reduce the negative linear edge effect and contrast of the existing mixed ownership pattern. The effect would improve the overall scenic integrity and retain the valued landscape character. he proposed activities would be consistent with the Forest Plan objective of Retention, Partial Retention, and Modification.

Recreation

Existing Condition

The Hanlon Project is located in the middle of Pend Oreille County. The adjacent Pend Oreille River has many permanent and seasonal homes along its length. Visitors primarily come from adjacent residences, Pend Oreille and Spokane Counties.

Recreation use in this area includes camping at dispersed campsites, picnicking, sight-seeing, wildlife viewing, and geo-caching; berry picking, mushroom picking, firewood cutting, and hunting; hiking, horse and OHV riding. There are no developed recreation sites within the analysis area. The Hanlon analysis area has about 90 dispersed camping sites. The Forest Service provides no amenities at these sites.

Dispersed Camping

Yocum Lake Area

Yocum Lake is a 45-acre lake accessed by FR 1900096 and a County Road. The county manages the lake as electric motors only. The northwest part of the lake is mostly NFS land, the remainder is Pend Oreille County (POC) land[54]. Yocum Lake has a primitive boat launch on POC land at the south end of the lake, and three user created launch sites on NFS land. The launches on NFS lands are in poor condition and are actively eroding into the lake. The Forest Service is working with Pend Oreille County and the Kalispel Tribe of Indians to reduce the number of access points to the lake[55] and reduce the resources impacts from dispersed recreation.

Diamond City/West Branch Campground/Ballpark Area

Diamond City was a large logging camp from the late 1920s until about 1940. All the buildings have been removed, but concrete footings and one fireplace are still there. The Forest Service maintained a campground about ½ mile south of Diamond City (West Branch CG) in a meadow that is known as the “West Branch” or the “Ballpark”[56]. The campground was closed in the late 1970s and the NFS provided amenities (tables, toilets, fire rings) were removed.

The Diamond City/West Branch Campground/Ballpark area contains about 15-20 dispersed campsites. About 10 campsites are in the Ballpark; an open meadow adjacent to the West Branch Le Clerc Creek. Most of the sites are found along the edge of the meadow within the Riparian Habitat Conservation Area (RHCA) for West Branch Le Clerc Creek. Seven sites are experiencing heavy to extreme resource impacts.

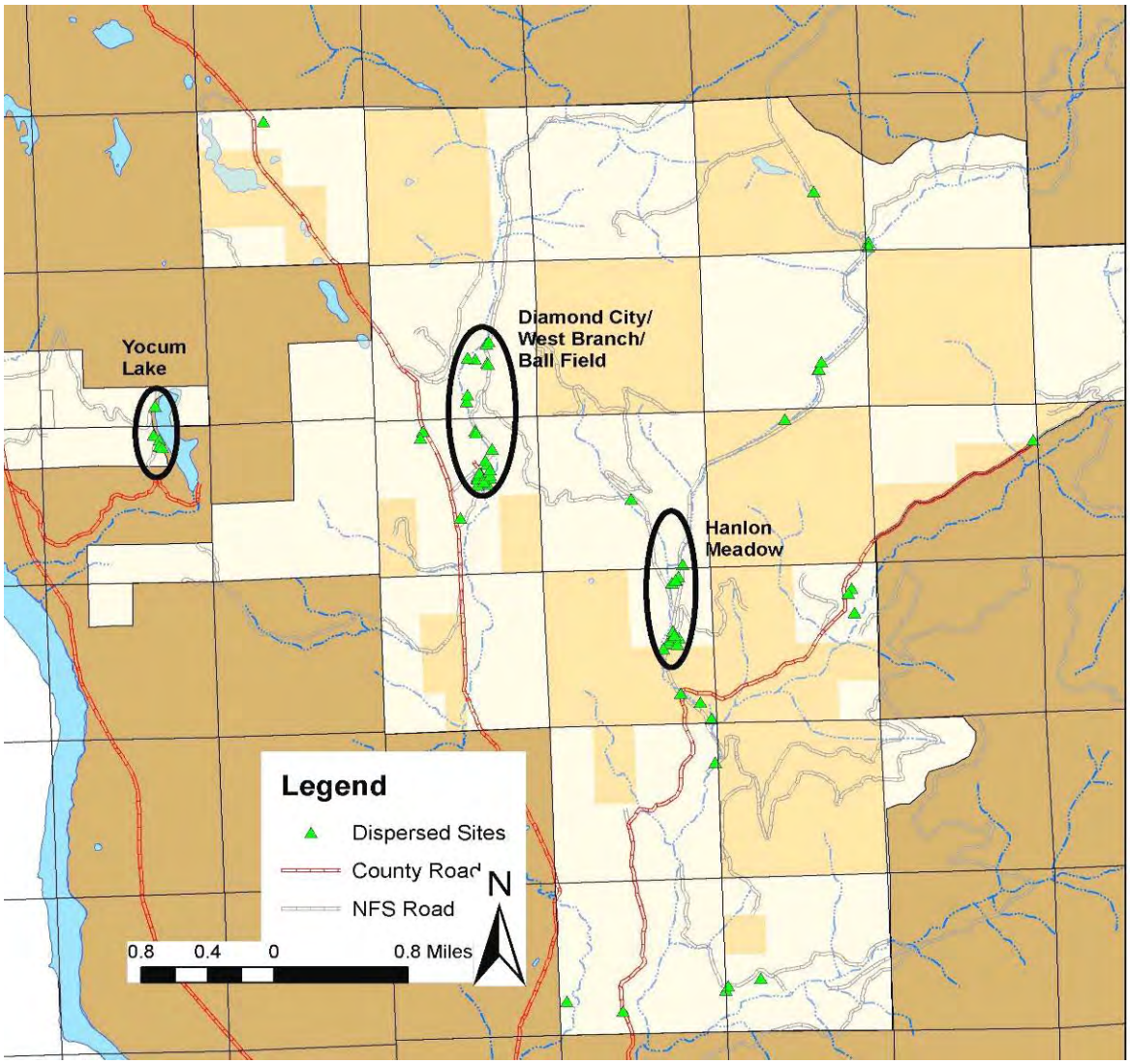
[54] POC acquired land from Stimson Lumber Company in 2006 and right-of-way on the road accessing the south part of the lake.

[55] The Kalispel Tribe and Forest fisheries biologists expressed concern about the number of access points. Both groups recommend reducing the number of boat launches to one, and limiting vehicle access to the southern road.

[56] The clearing was a baseball field when Diamond City was active. Some people call this Hanlon Meadow, but Hanlon Meadow is on the Middle Branch Le Clerc Creek. Some people call this area the West Branch Campground or simply the campground.

The Diamond City area contains about 6 dispersed campsites. These campsites are nestled in a wooded setting within the RHCA of the West Branch. All are accessed by spur roads. Two sites were rated as having extreme impacts, three as having heavy impacts, and one as having light impact.

There are a few overflow sites in the surrounding area. All are located in a wooded setting along the West Branch. One was closed to vehicle access use a few years ago. These sites generally receive a moderate level of use and have moderate resource impacts.



Dispersed Recreation Sites in the Hanlon Analysis Area

The road accessing this area is suitable for all vehicles including recreational vehicles and large trailers. This area is the hub of OHV recreation. This area receives the highest use level in the analysis area. In the summer, mid-week use is about 3-5 day use visitors/day, and up to 3 overnight visitors/day. On nice summer weekends the sites have about 90-100% occupancy. On summer holiday weekends all sites are occupied and the number of trailers in the meadow may exceed the number of sites.

During hunting season occupancy ranges from 25-50% during the middle of the week, and 90-100% on weekends. [57]

Hanlon Meadow Area
Hanlon Meadow is located in the Middle Branch Le Clerc Creek. About 8 campsites are located in the Hanlon Meadow area; 3 in Hanlon Meadow and 5 on FR 1935 about⅓ mile south of the meadow.

Hanlon Meadow is a 15-acre homestead meadow. Part of the meadow is fenced for livestock. Campsites are located adjacent to some trees in the meadow, and along the edges. Two sites have moderate resource impacts, and one has heavy resource impacts. Visitors with horses are more likely to use these sites. None of these sites are immediately adjacent to streams.

Off-highway Vehicles
For NFS lands in the Pend Oreille Valley, this analysis area probably has the second highest level of OHV activity. The analysis area has no designated OHV trails. Forest Road 1935115 (Hanlon Cut-off) is the only NFS road open to mixed use[58]. Pend Oreille County has designated County road (CR) 3503 and CR3521 for mixed use through the analysis area. Because of the grizzly bear recovery area, most side roads are closed with gates or barriers, on both NFS and Stimson Lumber Company lands. These closures limit the opportunity to expand designated OHV routes in this area.

The OHV "racetrack" north of FR 1935115

The Diamond City/West Branch Campground/Ballpark Area is the center of OHV activity. Riders have created a 'race track' in the meadow and a hill climb on the adjacent slope. The Diamond City area has a number of old roads and railroad grades dating from 1900-1940 era, most of which have grown closed. None of the roads have been adopted by the Forest Service as part of the road or trail systems – they are considered 'unauthorized' or 'abandoned' roads. Over the years OHV riders have reopened a number of these roads, creating what the agency considers 'user created trails'[59]. The Forest estimates there are about 5-7 miles of user created trails in this area.

The area between the West Branch and the Pend Oreille River also receives a lot of OHV activity. Most riding is on Stimson Lumber Company roads that have been closed. OHVs have been riding FR 1933050 from the West Branch to the Yocum Lake area.

Effects of Alternative A

In the short-term, the no action alternative is not likely to change the recreation experiences and opportunities. 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. Mortality of lodgepole pine is expected to accelerate due to the age of the trees. 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.

The potential for a large fire to disrupt the various recreational pursuits is increasing although the timeframe is not certain. Access could be curtailed as a result of a large fire. 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.

[57] Estimates of use are from Nan Berger, personal communication, July 27, 2009.
[58] Mixed use means that both OHVs and street legal vehicles may use the road.
[59] Some people would argue that these are not really user created, more like user reopened. Nonetheless, they are not NFS roads or trails.

Effects of Alternative B

Dispersed Camping

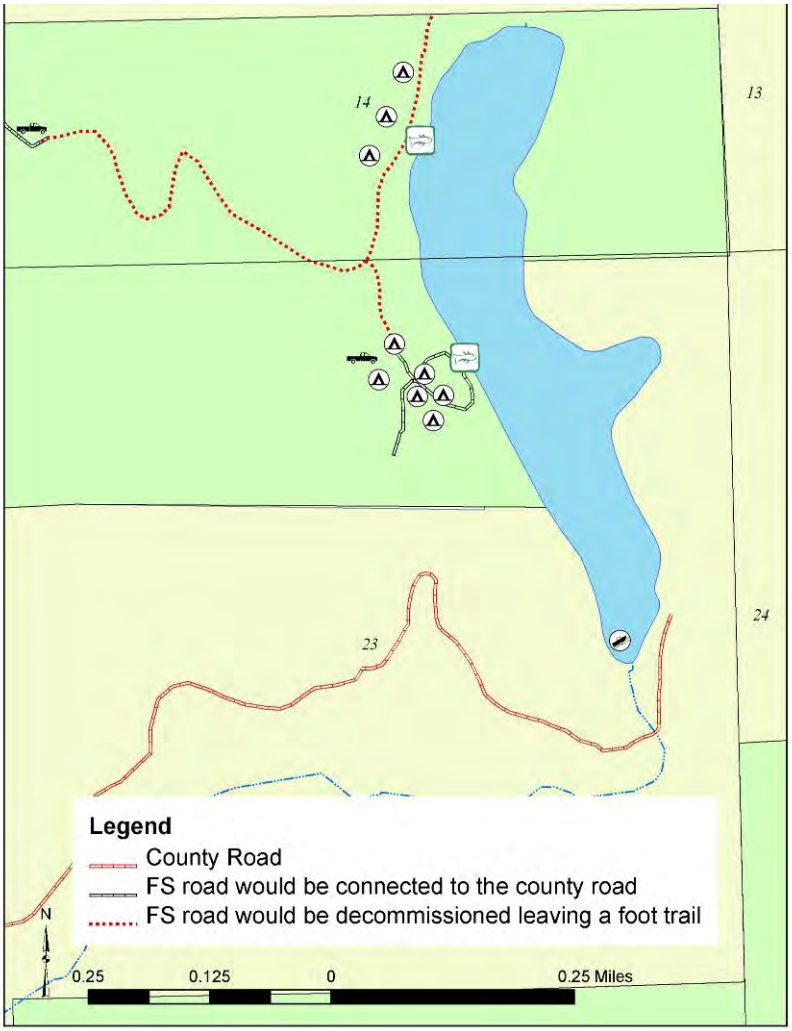
The proposed activities may create dust, noise, and smoke – directly impacting forest visitors. In addition, changes in the stand adjacent to sites may impact visitor enjoyment. In addition, this project proposes some direct changes to the dispersed campsites in the Yocum Lake and Ballpark areas.

Yocum Lake Area

Under the Forest Plan, the Yocum Lake Area is considered a 'significant dispersed site'. No timber management is proposed in this area; but prescribed fire is proposed just west of the camping areas. Forest Road 1900096 would be used for timber harvest and haul for unit 1. Unit 1 is expected to be logged in the summer season.

This project would also change the Yocum Lake dispersed camping area FR 1900096 would be closed about ½ mile from the lake. The road would be ripped and a single-track non-motorized trail would be maintained in its place. A small parking area would be developed so people could walk down to the lake. A new road to be constructed from the County Road at the south end of the lake to the dispersed camping area is being considered as a future project. Other nonsystem roads around the lake would be converted into nonmotorized trails.

Campsites north of the intersection would be closed to vehicle access, but would be accessed via a trail. A small parking area would be developed for those campers. The distance from the parking to the sites is about ¼ mile.



Proposed Activities at Yocum Lake

If a new road from the south is constructed in coordination with the County, campsites south of the intersection would remain vehicle access. Individual campsites would be modified to reduce impacts to the lake. Rocks and plantings would be used to limit the site boundaries. One toilet would be placed near the vehicle accessed dispersed camping sites.

Trailered boats would no longer be able to launch from NFS lands, but portage boats would.

Visitors who have driven to the lake on FR 1900096 would be unable to use the road during timber operations, and would have to walk about ½ mile to the lake after the project is completed. Visitors that used trailered boats would have to use the county launch.

Vehicle-access camping would be reduced from about 8 sites to 4 sites. Older people, people with small children, and people with disabilities are more likely to utilize vehicle access sites than walk-in sites; they would find fewer sites at Yocum Lake. The distance from the parking to the northern dispersed sites is about ¼ mile, a relatively short distance for a walk-in campsite.

Prescribed fire is likely to occur in the early spring or fall – the typical burning windows. The impact is short-term (a few days to a week), and does not occur

during the peak recreation season. Visitors using the lake at that time would experience smoke and noise from the lighting and holding crews.

The camping areas are mostly in the riparian area along the lake. It is unlikely that burning would extend down to the sites.

Diamond City/West Branch Campground/Ballpark Area
Under the Forest Plan, the Diamond City/West Branch Campground/Ballpark Area is considered a 'significant dispersed site'. This project proposes timber harvest in most of the stands surrounding the dispersed camping areas, and in the stand including Diamond City. All logging is proposed in the winter. The logging slash and excess fuel would be treated with a combination of mastication, machine piling, and prescribed fire.

Because of the existing resource damage at the 'racetrack', the racetrack area may be used as a log landing. Upon completion, the 'racetrack' would be scarified or ripped, leveled, and seeded – restoring it to more natural conditions.

The project also proposes to move the dispersed camping sites farther from the West Branch Le Clerc Creek using a combination of fencing and planting.

Since the logging would occur in the winter, there would be no direct logging effects such as noise or dust. The primary impacts would be from fuel treatments and the change in vegetation conditions surrounding the sites.

Design criteria for this project would retain understory vegetation near the campsites, continuing to provide some screening.

In the Diamond City area the activities all occur in the winter. Logging and mastication in the winter would leave little sign of the activity – small woody material would be scattered around but the forest floor would remain intact. The primary change would be in the condition of the surrounding vegetation. Many of the small understory trees would be removed. Shade at the campsites would remain about the same, but vegetative screening may be less than previously. Basic campsite cleanup is required after timber harvest and mastication.

In the Ballpark area all logging activities would occur in the winter, but the slash treatments would occur in the late fall through early winter. Mastication would take about 10 days to 2 weeks to complete. Campers, likely hunters at that time, would hear the machinery quite distinctly during that period. The primary change would be in the condition of the surrounding vegetation. Many of the small understory trees would be removed, but young trees and brush around the sites would remain. Shade at the campsites would remain about the same and vegetative screening would remain about the same. Mastication would leave small woody material scattered on the ground and is visually compatible with the dispersed camping setting. Campsites along the stream would be moved farther into the meadow, and a fence built to keep vehicles away from the stream. The sense of intimacy with the stream would be reduced.

Hanlon Meadow Area
The Hanlon Meadow area is not considered a 'significant dispersed site'. No timber harvest is proposed immediately adjacent to the camping areas. All logging would occur in the winter. The logging slash and excess fuel would be treated with a combination of machine piling, mastication and prescribed fire. Machine piling and mastication are likely to occur in the late fall through winter. Prescribed fire would occur in the early spring or fall.

The primary impact would be noise from mechanical fuel treatments in nearby units. Unit 42 is across the creek from the 'cattleguard flat' area. Fourteen acres would be machine piled, probably in about 3-5 days. Units 37, 38 and 41 frame Hanlon Meadow. Altogether about 150 acres of machine piling or mastication is proposed in these units. Mechanical fuel treatments would take about 2 months to complete. During these periods of time noise would probably be an annoyance to campers and hunters in this area.

The reconstructed FR1935 would cross 'cattleguard flat' in a different location, displacing some campsites. But the area is open and campsites can easily be relocated to other areas on the flat.

Off-highway Vehicles
Legally, this project has no effect on off-road vehicle activities. This project does not change the access provided to OHVs under the Motor Vehicle Use Map (MVUM). With winter logging, this project does not increase logging traffic while OHVs are on the road.

However, as the area is currently used, the proposed action does affect OHV riders. This proposal would strengthen implementation of the MVUM by closing all user-created OHV trails[60]. All non-system roads and trails within harvest areas would be obliterated through the logging process and post-harvest process.

The 'racetrack' at the Ballpark meadow would be obliterated, seeded with meadow grasses and native species.

The Forest Service has received comments from the public objecting to the closure of user-created OHV trails in the Diamond City area. For visitors who come to this area to camp and ride their OHVs the proposed action creates a changed situation. It has been illegal to ride on user created trails since the Motor Vehicle Use Map was released in 2008. Many riders do not appear to realize that is it illegal to ride these trails. By closing and obliterating the user-created trails, this project would make this area much less desirable to OHV riders and is likely to displace some riders.

The 'racetrack' at Ballpark meadow would be obliterated and restored to a meadow condition. The Forest Service has received comments objecting to restoring the Ballpark meadow. Some visitors like to camp at Ballpark meadow because they can supervise their smaller children riding the racetrack. Closing the racetrack would eliminate this camping/OHV combination. These users may reestablish a racetrack or may look for other camping/OHV areas.

Range Management

Existing Condition

Portions of the Le Clerc Creek Allotment are within the project boundary. This allotment has been divided into smaller sub-units or pastures, which supports 101 permitted livestock annually. Grazing within these allotments occurs in correlation with the Allotment Management Plan that has been established. The grazing season begins on June 1 each year and extends into fall ending on September 30. According to past monitoring information grazing use is occurring at acceptable levels and within the specified use levels.

The allotment has several livestock management fences to support livestock grazing within the allotments. Most of the range improvements are in satisfactory condition, but there is one fence in poor condition that is going to be assessed for removal.

Generally, the loss of primary range due to conifer encroachment has been offset by the transitory range created through the even-aged timber management practices of the 1970s and 1980s. Many of these harvested areas were seeded for wildlife and livestock forage. Unfortunately, since many of the harvested units included riparian and wet areas, cattle access and use has resulted in scattered areas where resource impacts such as bank trampling have occurred in the past. These effects have been mitigated through various methods including fencing of sensitive riparian areas, increased cattle management by the permittee, and salting to help draw cattle out of riparian areas and into upland areas. Grazing use monitoring data collected suggest that there is ample forage present to support the current level of stocking and use in the Le Clerc Creek Allotment

Effects of Alternative A

Short-term effects of this alternative would result in little or no change in the range resource compared to the existing condition. Livestock would continue to graze on the allotment and range improvements (such as fences, water developments and corrals) would exist on the landscape and be used to manage grazing.

Long-term effects of the "no action" alternative would be the perpetuation of denser stands of trees that provide little value for production of forage. Dense stands of fire intolerant species such as Douglas-fir, grand fir, and western red cedar typically have closely spaced tree canopies that allow little sunlight to reach the forest floor. The understory found in these types of environments usually consists of few grasses and are therefore, generally not used by livestock. These types of stands also provide a benefit to livestock management by creating natural barriers, which act to restrict livestock movement. Livestock do not pass through areas of dense timber, where there is little or no herbaceous vegetation for an extended distance, because they will not utilize areas that do not provide adequate foraging conditions. By having intact natural barriers, which limit livestock movement, the need for fencing to manage livestock movement is less.

[60] FR 1935115 is the only designated Forest Service OHV route in this area.

However, if a wildfire were to occur in these dense stands of fire intolerant species the entire stand could be removed, which would remove natural barriers to livestock movement allowing cattle to drift to areas where grazing is not desired. Alternatively, the removal of the dense overstory may provide for transitory rangelands which are temporary in nature, but could provide additional forage and potentially help alleviate grazing pressure in areas of high use for a period of up to 30 years in areas where fire intensity does not negatively impact soil conditions.

Excluding wildfire, the “no action” alternative would allow lodgepole pine to continue encroaching into the more open and grassy areas of the allotments and thereby reducing the forage producing capability of the allotment. When trees encroach into upland grassy areas, they generally become more inaccessible and unavailable to livestock. As there is less forage for livestock in the upland areas of pastures, it is likely that grazing pressure would increase on lower elevation riparian areas.

This alternative would produce and propagate a forest condition that has a large amount of natural fuels. High levels of natural fuels could result in large stand-replacing fires burning the landscape. These types of fires would likely be more damaging to the forage base that supports livestock grazing in the short-term time frame than prescribed fire. Prescribed fire could be implemented during times that would be less damaging to cool season perennial grass plants, but wildfire could occur while plants are still growing and before they have produced mature seed.

This alternative has a greater potential to adversely affect range management because forage production would decrease as tree densities continue to increase. As the amount of uplands that support grazing decreases due to the encroachment of trees, riparian area impacts would likely increase.

Under this alternative range improvements, such as fences and water developments, would be at greater risk of having wildfire damage or destroy them. If a wildfire were to occur within the project area, there would likely be little done to protect range improvements and the improvements would have to be reconstructed.

Effects of Alternative B

Rangelands

The proposed action would result in a more open timber stand where there is likely to be a greater amount of herbaceous vegetation in the understory. Converting dense forested areas to more open stands is beneficial to range management and forage production by creating transitory rangelands that provide mid-term grazing land, which provides forage to livestock and wildlife. Forested sites have a high potential for producing forage following logging because moisture availability is relatively high and competition from previously established species is less (Miller and Krueger, 1976). Logged forest communities can produce approximately twice the herbage as primary rangeland and ten times more forage than un-logged forests (Miller and Krueger, 1976).

Transitory rangelands exist for approximately 10 to 30 years depending on when early structure stand tree canopies close, and older structure stands regenerate understories. Transitory rangelands for the Hanlon project would be created primarily by commercial fuel treatments, road construction and/or reconstruction, and surface fuels treatments. Reseeding of logged areas can create a valuable temporary forage supply and can hold and rebuild the soil for future timber crops (Wilson, 1960). Noncommercial fuel treatments would not likely create large enough openings to generate forage and produce transitory rangelands. Most of the created transitory rangeland would be in the non-riparian upland areas; therefore they would act to attract livestock away from riparian areas by providing foraging areas in the uplands.

The Hanlon project would create approximately 528 acres of transitory rangeland in the Le Clerc Creek Allotment. The transitory rangelands that would be created by the Hanlon project would be beneficial to livestock management by reducing grazing pressure on heavily grazed areas, but would not alter the livestock handling capacity or stocking rate of the allotment.

Grazing and Fuels Treatments

Most proposed units within the project area would not increase livestock access to riparian areas, or cause livestock to degrade riparian areas from their current state. By following INFISH standards and guidelines most riparian areas should be protected but there would still be potential to have increased riparian livestock impacts in some units and at new road stream crossings.

Intact or undisturbed natural vegetation provides the best means for riparian area protection from livestock impacts. Fuel treatments that are to occur in riparian areas pose some risk of increasing livestock impacts to such areas by removing natural vegetation. There is little concern from pile type fuel treatments since they would be localized, but if underburning is to occur near riparian areas, efforts should be made to have low intensity fires which are allowed to back down into riparian areas in an attempt to reduce the amount of tree and shrub mortality in the unit. Fewer livestock impacts to riparian areas are expected if natural vegetation is left intact in these areas. Riparian area impacts from livestock are not expected to increase following fuels treatment providing that prescribed fire is implemented so that fire intensity is low.

Prescribed fire has the potential to increase the quality of the primary rangelands within the project area by removing encroaching conifer trees and reducing shrub cover. Fire would also increase productivity of grasses by returning nutrients to the soil and by removing dead biomass. A large portion of the Le Clerc Allotment lies outside of the analysis area, so prescribed fire activities should have minimal impact to grazing activities. Health and productivity of herbaceous vegetation is expected to increase following prescribed fire in the project areas because there would be less competition for available moisture if shrubs and small trees are removed from sites, as well as a short-term increase in nutrient availability. Increased forage and foraging areas for livestock would result from the vegetation and fuels treatments defined in the proposed action. Implementation of the proposed action is not expected to require grazing deferral or adjustment of grazing rotation systems. Impacts to herbaceous vegetation from prescribed fire are expected to be light with minimal damage to roots. Therefore, established forage grasses are expected to be adequately recovered by June 1st when the grazing season begins.

Range Improvement Projects

Livestock management is accomplished in part by range improvement projects that exist within each grazing allotment. These range improvement projects include such items as fences, water developments, corrals and exclosures. These improvements are critical for the implementation of sound livestock management, they encourage and support livestock grazing in acceptable areas and provide for resource protection.

Allotments and pastures are separated by a combination of Forest Service fences, privately owned fences, and natural barriers. Natural barriers consist of areas that are too steep and/or rocky for livestock to cross and areas of dense timber with a lack of herbaceous plants in the understory. Cattle do not typically venture into areas of dense timber because there is a lack of forage available to support livestock grazing. Natural barriers function well until the point they become compromised due to vegetation treatments or wildfires. The vegetation and fuels treatments in the proposed alternative have the potential to compromise some natural barriers. Vegetation and fuels treatments in units 32, 37, 41, 42, 64, 91, and 94 have the potential to remove approximately 2.5 miles of natural barrier that may need to be replaced by fencing or other barriers to cattle movement such as slash piling or directional tree felling.

An additional risk that may be created or amplified by the proposed action would be related to the removal of natural barriers to livestock movement that exist between private property and Forest Service lands which act to keep Forest Service permitted livestock from leaving the grazing allotment. Units within the Hanlon project area would have the vegetative structure altered from their current state. Densely forested stands that are proposed for treatment under the proposed action have not been productive rangelands. Once these stands are treated, they would be more open and would develop a more productive understory which may support livestock grazing. Vegetation treatments have the potential to create desirable grazing lands near the allotment boundary. If these newly created transitory rangelands were natural barriers to livestock movement prior to treatment, they may become areas where livestock leave the allotment after treatment. Additional fencing may be needed near allotment boundaries where natural barriers are compromised or livestock use patterns are altered by treatment activities.

Road Decommissioning

Road decommissioning is to occur on approximately 13 miles of National Forest System roads within the project area. Road decommissioning from this project is not expected to result in a negative impact to range or livestock management since proposed decommissioning does not restrict or limit access to range improvements or areas the permittee may need to access to gather or move cattle.

Other Projects

Other projects proposed under the proposed action include Hanlon Meadows (Racetrack) Riparian Protection, West Branch Diversion Dam Sediment Reduction, Le Clerc Instream Habitat Improvement, Diamond City Stream

Channel Restoration, precommercial thinning, and rock pit development. These projects would not have tangible effects on grazing or livestock use.

Cumulative Effects

The geographic cumulative effects are limited to the Forest Service allotment boundaries for areas contained within the project area. Although land ownership within the Hanlon project area is a mixture of NFS lands and privately owned land, no Term Private Land Grazing Permit has been issued. Therefore, these lands are not considered in determining grazing capacity or when making allotment management decisions.

The cumulative effects of past timber harvest, roading activity, wildfire and increased recreational use and development have all complicated the management of grazing within the analysis area.

Between approximately 1975 and 1995 there was a dramatic increase in the amount of roads and timber harvest units which provided livestock access to riparian areas. In the past, many of these activities also prescribed the use of palatable forage species when seeding for erosion control. This created an environment that attracted livestock into riparian areas and provided desirable forage that allowed them to stay in these areas rather than moving on to native upland foraging areas.

Past timber harvest activities have resulted in a positive effect on the forage base for the Le Clerc Creek allotment. Timber harvest created openings in the forest which provided temporary additional forage for livestock by way of creating transitory rangelands. When transitory rangeland is created and available, it reduces the level of grazing pressure on primary and secondary rangeland. Transitional rangelands also provide an abundance of forage for livestock which produces heavier calves for the producers and higher economic gains when their calves are sold at market.

The proposed treatments within this analysis area have the potential to remove natural barriers which limit livestock movement on the forest and allow for pasture rotations and deferment. Mitigating measures have been identified to address the potential effects of natural barrier removal, but constructing new fencing produces additional maintenance requirements that are likely to continue far into the future.

Current timber harvest levels on the Forest are greatly reduced as compared to the mid 1990s. This means that there is less transitory range being created by vegetation management projects on the Forest than there has been in the past. This compared with a switch from regeneration harvesting (clearcut, seed tree and shelterwood treatments) to intermediate harvests (thinning) has decreased the number of openings being created in the forest and the resulting available forage. The amount of transitory rangeland within the project area would increase following implementation and would provide valuable upland foraging opportunities for livestock, thereby attracting them away from riparian areas.

The creation of transitory rangelands due to vegetation and fuels treatments would allow livestock to disburse over a larger area which would result in less concentrated use. As a result, concentrated livestock use and the associated impacts to soils and vegetation would be reduced. The openings created within the project area are minor compared those created by large wildfires that could burn in the area given the current health of the forest and the amount of fuels present. The effects of creating a more open stand are generally beneficial to range management due to the creation of transitory rangeland that is suitable for livestock grazing.

The proposed action should improve rangeland condition by increasing productivity on primary rangelands through fuels treatments as well as by creating transitory rangelands through vegetative treatments. The transitory rangelands created by vegetative treatments would reduce the amount of grazing pressure on primary rangelands and decrease impacts to soils and plant communities. Overall riparian health should improve as well because of the creation of transitory rangeland in the uplands of the allotment would decrease pressure on riparian areas. The proposed action also would allow the permittees to continue grazing at current levels with greater economic returns. Federal lands are very important in the production of red meat to supply public demand (Holechek, 1981), and improved production of cattle from Federal lands would help maintain the local grazing industry, the ranching lifestyle and the local economy.

The activities in the proposed action combined with past, ongoing and reasonably foreseeable future actions would not cumulatively negatively affect range management within the Forest Service grazing allotment.

Heritage Resources

Existing Condition

Past Human Land Usage

During the past 6,000 years, the region has been utilized by diverse groups of people for a variety of activities. The project area lies within the traditional use area of the Kalispel Tribe. Ethnographic accounts indicate that the Kalispel practiced wintertime deer drives and maintained resident fisheries along the Pend Oreille River. In addition to hunting deer and fishing, the Kalispel harvested camas (*Camassia* sp) (Lahren 1998). There are currently no known Native American cultural resource sites (on National Forest System lands) within the Area of Potential Effect. The project area was largely unoccupied by non-Native Americans until the turn of the century. The early 1900s was a period of settlement and development of lumber, mining and agriculture industries.

Historic Properties

There are forty-eight identified historic properties within the proposed analysis area. Twenty-six of the forty-eight historic properties are located within or near identified planning units, and have the potential to be affected. Currently the Heritage Program management attempts to relocate sites, monitor the sites for damage or deterioration, evaluate the sites for National Register of Historic Places (NRHP) eligibility, and preserve/protect the sites.

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

Effects of Alternative B

Project activities have the potential to damage or destroy 6 management class 1 sites and 21 management class 2 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 District Archaeologist, or qualified Heritage Program personnel would identify sites on the ground and would coordinate with appropriate project personnel to provide location information to pre-sale, roads, and fuels treatment crews

Management Class 1 Sites have been evaluated and determined not eligible for the National Register of Historic Places. Before any activity occurs at the sites, the State Historic Preservation Office (SHPO) would review and need to concur with determinations. Management Class 1 sites would then not need to be actively managed.

Management Class 2 sites must be protected and preserved as if they were eligible for the NRHP. There are two protection options available. Either provisions must be made to avoid direct impacts to the site during the planned activities (e.g. delete or buffer entire unit or a sufficient amount of the unit to avoid impacts to the site) or, if it is determined this is not a viable option, a plan for site evaluation and effects mitigation must be developed and executed by the Forest or District Heritage Program. There are several mitigation options that can be explored including research, interpretation, public education, site enhancement or a combination of these and other options. The State Historic Preservation Office concurs with these actions.

Cumulative Effects

Under alternative B, historic properties within the analysis area would experience minimal cumulative effects from this project. There are no cumulative effects from adjacent landowners. Future activities associated with alternative B within the analysis area, following site-specific mitigations and design elements listed in chapter 2, would have no foreseeable cumulative effects on the historic properties.

Special Uses and Easements

There are numerous special use authorizations for improvements located within the Hanlon analysis area. Appendix C of the EA contains a list of the authorizations by use type and provides the legal description of their location. Implementation of alternative A would have no effect to the special use authorizations.

No adverse impacts (direct, indirect, or cumulative) are anticipated with implementation of alternative B with regard to improvements authorized under special use permits or easements if the recommended design requirements listed in chapter 2 are implemented. Effectiveness of the measures in avoiding impacts to improvements is expected to be very high and success (ability to implement the measure) would also be very high. Directional felling of trees away from structures such as power transmission lines is a standard safety practice and is expected to be followed by the timber sale purchaser or his/her operator(s). Review and approval of skid road/trail locations by Forest Service personnel would ensure that they do not cross powerlines. Fuels treatment is generally designed by the Forest Service and would take into account potential hazards such as powerlines. Specifications for maintenance of haul roads would be a standard part of any timber sale contract awarded and would be enforced by the Forest Service.

Transportation

Washington State Highway 20 and Pend Oreille County 9325 provide the main access to the western perimeter of the analysis area. County roads 3503, 3521, and Forest Service collector roads 1933, 1934, and 1935 provide secondary access into this analysis area. Numerous Forest Service roads provide additional access to the areas proposed for treatment activities.

Existing Condition

Based on a query of the corporate database INFRA-Travel Routes of the mapped transportation layer on 9/08/08, there are approximately 80.0 miles of existing roads in the Hanlon analysis area.

An approximate breakdown of these roads by jurisdiction is as follows:

Jurisdiction	Length (miles)	Percent of total
State	0.0	0.0
County	11.9	14.9
Private	32.1	40.1
USFS	36.0	45.0

Included in the 36.0 miles shown under USFS jurisdiction, are approximately 1.5 miles of unauthorized roads[61] that were identified and mapped during the Hanlon Road Analysis Process. There may be more of these unauthorized existing roads in the analysis area that are not mapped, and may be discovered during project layout. These could be used in lieu of creating new skid trails or temporary roads if deemed feasible.

Effects of Alternative A

No road construction, reconstruction, or maintenance beyond what is planned for other projects or standard Forest maintenance work would occur.

Effects of Alternative B

About 3.2 miles of new system road would be constructed and maintained as part of the forest road system with this action, all of it associated with the relocation of a short segment of C3521 and two segments of 1935000. Approximately 19.7 miles of specified road reconstruction (classified as either light or medium reconstruction),

[61] *Unauthorized roads* are roads that are not intended to be part of, and are not managed as part of, the National Forest transportation system such as unplanned roads, off-road vehicle tracks, or abandoned travelways. (36 CFR 212.1)

and approximately 4.4 miles of temporary[62] road construction is proposed. Also proposed are approximately 13.4 miles of roads identified as priority candidates for decommissioning (removed from the Forest transportation system by either physical closure or obliteration).

Table 13 Road Construction, Temporary Road Construction, Reconstruction, and Decommissioning

Alternative	Miles of New Construction	Miles of Temporary Road Construction	Miles of Reconstruction	Miles Proposed for Decommission	Net Change in Open Road Miles
A	0.0	0.0	0.0	0.0	0.0
B	3.2	4.4	19.7	13.4	-5.8

For alternative B, other than the relocated part of FR1935, newly constructed system roads would be closed with either a gate or earthen berm. 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 and obliterated.

Cumulative Effects

Declining or static road maintenance budgets are not allowing the Forest to maintain all Level 1 and 2 Maintenance roads to a degree that would bring them up to a more self-maintaining level. Light and Moderate reconstruction of open roads would help to mitigate this while improving road drainage and sight distance on approximately 8.1 miles of open forest system roads. It would also help to reduce sedimentation and erosion from an additional 11.5 miles of currently closed roads that would otherwise not receive maintenance, and put them into a more self-maintaining condition prior to being placed back into storage. Deferred maintenance costs would be reduced by approximately 17% ($40,000), should 1935000 be relocated and the abandoned segment obliterated as proposed in this action.

Economics (Purpose and Need Objective #5)

During public meetings the local community and Kalispel Tribe requested the Hanlon projects be implemented in a manner that would maintain the local infrastructure (e.g., roads and businesses). Having economically feasible projects would provide jobs in the communities and provide methods for completing restoration projects that are high priority for the Kalispel Tribe (e.g., fish habitat improvement, restoration of early-seral tree species).

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 above the advertised rate. This value is in dollars per hundred cubic feet[63] ($/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. This analysis used the values published in “RTI Fact Sheet #28 – Investments in Fuel Removals Avoid Future Public Costs”. 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 time would be 30 years. In the Hanlon analysis, this benefit was

[62] The intent of temporary roads is to use them for the short-term only, after which they would be closed, effectively obliterated, seeded, and put back into resource production within 10 years of contract completion.
[63] To convert hundred cubic feet (CCF) volume to thousand board feet (MBF), multiply the CCF quantity by 0.52.

only applied to acres receiving some sort of fuel or other 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 timber harvest, 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 improving visual appearance.

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, road obliteration, 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 assessment is finalized, most of the planning costs would already have been incurred and would 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 using the LogCost 10.0 spreadsheet.

In **alternative A**, No Action, none of the fuel or vegetation treatments would occur. There would be no reduction in fire risk level, so there is a higher potential for incurring costs related to fighting wildfires under this alternative. No stewardship, timber sale or service contracts would result from this alternative.

Table 14 below displays a summary of Present Net Value Benefits and Costs for each alternative of the timber sale portion of the project. A summary of Present Net Value Benefits and Costs for each alternative for the whole project can be found in Table 15.

Table 14 Present Net Value (PNV) Benefits and Costs by Alternative for Timber Sale Portion (commercial treatments only) of the Hanlon Project

Alternative	Acres	Volume (CCF)	Discounted Benefit	Discounted Costs	PNV ($)
A	0	0	0	0	0
B	4,647	50,187	$1,137,589	($629,279)	$508,310

Alternative B uses commercial timber harvest to meet the objectives of the project. The sale-as-a-whole present net value is a positive number. A unit-by-unit analysis would show that some of the units are positive and some are negative. Units that are negative are due to high logging costs (generally associated with helicopter logging) and currently low timber value. Since the majority of the sale would use a ground based system, which is generally the least costly, the cost is weighted towards this less costly system.

Table 15 displays a summary of costs and benefits with commercial and noncommercial activities combined. Costs listed under alternative A are associated with expenses incurred if a wildfire ignited the untreated area (which is related to the higher fire risk level).

Alternative B is economically viable based on the PNV values show in Table 15. This analysis also includes the costs and benefits of fuel treatments outside of the timber sale units. If this project or a portion of the project is implemented as a stewardship project, the receipts from selling forest products would offset the service work required to reduce fuels.

Table 15 Present Net Value Benefits and Costs by Alternative for Entire Hanlon Project (commercial and noncommercial treatments combined)

Alternative	Treatment Acres	Benefits	Costs	PNV ($)
A	0	0	($4,070,195)	($4,070,195)
B	6708	$5,207,784	($4,031,437)	$1,176,347

The additional benefit from the noncommercial fuel treatments is the risk reduction from a future wildfire and its associated costs. The net benefit is derived from the moderate risk column in Table 1 in the “RTI Fact Sheet #28 -

Investments in Fuel Removals Avoid Future Public Costs" by Mason, Lipke, and Zobrist. Conversely, this could be a cost for alternative A where no treatments would occur to reduce wildfire risk.

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). Alternative B meets the above Forest Plan direction.

Alternative B meets the public and Kalispel Tribe objective of creating contract opportunities that would support local infrastructure and also provide means for implementing restoration projects that are high priority for the Kalispel Tribe.

Cumulative Effects

The Hanlon and Scotchman sales are planned for fiscal years (FY) 2010 and 2011. It is expected that these stewardship or timber sales and other project activities may bring the local economy some increased relative stability during the life of the project.

Effects on American Indians

The Kalispel Tribe of Indians, Confederated Tribes of the Colville Reservation, and the Spokane Tribe of Indians were 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. Kalispel Tribal members use the National Forest for recreation, religious purposes, and to gather forest products such as firewood and huckleberries. Tribal members' use of this area of the National Forest would not be disproportionately affected when compared to other people for any of the alternatives considered with this project.

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

This section is based on information in the US 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. Approximately 18% of the people in Pend Oreille County have an income that is below the federal poverty level (US Census 2000). 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 low-income people use this area of the National Forest disproportionately when compared to other people.

Alternative B would reduce motorized access to portions of the analysis area through the proposed road decommissioning (see appendix B for a map with locations). 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.