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Specialist's Reports

for the

Prichard-Murray Resource Area Environmental Assessment

Under Authority of the Healthy Forests Restoration Act

List of Specialist's Reports

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Specialist's Report on Fire/Fuels in the Prichard-Murray Resource Area

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SPECIALIST'S REPORT ON FIRE/FUELS IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework for Fire/Fuels

The authority for fire management on National Forest System Lands is described in Forest Service Manual (FSM) 5100 - Fire Management (PF Doc. FF-29). The objectives of fire management are (FSM 5140, PF Doc FF-30):

1. *To use fire from management ignitions or natural ignitions in a safe, carefully planned, and cost-effective manner to benefit, protect, maintain, and enhance National Forest System resources.*
2. *To reduce future fire suppression costs and unwanted effects.*
3. *To restore natural ecological processes.*
4. *To achieve desired conditions and attain management objectives adopted in approved forest land and resource management plans (forest plans).*

The IPNF Forest Plan objective for fire management is to implement efficient fire protection and use programs based on management objectives, site-specific conditions, and expected fire occurrence and behavior (CR-002). Management area standards and goals provide direction for appropriate use of prescribed fire and initial attack strategies. Forest-wide standards require that Fire management plans are to be guided by management area standards. Human life and property are to be protected, and activity fuels should be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.

The Forest Plan identified four management area designations for National Forest System lands in the Prichard-Murray Resource Area (EA, page EA-2). Appropriate initial attack strategies (confine, contain and control) are to be used to achieve the best benefit based on commercial timber values, big-game winter range values, or elk summer range values. Prescribed fire is to be used as needed to meet silvicultural objectives and the objectives of the management area.

The *Federal Wildland Fire Management Policy and Program Review* was chartered by the Secretaries of the Interior and Agriculture to examine the need for modification of and addition to Federal fire policy. The review recommended a set of consistent policies for all Federal wildland fire management agencies. In adopting the policy, the Federal Agencies recognized the role of wildland fire as an essential ecological process and natural change agent that will be incorporated into the planning process (USDI and USDA 2001a, PF Doc. FF-22). The severe wildfire seasons in recent years throughout the country have made it clear that fire cannot be excluded from fire-dependent ecosystems. On the other hand, because of developed areas and commercial forests, fire cannot be fully restored to its historic character without severe consequences to humans, except perhaps in a few of the largest wilderness areas (Brown et al. 1994, in Hardy and Arno 1996, PF Doc. FF-20).

After the record-breaking wildfire season of 2000, the President requested a national strategy for preventing the loss of life, natural resources, private property, and livelihoods in the wildland/urban interface. Working with Congress, the Secretaries of Agriculture and Interior jointly developed the National Fire Plan ***(www.fireplan.gov)*** to respond to severe wildland fires, reduce their impacts on communities, and assure sufficient firefighting capabilities for the future. The National Fire Plan (NFP) is a long-term commitment based on cooperation and communication among federal agencies, states, local governments, tribes and interested publics. The federal wildland fire management agencies worked closely with these partners to prepare a 10-Year Comprehensive Strategy, which was completed in August 2001 (PF Doc. FF-24). The four

goals of the 10-Year Comprehensive Strategy are to improve fire prevention and suppression, reduce hazardous fuels, restore fire-adapted ecosystems, and promote community assistance. In response to the 10-Year Comprehensive Strategy goal of promoting community assistance, Shoshone County initiated a contract to develop a Fire Mitigation Plan to aid in the protection of the communities within the county (CR-020). The Shoshone County Wildland Urban Interface Fire Mitigation Plan is a HFRA (Healthy Forests Restoration Act) compliant Community Wildfire Protection Plan (CWPP). The plan identifies a goal to reduce the rate of fire spread and acres of land burned by forest fires through the implementation of targeted fuel mitigation treatments where the landscape has the potential to sustain fires that threaten communities in the rural urban interface.

The Shoshone County Fire Mitigation Plan describes the buildings near Prichard, along the Coeur d'Alene River Road as being surrounded by dense forests with a high propensity for fire ignition and spread. The plan says that all of these buildings are at high-risk to wildfire loss in the event of a wildfire within the region. (CR-020, page 71-76).The plan identifies the Prichard-Murray area as a priority treatment area for Shoshone County, and also identifies several treatment areas which encompass Forest Service, Bureau of Land Management and private lands. Private lands are being treated by Shoshone County's Fire Mitigation Program, while the federal lands are being addressed by the respective agency. All fire mitigation work by all agencies is completed under the guidance of the Shoshone County Fire Mitigation Working Group, which consists of the USFS, BLM, Idaho Department of Lands, and the Shoshone County commissioners, fire chiefs, fire mitigation program and planning department. The Prichard-Murray Fuel Reduction Project was initiated in response to the Shoshone County Fire Mitigation Plan and is being planned and completed in cooperation with the Shoshone County Fire Mitigation Working Group.

The Proposed Action is also designed to help accomplish the goals of the 10-Year Comprehensive Strategy, primarily by reducing hazardous fuels. One of the guiding principles of the Strategy is to set priorities that emphasize the protection of communities and other high-priority watersheds at risk. The long-term emphasis is to maintain and restore fire prone ecosystems at a landscape scale. The Prichard-Murray Resource Area is almost entirely within the wildland-urban interface as defined by the Shoshone County Fire Mitigation Working Group (PF Doc. FF-39 and FF-46); the resource area is in close proximity to communities, and includes a domestic watershed. These factors make the Prichard-Murray Resource Area a high priority for hazardous fuel treatment.

The National Fire Plan, the 10-Year Comprehensive Strategy, and the Implementation Plan for the Strategy (PF Doc. FF-25) can be accessed on the internet at ***www.fireplan.gov***.

2. Methodology for the Fire/Fuels Analysis

Several sources of information were used to assess the existing conditions in the Prichard-Murray Resource Area. The fire history of the Coeur d'Alene River Ranger District, including the Prichard-Murray Resource Area, has been recorded and mapped by the Forest Service since its inception. Fires were initially mapped with colored pencil on a district map, but are now digitized and placed in a GIS (geographic information system) coverage. A map of the recorded fire history for the Prichard-Murray Resource Area was used to make assumptions as to when effective fire suppression began (PF Doc. FF-37). Additionally, a fire history study of the Idaho Panhandle National Forests was conducted by Zack and Morgan (1994; PF Doc. FF-23). The information gathered by this study and the subsequent conclusions drawn from it are relevant to the Prichard-Murray watershed and were used to help characterize the existing condition of the area.

Records of fire ignitions are compiled by the Forest Service (1960 to 2000) and Idaho Department of Lands (1981 to 2000), and kept in a national database. These records include the year, size, location, and cause of each fire reported. Records for fire ignitions in the Prichard-Murray Resource Area were used in this analysis (PF Doc. FF-36).

Fire Regime Condition Class (FRCC) was analyzed using the Fire Regime Condition Class software and direction outlined in the Interagency Fire Regime Condition Class Guidebook (PF Doc. FF-52). Of primary

concern to fuels management is the long-term fuel loading increase and subsequent changes in fire intensity and severity that may occur. The Forest Vegetation Simulator (FVS), which is widely used by forest managers throughout the United States and Canada to predict the effects of various vegetation management actions on future forest conditions, was used for this additional analysis. The Fire and Fuels Extension to FVS (FFE-FVS) integrates FVS with elements from existing models of fire behavior and fire severity. Model output displays fuels, stand structure, snags, and potential fire behavior over time and provides a basis for comparing proposed fuel treatments (Reinhardt and Crookston 2003, page 12; PF Doc. FF-14). FFE-FVS was used in this analysis to describe the existing conditions of the forest stands in the Prichard-Murray Resource Area, as well as to compare the effects of proposed treatments within each alternative.

Information about existing vegetation was obtained from an existing database (Field Sampled Vegetation or FSVeg) that was developed from stand exam information, historical records and aerial photo interpretation. This information was used in the Fire and Fuels Extension (FFE) to the Forest Vegetation Simulator (FVS), which was developed to assess the risk, behavior, and impact of fire in forest ecosystems. (Beukema et al. 1999; page 1; PF Doc. FF-7). The Fire and Fuels Extension was created in order to link the changes in forest vegetation due to growth, natural or fire-based mortality, and management, with changes in fire behavior, using existing models and information wherever possible (Beukema et al. 1999, page 1; PF Doc. FF-7).

FFE-FVS was used to assess the risk of fire to a stand with indicators such as potential flame length, the type of fire (e.g. surface fire or crown fire), the probability of torching, and the critical wind speeds required to initiate and sustain a crown fire. This model is not intended to predict the probability of fire or the spread of fire between stands (Reinhardt and Crookston 2003, page 12; PF Doc. FF-14). It is used solely to assess the potential fire behavior and fire effects possible considering current and future stand conditions.

Three primary indicators of fire hazard were used to evaluate the changes in fire behavior in forested stands. First, the potential **flame length** (which is related to fuel loading and fuel arrangement) was used to determine the surface fire behavior potential, as well as the trend over time. Suppression tactics are directly related to flame lengths. For example, flame lengths less than four feet can be effectively attacked using hand crews constructing direct fire line, while flame lengths greater than four feet will likely have to be attacked using dozers, engines, and retardant aircraft (NWCG 1993, page B-59; PF Doc. FF-11).

Figure FF-1. Passive crown fire behavior or torching.

The second indicator of fire hazard used in this analysis was the **probability of torching** (PF Doc FF-18, pg. 159) A torching situation is generally defined as one where tree crowns of significantly large trees are ignited by the flames of a surface fire or flames from burning crowns of small trees that reach the larger trees. This index estimates the probability of finding a torching situation in a forest stand. The probability of torching is the proportion of small places where trees are present and torching is possible. To calculate this index, fire conditions such as surface fuels, fuel moisture, and windspeed are needed. The probability of torching is sensitive to the flame length and key processes in stand development – the development of an understory, the decline of overstory trees, and crown recession. Management actions that modify these key processes modify the predicted value of the probability of torching in realistic ways. The probability of torching can be very sensitive to flame length.

The third indicator of fire hazard used to compare alternatives was the **crowning index**. The crowning index is the wind speed, 20 feet above the canopy, at which active crowning is possible (Scott and Reinhardt 2001, page 17; PF Doc. FF-10). The crowning index reflects the density of canopy fuels. Active crown fire, also called a running or continuous crown fire, is one in which the entire surface/canopy fuel complex becomes involved, but the crowning phase remains dependent on heat from the surface fuels for continued spread. Active crown fires are characterized by a solid wall of flame extending from the fuel bed surface through the top of the canopy (Scott and Reinhardt 2001, page 4; PF Doc. FF-10). Because active crown fires consume the crowns of trees, they result in complete mortality of the overstory. Sites that can initiate or sustain a crown fire at lower wind speeds are more prone to crown fire. Critical open wind speeds for crown fire initiation and active spread are stand-specific indicators of crown fire hazard. Although critical wind speeds were used as indices, the site conditions (surface and canopy fuels, slope steepness), not the weather, are being rated (Scott and Reinhardt 2001, page 16; PF Doc. FF-10).

Figure FF-2. Active crown fire behavior.

The crowning index describes the point at which active crowning is possible, not necessarily the point at which a crown fire can be initiated. Conventional wisdom is that a surface fire must first go through a passive crown fire phase before becoming active as burning conditions worsen. A passive crown fire phase is a phase in which individual or small groups of trees torch out, but solid flame is not consistently maintained in the canopy. This wisdom also suggests that any stand not capable of initiating a crown fire would not support an active crown fire under the same conditions (Scott and Reinhardt 2001, page 21; PF Doc. FF-10). However, it is possible to have an active crown fire in a stand that would not easily initiate an active crown fire, depending on the type of originating fire (Scott and Reinhardt 2001, page 22; PF Doc. FF-10). For example, although there may not be enough ladder fuels in a particular stand to initiate a crown fire until the winds reach 75 miles per hour, if a crown fire enters that same stand from another area, it could sustain the crown fire at a much lower wind speed, perhaps 20 miles per hour. For this reason, stands that are considered safe from crown fire initiation cannot necessarily be relied upon to cause crown fire cessation (Scott and Reinhardt 2001, page 26; PF Doc. FF-10). The spatial variability of fuel conditions in the Prichard-Murray Resource Area (and beyond) could lead to crown fires initiating elsewhere and entering the stands targeted with this project.

All of the indices used (flame length, probability of torching, and crowning index) need to be considered in conjunction with one another. For example, just because the crowning index is increasing over time (meaning crown fire *hazard* is decreasing), it does not necessarily indicate a positive trend for potential fire suppression activities. Surface fuels and the associated flame lengths may be increasing at the same time, dictating different suppression tactics.

Features Related to Fuels Management

The Action Alternatives include specific design features that would be followed during project implementation to protect resources in the Prichard-Murray Resource Area.

- *Surface or understory fuels in harvest units would be treated through the use of prescribed burning, grapple piling, or 'chunking'. Because post-harvest fuel conditions cannot be completely predicted, assessments would be made by a fire/fuels specialist and a silviculturist after completion of harvest activities. A determination would then be made as to whether the burn could be implemented safely and effectively without further fuels treatment, or if some modification of the fuels using other methods is required to meet the objectives of the silvicultural prescription. These methods could include slash piling, leave tree protection, or slashing.*

> *"Chunking" is a treatment similar to chipping, where slash is broken into chunks the size of a football (or smaller) and left on the ground. This reduces fuel bed depth and retards combustion rates.*

- *Post harvest activities would include prescribed burning (and related slashing, as needed) to reduce fuels, fuel continuity, and fuel ladders, and introduce fire as an intermediate disturbance process.*

> *"Slashing" is the use of chainsaws to cut noncommercial undesirable trees in order to prepare a site for burning and reforestation with desired species.*

- *Burning would take place only when soil moistures are above 25 percent.*
- *Based on past experience, less than 20 percent mortality of overstory trees should be anticipated as a result of prescribed burning. Salvage of this mortality would not occur without further analysis as appropriate under NEPA.*

Features Designed to Protect Air Quality

The Idaho Panhandle National Forests is a member of the Montana/Idaho Airshed Group, which is composed of members who conduct a "major" amount of prescribed burning and the regulatory and health agencies that regulate this burning. The intent of the Airshed Group is to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction (PF Doc. FF-42).

The monitoring unit of the Montana/Idaho Airshed Group coordinates burning and smoke emissions to minimize smoke accumulation and provides smoke dispersion forecasts and air quality monitoring support for burners in the Airshed Group. Between January 2nd and February 27th of each year, members submit to the Monitoring Unit a list of all prescribed burns planned for the current calendar year through an Internet-based reporting system for tracking and reporting prescribed fires. This burn reporting system allows members to build preseason burn lists directly into the program's master database, propose burns on a daily basis, and report accomplished burns. Daily during the burning season, burners post proposed burns before 11:00 am; the monitoring unit considers proposed burns together with expected ventilation or smoke dispersion conditions and existing air quality to determine burn recommendations for the following day (with concurrence from the Idaho Department of Environmental Quality). These procedures limit smoke accumulations to legal, acceptable limits. The District strictly complies with these procedures, and has had no air quality violations.

Historically, prescribed burning on the Coeur d'Alene River Ranger District occurs in the spring and fall seasons over a total time span of 45 to 60 days during each season. All burning complies with federal, state and local regulations. Prescribed burning during spring or fall would generate less smoke than a much hotter stand replacing summertime wildfire (PF Doc. FF-42).

> **Fire Behavior Indicators:**
> - ✓ Flame Length
> - ✓ Probability of Torching
> - ✓ Crowning Index

3. Existing Conditions

A. Fire Regime Condition Class

The FRCC analysis is completed at three scales:

- ✓ **Landscape**
- ✓ **Strata**
- ✓ **Stand**

The results of the analysis can only be applied at the appropriate scale!

An analysis of Fire Regime Condition Class (FRCC) was completed for the Prichard-Murray Resource Area (PF Doc. FF-50 and FF-51). The analysis was completed for Forest Service ownership only, because adequate data such as habitat type, species composition and size class did not exist at the time of analysis for other ownerships. An assessment of fire hazard for all ownerships was completed with the Shoshone County Fire Mitigation Plan (CR-020). The FRCC analysis is not necessarily an analysis of fire hazard, but a classification of the amount of departure from the natural regime (Hann and Bunnell 2001, PF Doc. FF-53). FRCC includes three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g. insect and disease mortality, grazing and drought). The three classes are based on low (FRCC 1), moderate (FRCC 2), and high (FRCC 3) departure from the central tendency of the natural (historical) regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside of the natural range of variability. See table FF-1 for a full description.

Characteristic vegetation and fuel conditions are considered to be those that occurred within the natural (historical) fire regime. Uncharacteristic conditions are considered to be those that did not occur within the natural (historical) fire regime, such as invasive species (e.g. weeds, insects, and diseases), "high-graded" forest composition and structure (e.g. large trees removed when they would have lived in a frequent surface fire regime).

Table FF-1. Description and Potential Risks of Each Fire Regime Condition Class.

Fire Regime Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime. Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) is low.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate.. Risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances.	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components is high.

Fire regimes in the Prichard-Murray Resource Area were determined using habitat types from field stand examinations. The habitat types were grouped into four broad habitat type groups or **strata**: dry, moderately moist, moist, and subalpine. Dry habitats are primarily south aspects where ponderosa pine or Douglas-fir is the climax species. Dry habitats fall into Fire Regime I. Moderately Moist habitats are generally dominated by grand fir, especially in the mid- to late- successional stages, in the absence of fire, and in response to pathogens that affect other species, like bark beetles and white pine blister rust. Moderately moist habitat types fall into Fire Regime III. Moist habitats are generally more northerly aspects or draws, and host a variety of species such as western larch, white pine, grand fir, Douglas-fir, and western red cedar. The most dominant climax species on moist sites in the Prichard-Murray Resource Area is western hemlock. Subalpine habitats generally occur above an elevation of 4,000 feet in the Prichard-Murray Resource Area, and have species such as subalpine fir and mountain hemlock. The moist and subalpine habitats fall into Fire Regime III.

Fire Regime Definitions:

- **I** 0-35 year frequency and low (surface) fire most common to mixed severity (less than 75% of the dominant overstory vegetation replaced.
- **II** 0-35 year frequency and high (stand replacement) severity (greater that 75% of the dominant overstory vegetation replaced.
- **III** 35-100+ year frequency and mixed severity (less than 75% of the dominant overstory vegetation replaced)
- **IV** 35-100+ year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced)
- **V** 200+ year frequency and high (stand replacement) severity

The **Fire Regime Condition Class** Analysis is completed at different scales: stand, strata and landscape. The landscape scale is relevant to the entire resource area as a whole, the strata scale reflects the FRCC of groups of similar habitat types, and the stand scale reflects the FRCC of an individual forest stand. The stand level Condition Class results are dependent upon the results at the strata and landscape levels, and each scale is only relevant in the context of the others.

The **Fire Regime Condition Class** Analysis for the Prichard-Murray Resource Area showed that the landscape as a whole is in Condition Class 2, and is in need of restoration of fire effects, vegetation composition/structure and fuel characteristics. The dry, moderately moist and subalpine strata are most altered, and fall into Condition Class 3. The moist strata is in Condition Class 2. The dry strata was most influenced by a departure of fire frequency and severity, and is in need of restoration of fire effects. The departure from natural fire frequency/severity, the departure from natural vegetation composition/structure, and the departure in fuel characteristics all influenced the moist, moderately moist, and subalpine strata. The presence of white pine blister rust caused a portion of the moist and moderately moist strata to be uncharacteristic due to the absence of white pine. Uncharacteristic stands are automatically rated as Condition Class 3. Another theme in this Condition Class analysis is the abundance of late-seral, closed canopy conditions. In the dry, moderately moist and subalpine strata, late-seral, closed canopy conditions are far more common than they were historically, and are so abundant that they are outside the historic (natural) range of variability in those strata. The following graph shows the result of the analysis. Maps of Fire Regimes and Condition Classes are in the project file (PF Doc. FF-35, FF-48 and FF-49).

Figure FF-3. STAND SCALE Fire Regime Condition Class. *Distribution of the stand-level Condition Classes in the Resource Area. A majority of the stands are in Condition Class 3, with the remainder in Condition Class 1.*

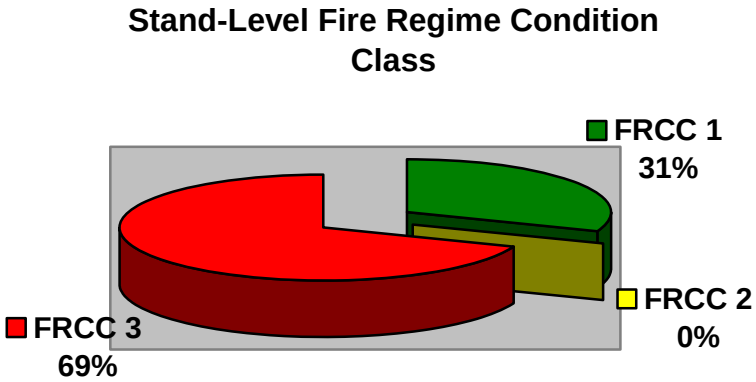
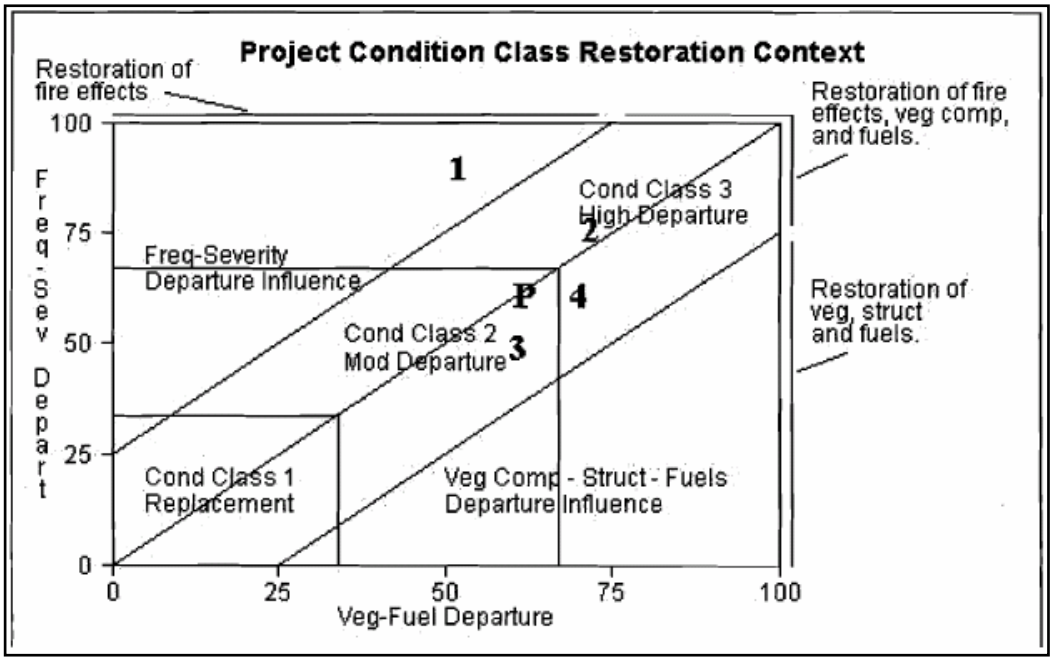


Figure FF-4. Fire Regime Condition Class Analysis Summary at the LANDSCAPE SCALE for the Prichard-Murray Resource Area. *Dry habitats are represented by the number 1, moderately moist by the number 2, moist by the number 3, and subalpine by the number 4. The resource area is represented with a 'P'. The graph shows dry, moderately moist and subalpine habitats in Condition Class 3, and moist in Condition Class 2. The resource area as a landscape is in Condition Class 2.*



B. Broad Scale Fire History

Fire is the major disturbance factor that produces vegetation changes in our ecosystems. Changing or removing the role of fire results in substantial changes in the ecosystem. Fire has burned in nearly every ecosystem and nearly every square meter of the coniferous forests and summer-dry mountainous forests of northern Idaho, western Montana, eastern Washington and adjacent portions of Canada. Fire was responsible for the widespread occurrence and even the existence of western larch, lodgepole pine, and western white pine. Fire maintained ponderosa pine on sites throughout its range at the lower elevations and killed ever-invading Douglas-fir and grand fir (Spurr and Barnes 1980, PF Doc. FF-19). Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire. According to Zack and Morgan (1994; pages 19-22; PF Doc. FF-23) there are generally three types of fires that occur in forested ecosystems:

- ***Nonlethal fires*** *- fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low severity surface and understory fires, often with short return intervals (a few decades).*
- ***Mixed severity fires*** *- fires that kill more than 10%, but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable.*
- ***Lethal fires*** *- fires that kill 90% or more of the dominant tree canopy. These are often called "stand-replacing" fires and they often burn with high severity. They are commonly crown fires. In general lethal fires have long return intervals (140-250+ years apart), but affect large areas when they do occur. Local examples of these types of fires would be the Sundance and Trapper Peak fires of 1967 that burned over 80,000 acres in a relatively short time period during late summer drought conditions.*

The Coeur d'Alene River drainage historically had a variable fire regime of long interval, large, lethal fires mixed with shorter return interval non-lethal and mixed severity fires. Fires were more frequent in watersheds on the periphery of the Coeur d'Alene Basin, adjacent to and downwind from the drier, pine dominated Rathdrum Prairie (FF-23, Zack and Morgan 1994, page 34). Prior to Euro-American settlement (1880), the mean fire return interval within the Interior North Fork of the Coeur d'Alene River was 65 years. The mean fire return interval on the Rathdrum Prairie face and the Hayden Lake watershed was 55 years (Zack and Morgan 1994, page 27; PF Doc. FF-23).

"Severity" refers to the degree to which a site may be altered or disrupted by a fire which is often determined by the degree of soil heating.

"Return interval" refers to how often a particular type of fire occurs.

"Fireline intensity" is the energy release rate per unit length of fire line and is a physical parameter that can be related to flame length.

The fire history analysis of the Coeur d'Alene Basin conducted by Zack and Morgan in 1994 (PF Doc. FF-23) drew the following conclusions:

- *In addition to cycling carbon and nutrients, the infrequent large lethal fires played a dominant role in resetting the successional sequence and structuring the vegetation matrix across the landscape. However, the nonlethal and mixed severity fires were also important. Most stands (within the Coeur d'Alene Basin) apparently experienced an average of one to three of these low severity burns between lethal fires. These lower severity fires would reduce ground fuels, reduce ladder fuels, thin stands, and favor larger individuals of fire resistant species (larch, Douglas-fir, and ponderosa pine), than if these mixed severity and nonlethal fires had not occurred.*

- *Lower severity fires structured how the landscape responded when a lethal severity fire did occur. The lower severity fires increased the proportion of the landscape with big trees and open canopies that would not sustain a crown fire. Reduction of ladder fuels would mean that even high intensity fire might not reach tree canopies in some cases. The larger trees that grew as a result of this thinning would be more likely to survive even intense fires. The net result would be that even lethal severity fires would be likely to leave more individual residual trees and patches of residual trees than if the lower severity fires had not occurred. The effects of lethal fire events would be less uniform as a result of the lower severity fires*

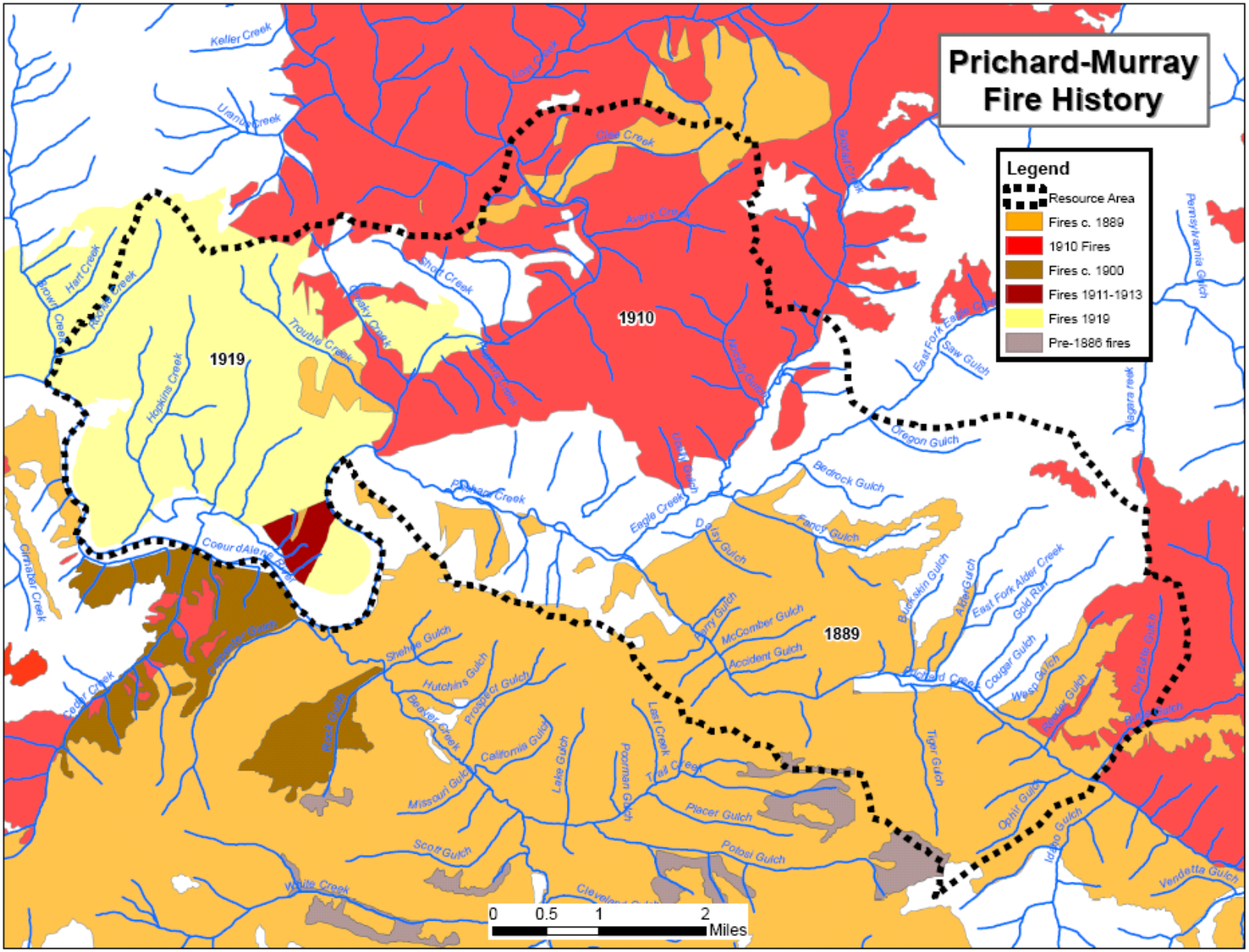
Zack and Morgan (1994, page 1; PF Doc. FF-23) found that since 1540 there was one major fire every 19 years, somewhere in the Coeur d'Alene River Basin. However, since the mid 1930's, fire control efforts have become effective, and the last major stand-replacing fire in the Coeur d'Alene River Basin occurred in 1931. The primary impact of fire control has been to eliminate underburns and mixed severity fires which served as the thinning agents that favored larch and ponderosa pine.

C. Prichard-Murray Resource Area Fire History

The Prichard-Murray Resource Area has been affected by several large fire events in recent history. Most recently, much of the western side of the Resource Area burned in 1919. The lack of timber in this general area due to fires is most likely why roads were not built and the area today is a designated roadless area. The fires of 1910 also made their mark on the area – two of the large 1910 fires seem to have started near Prichard and Murray and then were spread by strong frontal winds for many miles. The 1889 fire burned in the south and eastern portion of the Resource Area. These large fires burned a large portion of the Resource area over a period of only 30 years. Since then, however, fire suppression has been very effective.

Forest Service and Idaho Department of Lands records show that 64 fires have been detected and suppressed in the Prichard-Murray Resource Area. The majority of these fires were kept very small, accounting for a total of just 111 acres burned. The lone exception is the Gold Chest Fire of 2003, which was 82 acres. Approximately 60% of the reported fires were caused by lightning and the remaining 40% were human-caused (PF Doc. FF-36). The proximity of the Resource Area to communities results in a higher incidence of human-caused fires than in remote areas.

Figure FF-5. Fire History for the Prichard-Murray Resource Area. *Much of the Resource Area has been affected by fire events in recent history. Major fire events in the Resource Area include 1889, 1910, and 1919.*



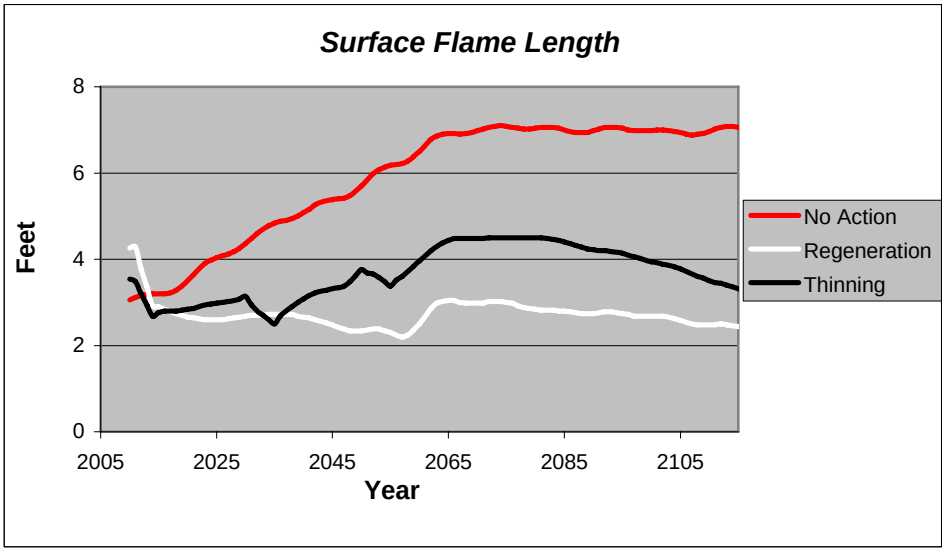
4. Environmental Consequences

The following graphs briefly compare the No-Action and Action Alternatives in terms of the three fire behavior indicators (flame length, probability of torching, crowning index). These figures describe one representative stand, and effects vary somewhat between stands depending on site conditions and other factors (refer to PF Doc. FF-44 for all modeling results).A more detailed discussion of the effects of each alternative follows the comparison.

A. Flame Lengths

Only flame lengths of 4 feet or less can be safely attacked directly using hand crews. Once flame lengths surpass this mark, other suppression tactics must be employed. These could include using dozers and air tankers, as well as indirect attack. Indirect attack means that suppression forces would retreat to a safe and defensible place where they believe the fire can be stopped, and attempt to hold the fire at that location. Use of this tactic often results in more acreage burned (NWCG 1993, page B-59; PF Doc. FF-11). In addition, as surface fuels and flame lengths increase across the landscape, the likelihood is greater that the fire will climb into the canopy and become a crown fire. Crown fires have the largest immediate and long-term ecological effects and the greatest potential to threaten human settlements near wildland areas (Graham et al. 2004, page 20; PF Doc. FF-6).

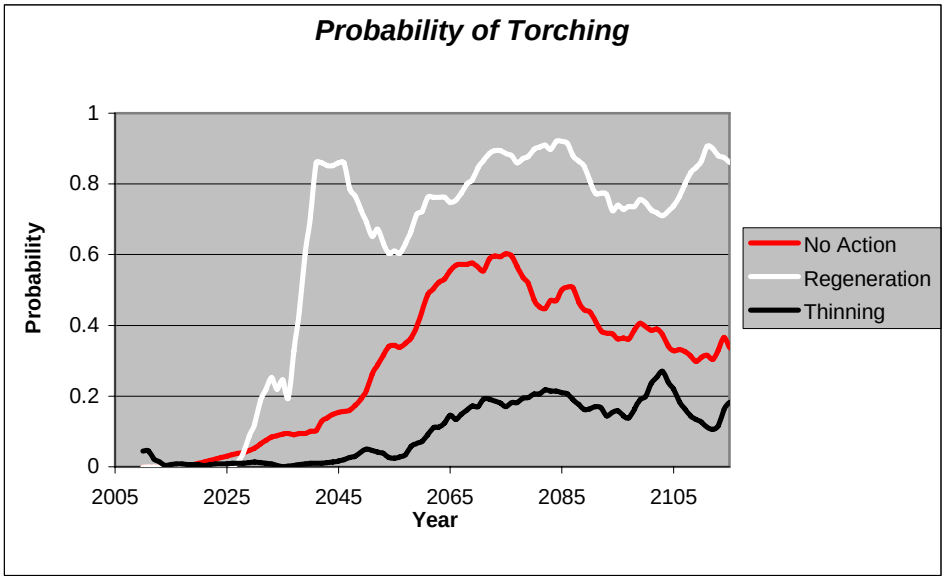
Figure FF-6. Flame length over time. *Under the No-Action Alternative, flame lengths in this stand would surpass the four-foot mark in the near future, while with either regeneration or thinning treatments, surface flame lengths remain below 4 feet for much of the modeling period. With thinning or regeneration treatments, flame lengths would increase as slash is created from harvest operations, then subside after slash is treated. Activities under the action alternatives would reduce surface fuels and the associated flame lengths. With either of the proposed harvest activities, surface flame lengths are reduced for over 100 years. Although flame lengths vary widely among the stands in the resource area, without management action, they all exhibit the same trend shown in this graph - increasing flame lengths over time as surface fuels build.*



B. Probability of Torching and Crowning Index

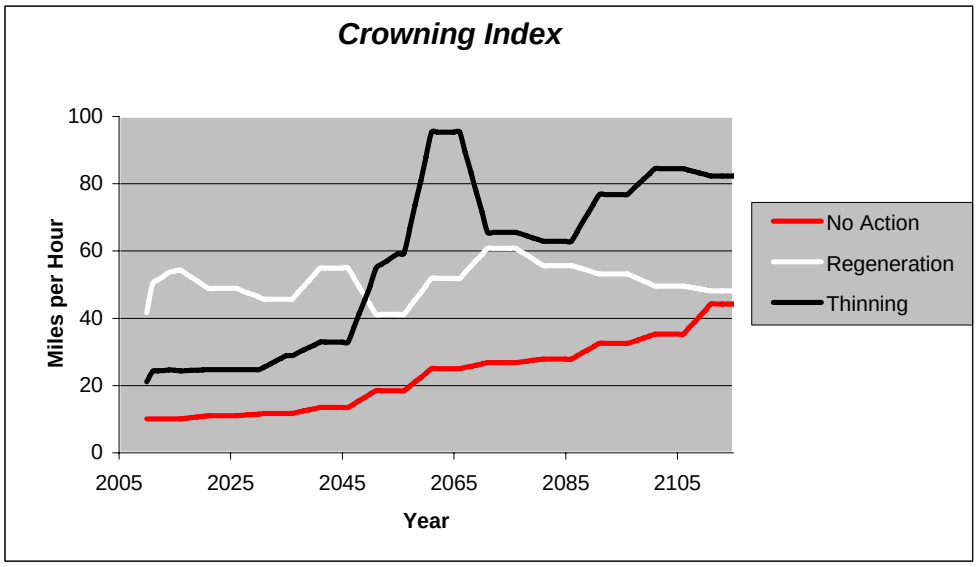
Effects of thinning and regeneration treatments on crown fire behavior under specific weather conditions are shown in the following figures. These figures describe one representative stand, and effects vary somewhat between stands depending on site conditions and other factors (refer to PF Doc. FF-44 for all modeling results). The probability of torching is the proportion of small places where trees are present and torching is possible. The higher the probability of torching, the more ladder fuels and the higher the likelihood that the fire will climb into the tree crowns.

Figure FF-7. Probability of torching. *With no action, the probability of torching will generally increase in this stand over time. Thinning and burning reduces the probability of torching because it reduces ladder fuels. Regeneration treatments typically increase the probability of torching because of the abundance of small trees with branches close to the ground. This increased torching hazard in a regeneration treatment is offset by the sparse crown fuels and low crown fire hazard after a regeneration harvest.*



The crowning index reflects the density of the tree canopy, and its ability to sustain an active crown fire. **When the crowning index increases, it means that it takes a stronger wind to keep the fire in the crowns of the trees – a higher crowning index means a lower crown fire hazard.** The effects of thinning and regeneration treatments on the crowning index are shown in Figure FF-7. The thinning treatment increases the crowning index compared to no action, i.e. crown fire hazard decreases because canopy fuels and the overall density of the canopy have decreased. The regeneration harvest increases the crowning index even more – there is very little crown fire hazard when crown fuels are sparse, such as after a regeneration harvest. Both the thinning treatment and regeneration treatments provide improvements in crown fire hazard over no action. This is a long-term effect, and although every stand modeled does not show such a significant improvement, the stands do show the same trend of an immediate decrease in canopy fuels that lasts for many years, in most cases.

Figure FF-8. Crowning Index. *Under the No-Action Alternative, this stand would sustain an active crown fire with less than 10 mph windspeeds. Thinning would substantially reduce crown fuels, increasing the crowning index and reducing the crown fire potential of the stand. Regeneration harvest reduces the crown fire hazard even more. With no action, the crowning index would remain significantly lower throughout the modeling period, which means that it would take less wind to sustain an active crown fire.*



C. Effects Under the No-Action Alternative

Direct and Indirect Effects of the No-Action Alternative

Direct effects (those which are caused by the action and occur at the same time and place) to fire and fuel conditions would be minimal if not absent under the No-Action Alternative, because no activities are proposed under the No-Action Alternative.

The primary effects of the No-Action Alternative would be indirect and cumulative as a result of the ongoing and reasonably foreseeable activities (EA, Appendix B). Although it is possible that wildland fire use will be employed in the future in parts of the Resource Area, it is not a reasonably foreseeable activity, therefore this analysis was completed assuming that the current full fire suppression policy would continue; no natural ignitions would be allowed to burn as wildland fire use fires. Surface fuels would continue to accumulate. The successional changes in stand structure that affect fire behavior would also continue on their current trend. Figure FF-5 displays the effects of the process of surface fuel accumulation over time, if no action is taken. Flame lengths would increase over time as the fuel load builds. Flame lengths would surpass four feet within 20 years under the No-Action Alternative.

Cumulative Effects of the No-Action Alternative

As discussed earlier, fire suppression is the primary factor in determining cumulative effect of this project. The No-Action Alternative represents the continuation of current management, which means the effects of over 85 years of fire suppression would continue on their current trend. The No-Action Alternative would allow the continuation of surface fuel accumulation, as well as the changes in fire behavior associated with a change in forest structure and species. Successful fire suppression without prescribed fire causes an increase in amount and continuity of the living and the dead material that fuels fires (Saveland 1998, page 4; PF Doc. FF-3). The continued loss of fire-resistant species would continue to lead to forests that are less resilient to fire, meaning that they could experience more pronounced fire effects and an increased amount of mortality associated with a wildfire.

Under the No-Action Alternative, fire behavior would maintain its trend away from historic conditions, creating an increasing challenge to fire suppression forces. Fires would continue to be more intense, and therefore more dangerous to firefighters. Forests where insect and disease problems are increasing would also contain more snags, which are particularly dangerous for firefighters. Larger, more intense fires that threaten nearby homes and communities could have various unwanted effects (evacuations, threatened and burned structures, adverse health effects from smoke, negative economic impacts).

Fire exclusion has many effects that are documented in the publication *Cascading Effects of Fire Exclusion in Rocky Mountain Forests*" (PF Doc. FF-32). Those effects are summarized here. Fire exclusion causes forest composition to change from early seral, shade-intolerant tree species to late seral, shade-tolerant species, while stand structure changes from single-layer canopies to multiple-layer canopies. An important stand characteristic that changes with advancing succession in the absence of fire is the increase in the amount of dead and live biomass or fuels. Fuels loadings generally increase in the absence of fire because of a myriad of ecological factors. First, long fire return intervals mean live fuels have longer times to grow and dead fuels have longer periods to accumulate on the ground. Next, crown fuels increase because late seral, shade-tolerant species tend to have more biomass in the forest canopy due to their high leaf areas, and biomass tends to be well distributed over the height of the trees. Stand leaf area generally increases over successional time because shade-tolerant species generally have longer needle retention times, higher leaf area/sapwood ratios, and more leaf mass in the crown. Higher leaf area usually requires additional conducting tissue for support, which means the tree may need to produce more branch and twig wood along greater portions of its stem. Because late seral species are shade tolerant, there are many smaller seedlings and saplings present in the understory to take advantage of any gaps in the canopy. So, the greater crown biomass distributed along greater parts of the stem, coupled with high seedling and sapling densities, can create the ladder fuels that allow flames from surface fires to climb into the forest canopy and result in crown fires.

Surface fuel loadings increase as fire is eliminated because the greater crown biomass ultimately results in increased leaf and woody material accumulating on the forest floor because the recycling process of fire is absent. Dense crowns also reduce solar radiation attenuated to the forest floor, which may lower soil temperatures resulting in decreased decomposition rates and still higher branch and litter accumulations. Duff and litter depths generally increase proportionate to the crown closure and leaf area because of the additional needle fall and reduced decomposition.

Soil properties change as fires are reduced and succession advances in an ecosystem. Organic matter generally increases with decreased fire frequency, and this improves pore space, water-holding capacity, and aggregation. However, when soils with thick organic horizons are burned, some of the volatilized organic matter moves downward and condenses to form a water repellent layer that impedes infiltration and can cause massive erosion.

Landscapes tend to become more homogeneous as fire is removed because succession eventually advances all stands to similar communities dominated by shade-tolerant species. Even though late seral species may differ across a landscape depending on site, the multi-layer structures of these late seral stands are nearly identical across most biophysical settings. Landscape structure (spatial distribution of patches) also changes with fire exclusion as landscapes generally become less fragmented, have lower patch density, and evolve decreased patch diversity, which often results in more contagion, corridors, and large patches. Larger patches and high homogeneity tend to foster more continuous crown and surface fuels, which can then burn in large fires that create still larger patches and so on in this downward "fire-exclusion" spiral.

Fire exclusion combined with a lack of fuel-reduction activities as in Alternative 1 would heighten fire hazards to forest homes as people continue to develop and settle lands along the urban-wildland interface. The loss of homes and human life can escalate as the surrounding forest advances in succession because of the buildup of canopy and surface fuels. Moreover, multi-layered canopies and dense crowns will increase the chance of crown fires that are difficult to control. This could increase the harm to people who own the property and the firefighters who try to protect it. Brackebusch states that during any period of fire exclusion, the hazard usually continues to build and the probability of a disastrous fire increases correspondingly (PF

Doc. FF-8).

Under the No-Action Alternative, Fire Regime Condition Class would not be improved at the stand, strata, or landscape scales, and lack of activities would trend the landscape towards Condition Class 3. This approach would not re-introduce the effects of fire; restore vegetation composition/structure; or trend fuels to resemble the landscape's natural (historical) range.

The No-Action Alternative would not reduce fuels in key locations in the wildland-urban interface of the Prichard-Murray Resource Area. No actions would be taken to protect the Avista powerline, to reduce fuels along main roads, to interrupt fuel concentrations near communities, to create defensible space near homes, or to reduce the likelihood of large fire spread. The No-Action Alternative does not address or respond to the purpose and need to reduce dense fuels in any way.

D. Effects Under the Action Alternatives

Under the Action Alternatives, all harvest treatments would be followed by fuel reduction treatments. Underburning would be the primary treatment, although other mechanical methods (such as grapple piling, hand piling and chunking) are also proposed. Activities that reduce surface fuels (low vegetation, woody fuel, shrub layer) decrease the chances that a surface fire would be able to ignite ladder fuels and canopy fuels (Graham et al. 2004, page 23; PF Doc. FF-6).

Both action alternatives propose harvest treatments adjacent to the Avista powerline on the west side of the resource area near Rookie Creek. The powerline is identified in the Shoshone County WUI Mitigation Plan as a resource that should be protected from the effects of an uncontrolled fire. The proposed treatments would reduce fuels and modify fire behavior such that an intense crown fire approaching the powerline would be forced to drop to the ground as a surface fire due to the lack of surface, ladder and crown fuels. The treatments are also designed to improve forest health and reduce tree mortality near the powerline, which would reduce the number of snags that may fall onto the powerline and start a fire. If a fire were to start near the powerline once treatments are completed, the fuel reduction should result in a slow spreading fire that is easily controlled.

Treatment units range in size, which is an important aspect of landscape and fuel variability. Discontinuities in surface, ladder and crown fuels interrupt fire spread, but relatively small patches may not have a substantial effect on relatively large fires. Treatments of individual stands under a given prescription would probably be irrelevant to fire behavior and effects at the landscape scale, because wildfires are often larger than individual treatment units (Finney and Cohen 2003, page 356; PF Doc. FF-31). Many of the treatments proposed in Alternatives 2 and 3 span several stands and therefore may be large enough to affect a large fire. Treatments under the Action Alternatives would be consistent with and would further the goals of the 10-Year Comprehensive Strategy Implementation Plan (www.fireplan.gov) to reduce hazardous fuels and restore fire-adapted ecosystems.

Alternatives 2 and 3 proposed treatments that are described as 50% regeneration and 50% thinning. These treatments will result in spatial variability within stands, with more residual overstory with the thinning portion of the unit relative to the regeneration portion. Post-harvest fuel treatments will result in a consistent reduction in surface and ladder fuels across both treatments. The effects of regeneration and thinning treatments are discussed separately in the following effects analysis; it must be understood that the treatments may be spatially intermixed and thus the effects may also be somewhat blended.

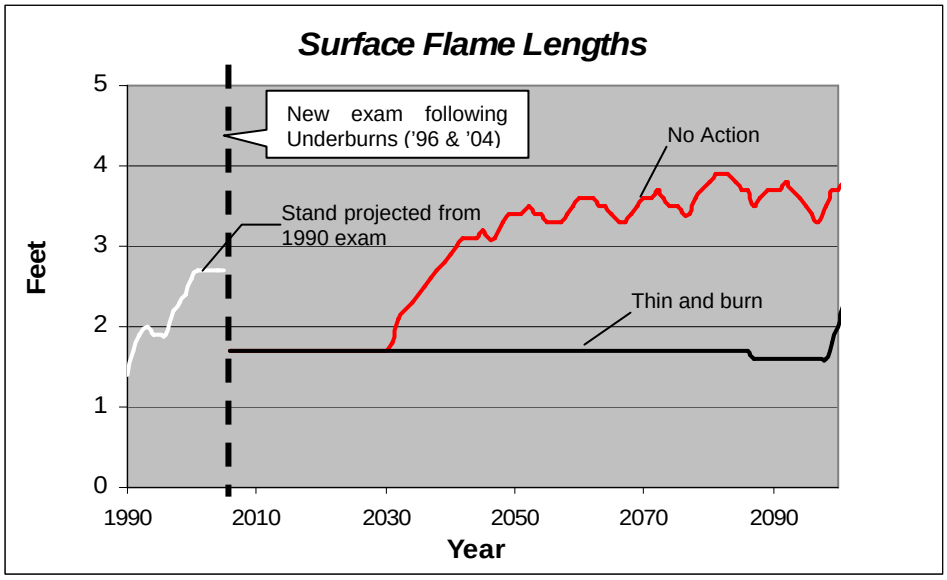
Direct and Indirect Effects of Prescribed Burning Under the Action Alternatives

Prescribed burning is an important aspect of the Action Alternatives, and can have a range of effects depending on the fuel and weather conditions at the time of the fire. Prescribed fire can effectively alter potential fire behavior by influencing multiple fuel bed characteristics (Graham et al. 2004, page 24; PF Doc. FF-6), including:

- *Reducing the loading of fine fuels, duff, large woody fuels, rotten material, shrubs and other live surface fuels, which together with compactness and continuity change the fuel energy stored on the site and potential spread rate and intensity.*
- *Reducing horizontal fuel continuity (shrub, low vegetation, woody fuel strata), which disrupts growth of surface fires, limits buildup of intensity, and reduces spot fire ignition probability.*
- *Increasing compactness of surface fuel components, which retards combustion rates.*

The effect of past prescribed burning on a stand within the project area is displayed in Figure FF-8. Stand exams before and after prescribed burning substantiate the positive effect the prescribed burning had on fire behavior.

Figure FF-9. Surface flame lengths following prescribed burning. *In 1990, an examination was completed of this 85 acre forest stand. Subsequently, underburns were completed in 1996 and 2004 (45 and 85 acres, respectively). Another stand exam was then completed and shows the reduction in fuels that was a result of the prescribed burning. The white line represents the flame lengths that were projected from the 1990 exam. The 2004 exam shows reduced flame lengths from those projected by the model(See PF Doc. FF-44 for detailed results from each exam). With the Action Alternatives, flame lengths remain low. With no action, flame lengths will rise again in the future. Five acres of this stand were harvested in 2002, but due to the limited extent of that activity, fuel reductions are attributed to the prescribed burning.*



Prescribed burning is completed using a prescription and burn plan in order to control and predict the effects of the fire. Common effects of prescribed burning include surface fuel reduction, understory and overstory mortality, duff consumption, soil heating, and mineral soil exposure. Although prescribed burning creates smoke that contains particulate matter, the proposed activities would substantially reduce the PM2.5 (particulate matter less than 2.5 microns in size) emissions of potential wildfires (PF Doc. FF-42).

The degree of each effect of a prescribed fire can be controlled by careful ignition in the appropriate weather conditions. Weather conditions, however, cannot be predicted completely accurately, so there is some risk of

escape with every prescribed fire that is ignited. The proximity of the Prichard-Murray Resource Area to private land and communities increases the values-at-risk, and dictates very careful implementation of any prescribed burning. Prescribed burning has been carried out in the Prichard-Murray Resource Area and in the Coeur d'Alene River Ranger District in the past, and, based on that history, it is reasonable to expect that prescribed burning under the Action Alternatives would be implemented safely and effectively, with little effect to private property. The boundaries of the proposed treatment areas were established with consideration of the prescribed burning to occur after the harvest, and will likely allow efficient ignition and suppression of prescribed fires. Whenever possible, changes in aspect and shaded draws would be used as boundaries; these areas often have higher fuel moistures (especially in the spring), and in many cases burn with very little intensity, if at all. Fireline would be used to contain prescribed burns when necessary (this determination would be based on site-specific characteristics and weather conditions at the time of the burn). Even with careful forethought and planning, prescribed burning can be uncertain, and small burned areas outside of the designated treatment areas should be expected. These "slop-overs" are commonly relatively small and quickly contained, and cause insignificant effects.

Burning treatments are proposed in both Fire Regime Condition Class 1 and 3 stands. For those stands that are already in Condition Class 1, burning will be a maintenance treatment. Prescribed burning in Condition Class 3 stands will likely improve some of those stands to Condition Class 1, depending on the amount of canopy opening created in each stand relative to the pre-burn level. A few stands, however, will remain in Condition Class 3 because the burning treatment will not result in enough change to the stand structure and composition to meet the threshold of a change in Condition Class.

Direct and Indirect Effects of Commercial Thinning Under the Action Alternatives

Surface winds are those beneath the canopy that affect surface fuels.

The Action Alternatives would include commercial thinning. Thinning and harvesting can reduce vertical and horizontal continuity of the tree canopy and limit initiation and spread of crown fires, especially when done in conjunction with prescribed burning (Finney 2005, page 1720, PF Doc. FF-40). Any removal of canopy would reduce the moderating effect of canopy on wind speed, so surface winds would increase. Scott and Reinhardt (2001, pages 31-32; PF Doc. FF-10) have addressed this subject. They state,

> *"The increased fuel-level wind speed coupled with increased insolation also leads to lower dead fuel moisture in treated stands during summer. These two factors tend to exacerbate surface fire behavior. However, properly executed treatments also tend to reduce the crown fire potential. Crown fire mitigation treatments often represent a tradeoff – the decrease in crown fire potential comes at the expense of increased surface fire spread rate and intensity. The greatly increased spread rate and intensity of crown fires makes this tradeoff reasonable."*

The relationship between the forest canopy, surface fuel moisture, soil moisture and fire behavior and effects is complex and has many aspects which must be considered when determining effects. In addition to those site factors that remain constant, current weather, season of the year, presence of drought and the characteristics of the fire in question are all very important but highly variable factors that influence fire behavior and effects.

Under the Action Alternatives, commercial thinning treatments and associated prescribed burning (or other surface fuel treatments) would result in a reduction of surface fuels (Figure FF-5, FF-8). Harvest units would result in a short-term increase in surface fuels until the slash is treated. Thinning treatments under the Action Alternatives would tend to decrease the probability of torching, meaning they would reduce ladder fuels. Some increases are short-term in nature, but others, as shown in Figure FF-6, would substantially decrease the probability of torching for a long period of time.

The timber harvesting included under the Action Alternatives would immediately cause an increase in surface fuel loading, as well as an immediate decrease in ladder and crown fuels (see Figures FF-5 through FF-8).

The unmerchantable branches and other fuels that are left after harvest can substantially increase the fuel load, and consequently the potential flame lengths on any given site. This fuel load would then pose a slash fire hazard for a short period of time (one to three years), until the fuel on the site was treated with an underburn or other slash treatment method such as grapple piling or chunking. These slash treatment methods either reduce the amount of surface fuels on site by burning, or they modify the fuel bed so that potential fire behavior is reduced.

Depending on the amount of fuel on the site and the potential effects of a prescribed burn to the remaining overstory, several methods may be used to control the effects of a prescribed burn. Slashing of the understory, protection of leave trees by pulling slash away from their boles, and piling and burning of slash are possible methods that could be used to decrease the slash load on a site and prepare the site for safe and efficient underburning.

Any type of human activity increases the possibility of ignition and wildfire. Common ignition sources include equipment and vehicle operation, smoking, and arson. A timber purchaser would be required to have fire suppression equipment on site and to take necessary fire precautions to prevent a wildfire from occurring. In the event of extreme fire conditions, harvest activities would be regulated or suspended until conditions improved. A timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations.

Commercial thinning under the action alternatives may result in an improvement in Fire Regime Condition Class, especially on the drier sites near Prichard Peak where the thinning may result in relatively open, late-seral stands. Thinning on the more moist sites would reduce fuels and improve potential fire behavior drastically in many cases, but would probably not change the Condition Class. It is important to remember that Condition Class is not a measure of fuel loading, but of ecological variance from reference conditions. Factors that influence the Condition Class rating such as changing structural stage, establishment of white pine, and change to less than 40% canopy cover do not apply to thinning treatments.. Thinning in those stands that are already in Condition Class 1 would be an effective maintenance treatment so that Condition Class is maintained.

Direct and Indirect Effects of Regeneration Harvests Under the Action Alternatives

The Action Alternatives include regeneration harvesting. Both thinning and regeneration harvests are followed by surface fuel reduction activities such as underburning or grapple piling, so they both result in a reduction in surface fuels once activities are completed. Another similarity between thinning and regeneration harvests is the reduction in crown fuels. The reduction in the density of crown fuels caused by a regeneration harvest is reflected in Figure FF-7. With the regeneration treatments in the Action Alternatives, the crowning index would increase substantially over what would occur under the No-Action Alternative. According to the model, this effect would last over 100 years.

A major direct effect of regeneration harvest is the almost complete reduction in crown fuels in the treated stands. This reduction results in a disruption in the continuity of crown fuels. Because regeneration harvests remove almost all crown fuels, they act as a barrier to crown fire spread. Any crown fire that encounters a regeneration harvest will be forced to the ground because of the lack of crown fuels. This effect is not permanent, however; as the regenerated stand grows, it once again builds crown fuels.

Although regeneration harvests and the accompanying fuel treatments have the similar effects as thinning treatments on surface and crown fuels, their effect on ladder fuels is different. Regeneration harvests remove most of the canopy and initiate the establishment and growth of small trees, which generally have their branches lower to the ground than larger trees. This growth causes an increase in ladder fuels, and thus an increase in the probability of torching. This increase in ladder fuels is not a concern, especially in the short-term, primarily because the canopy has been removed and there is nowhere for the fire to climb. As shown in Figure FF-7, ladder fuels remain relatively low for approximately 30 years post-treatment, then increase. This increase in ladder fuels is offset by the lower crown fire hazard in the regenerated stand.

Projections of stand growth and associated fire behavior show that the crown fire hazard in regenerated stands will not be as high as would be with no action, even in 100 years. This is most likely because of the regenerated stands will have a higher proportion of western larch, which has a sparse crown habit in comparison to other trees such as grand fir. Still, regeneration harvests may need treatments in approximately 30 years, such as pre-commercial thinning and piling of slash to mitigate the potential future fire hazard associated with increased ladder fuels. Overall, the benefits of regeneration harvests far outweigh the risks relative to potential fire behavior.

Regeneration harvesting will result in a change from Fire Regime Condition Class 3 to Condition Class 1 because the stands will change from a late-seral to an early-seral structural stage and native species (white pine) will be re-established.

Direct and Indirect Effects of Fuel Breaks Under the Action Alternatives

Research indicates that the potential for home ignitions during wildfires including those of high intensity principally depends on a home's fuel characteristics and the heat sources within 100-200 feet adjacent to a home (Cohen 1995; Cohen 2000; Cohen and Butler 1998 in Cohen, PF Doc FF-16). This relatively limited area that determines home ignition potential can be called the **home ignition zone**. The 'fuelbreak' treatments in the Action Alternatives are generally within the home ignition zone, and are designed to reduce the risk of home ignition in the case of an uncontrolled wildfire. These treatments include non-commercial thinning, pruning, and piling or chipping of residual slash. Fuel breaks will reduce surface and ladder fuels, which will in turn modify potential fire behavior so that the fire can be easily suppressed or the homes can be easily defended in case of an uncontrolled wildfire. The fuel breaks proposed with this project would occur where homes are in near proximity to Forest Service land. The Shoshone County Fire Mitigation Program has already completed a substantial amount of fuel reduction around homes on private land within the Resource Area (see Cumulative Effects discussion), and the fuel break activities proposed with this project will help further protect homes and structures in the community.

Figure FF-10. Heavy fuels on National Forest System lands directly adjacent to a home.. *A fuelbreak treatment is proposed to reduce fuels and create defensible space near this home.*

Fuel breaks will not result in a change in Fire Regime Condition Class because they will not change the structural stage, overstory canopy cover, or species composition of the stands. They are also very limited in extent and will only affect a portion of the stand.

E. Cumulative Effects common under the Action Alternatives

Cumulative effects are those that would result from the Action Alternatives in addition to the incremental impacts of past, ongoing and reasonable foreseeable actions (described in the EA, Appendix B). Fire suppression is the primary action to be considered when evaluating cumulative impacts in the fire/fuels analysis. The Action Alternatives would take steps to counteract the effects of fire exclusion as summarized previously in this section. The trend of fire behavior away from historical conditions would be interrupted, since early seral, less dense, single layer canopies would be promoted. Dead and live biomass (fuels) would be reduced in the form of surface and crown fuels, and, in many cases, ladder fuels would also be reduced for a period of time. Increasing the proportion of fire-resistant tree species such as western larch will increase the survivability of trees because they have thicker bark, taller crowns, and a higher canopy base height (Graham et al. 2004, page 36; PF Doc. FF-6). Research suggests that fire growth and severity of a large wildfire under extreme weather conditions were mitigated by fuel treatments that included prescribed burning. Longevity of treatment benefits was suggested to improve with unit size. Observations of fire movement near fuel treatments indicate that overall fire growth and large fire sizes can be reduced (Finney 2005, page 1721, PF Doc FF-40). The action alternatives contain several large units designed to take advantage of the improvements in fire behavior associated with increasing unit size.

It is almost impossible to separate indirect effects from cumulative effects when fire suppression is considered. Fire suppression has been effective in the Prichard-Murray Resource Area for over 85 years, and the incremental effect of suppressing each small fire in the watershed would have over time promoted late seral species rather than early seral species, and changed the structure of those moist forests, which in turn would change the way they responded to fires (Zack and Morgan 1994, page 32; PF Doc. FF-23).

The reduction in fuels under the Action Alternatives would change potential fire behavior and intensity, and could also affect fire severity. Activities under the Action Alternatives would promote early-seral, fire resistant species such as western larch, which are more likely to survive even intense fires, reducing future potential fire severities. Even if the larch were killed in a fire, it is possible that the seeds would survive to regenerate the stand with early-seral species. Without species such as western larch on-site, natural regeneration of that species after a wildfire would be much less likely.

Maintaining natural openings with prescribed fire and regenerating some stands in the Resource Area would create a mosaic of vegetation (Brackebusch, PF Doc. FF-8). This mosaic would create fuel interruptions that reduce the potential for conflagrations or serious fast spreading fires. Fuel mosaics can result in delayed fire spread or fire build-up, reducing the risk of escaped fires. Brackebusch recommends that these mosaics be tied to natural, fire resistant features of the terrain. However, in certain extreme weather conditions, fires may become uncontrollable despite any efforts at fuel management.

The spatial arrangement of vegetation influences the growth of large fires. Patches of vegetation that burn relatively slower or less severely than surrounding patches can reduce fire intensity, severity, or spread rate, or may force the fire to move around them by flanking (at a lower intensity), which locally delays the forward progress of a fire (Graham et al. 2004, page 29; PF Doc. FF-6).

Records show that 3,087 acres of prescribed burning has occurred on Forest Service lands in the past in the Resource Area (PF Doc. FF-41). This burning includes burning of piles (hand, grapple and dozer), underburning, broadcast, wildlife and ecosystem burning. Most of the past prescribed burning in the Resource Area is associated with timber sale activities. In addition, 32 acres of prescribed burning is planned for the near future in the Resource Area. The historic prescribed burning has reduced activity fuels and helped to maintain more acres of the resource area in an early seral stage, providing discontinuity to the fuels within the area.

Reasonably foreseeable activities on lands managed by the Bureau of Land Management near Murray would harvest approximately 100 acres followed by prescribed burning and planting. These activities would be beneficial to the fire/fuels resource by reducing fuels and changing species composition to early seral, long-

lived species. When considered independently from other activities in the resource area, the BLM Murray project likely has effects only to the local area. When considered in conjunction with past, present, and reasonably foreseeable fuel reduction activities, however, the project contributes to a safer environment to residents of Murray, especially because of its close proximity to the town.

It is neither possible nor desirable to "fireproof" fire-dependent ecosystems, but active land management can reduce potential effects of severe fire. Federal land management agencies can mimic natural disturbances, but it is essential for managers to consider that current conditions may be considerably different from those conditions that occurred historically. Reintroduction of native processes such as fire without modification of structural patterns, fuel loadings, and spatial distributions can produce unpredictable and undesirable effects (Quigley et al. 1996, pages 165 and 184; PF Doc. FF-21). Multiple treatments would be needed to regulate vegetation structure, composition, and associated biomass loadings. Long management horizons may be required to restore unhealthy ecosystems to more sustainable conditions. The most effective means to restore long-term forest health would be tree density and fuels management, plus regulation of species composition to improve the dominance and distribution of seral species (Harvey, et al. 1995; PF Doc. FF-17).

Activities under the action alternatives would affect the Fire Regime Condition Class by restoring fire effects, vegetation composition/structure, and fuels to more resemble the landscape's natural (historical) range. Treated areas would move toward Condition Class 1, rather than toward Condition Class 2 or 3.Alternative 2 treats more area than Alternative 3, and would therefore result in a greater improvement of Fire Regime Condition Class (see Figure FF-10).

Under either Action Alternative, the treatments are targeted to occur near valuable wildland-urban interface resources or where opportunities exist for efficient fuel treatment. Overall, Alternative 2 provides the most benefit relative to fuel reduction, FRCC improvement, and modification of potential fire behavior because it treats more key areas and a greater portion of the Resource Area. Alternative 2 responds the need to reduce dense fuels to the greatest extent of any of the alternatives.

Additional discussion on the effects of past, ongoing and reasonably foreseeable activities is provided in the EA, Appendix B.

Figure FF-11. A tree across the Avista Powerline within the resource area. *Fortunately, this tree fell during the winter months, when fire hazard is nonexistent. This situation illustrates the importance of managing the vegetation near the powerline to reduce hazards to the line, reduce potential wildfire ignitions, and minimize powerline down time. Photo courtesy of Avista.*

Cumulative Effects on Private Lands

Most often, timber harvests on private lands tend to be partial cuts that remove trees of the highest economic value, generally large fire resistant seral species. Natural regeneration is relied on to fill most created openings. This tends to favor shade tolerant Douglas-fir and grand fir over early seral species such as pine and larch. The historic fire adapted vegetation structure was lost early in the century. With increased values for private timber, and historic harvest practices on private lands, it is probably safe to say that inherent disturbance regimes and historic vegetation patterns will never be re-established on private lands within the analysis area. Because private lands are likely to convert to more shade tolerant species, the structure of stands on private land will probably not approximate what existed there historically. Inspections of harvesting completed by the Idaho Department of Lands show that all harvest slash within the past 2 years has been treated in a satisfactory manner according to the Idaho Forest Practices Act.

Fuel reduction efforts have been implemented that focus on private lands, primarily around structures within the Resource Area. These efforts are part of the Shoshone County Wildland Urban Interface Fire Mitigation Program, a program designed to help homeowners reduce fuels on their property and increase the chances of their home surviving a wildfire. In the last two years, 61.4 acres of private land were treated to protect 127 structures within the Prichard-Murray Resource Area under the Shoshone County Fire Mitigation Plan (PF Doc. FF-38). Work includes non-commercial fuel reduction activities such as thinning, pruning, piling and chipping primarily within the home ignition zone of the homes in the Resource Area. These activities are consistent with the goals of this project, and together they will help protect homes and other resources from damage by uncontrolled wildfire.

F. Differences in the effects of Alternatives 2 and 3

The effects of the treatments that are common to both action alternatives are essentially the same, however, since Alternative 2 also treats Old Growth stands, that results in significant differences between the action alternatives relative to the fire/fuels resource.

Because of the uncertainty involved in prediction where a fire will start and which way it will spread, the more acres that are treated to reduce fuels across a landscape, the better the alternative will be at reducing the likelihood of an uncontrolled wildfire. Alternative 2 reduces fuels on more acres than Alternative 3, which is one of the ways that Alternative 2 better responds to the purpose and need to reduce dense fuels. Both action alternatives reduce fuels near the Avista Powerline and create defensible space adjacent to homes. Since Alternative 3 leaves out some key fuel reduction treatments along main roads and near communities, and therefore does not provide as much benefit as Alternative 2 for interrupting fuel concentrations near communities, and reducing the likelihood of large fire spread.

In addition, since Alternative 3 does not treat Old Growth stands, it results in significant reductions of unit size, especially considering adjacency to previously treated areas. The reduction in unit size associated with Alternative 3 negatively impacts the ability of a treatment to influence wildfire intensity, severity and size. This effect is particulary evident in the units near Prichard Peak, but also occurs in some prescribed burning units near Babin's Junction and along the Coeur d'Alene River.

The fuel reduction units that are included in Alternative 2, but dropped from Alternative 3 also contribute to a landscape-scale arrangement of fuel reduction treatments that are most efficient when they act in conjunction with each other. The fuel reduction treatments in Fancy Gulch, Bedrock Gulch, and Oregon Gulch would be highly effective at slowing a wildfire spreading in a northeasterly direction; however, Alternative 3 drops the Fancy Gulch treatment and therefore reduces the cumulative effectiveness of the treatments in that area.

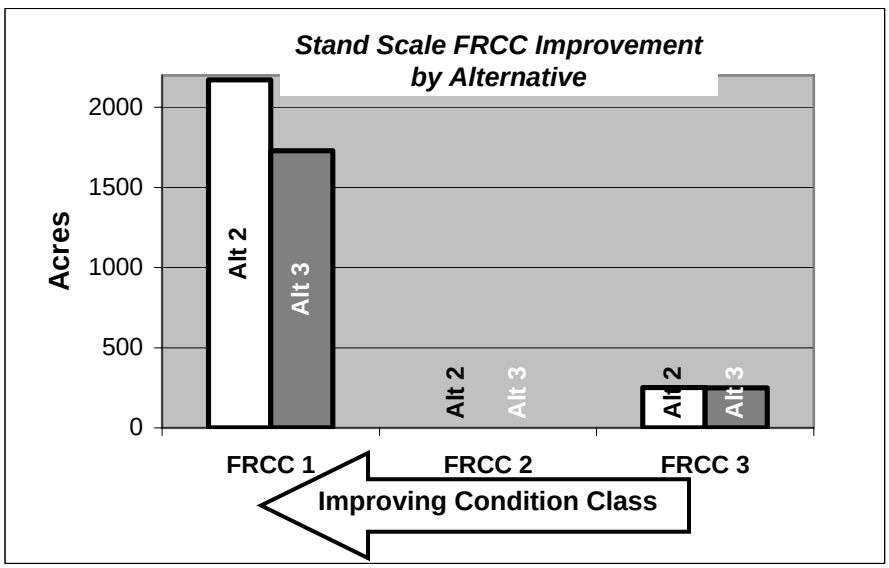
Most of the fuel reduction units that are included in Alternative 2, but dropped from Alternative 3 are adjacent to private land, and would provide a level of protection to those private lands from uncontrolled wildfire. Under Alternative 3, dense fuels and more hazardous potential fire behavior would be allowed to remain adjacent to private lands in several locations.

Alternative 2 results in 2172 acres in Fire Regime Condition Class 1, while Alternative 3 results in 1728 acres in Condition Class 1. Alternative 2 results in almost 450 more acres in Condition Class 1 than Alternative 3 – meaning that fire behavior, fire effects, and vegetation composition and structure have been effectively restored to resemble historical conditions. The resulting improvement in Fire Regime Condition Class under Alternative 2 is a 25% increase over that of Alternative 3.

Alternative 2 responds to the purpose and need to reduce dense fuels to the greatest extent of any alternative, reducing fuels near the Avista powerline, adjacent to homes and private land, and also near communities. Effective unit size is the larges in Alternative 2, resulting in the best treatment effectiveness against large fires. Alternative 2 creates the most effective landscape pattern of fuel reduction treatments than any alternative, and results in the greatest amount of Fire Regime Condition Class 1 in the Resource Area.

Alternative 3 responds to the purpose and need to reduce dense fuels sufficiently in many cases, such as reducing fuels near the Avista powerline and adjacent to homes, but it falls short because it does not reduce fuels in several cases along main roads, near communities, and adjacent to private land. Effective unit size is reduced in Alternative 3, reducing the treatment effectiveness against large fires. Alternative 3 also results in a less effective landscape pattern of fuel reduction treatments, and a significantly smaller amount of Fire Regime Condition Class 1 in the Resource Area.

***Figure FF-12*. Comparison of stand scale Fire Regime Condition Class improvement between the Action Alternatives.** *Alternative 2 results in 2172 acres in Condition Class 1, while Alternative 3 results in 1728 acres in Condition Class 1. Approximately 250 acres of treatment in either alternative does not improve Condition Class. These treatments reduce fuels considerably, but they do not change stand structure or composition enough to meet the threshold of a change in Condition Class. The No Action Alternative results in no improvements in FRCC. There are no stands in Fire Regime Condition Class 2 in any alternative.*



5. Consistency With Forest Policy and Legal Mandates for Fire/Fuels

The Forest Plan (PF Doc. CR-002, page II-38) identifies two standards regarding fire management.

Forest Plan Fire Management Standard #1

Fire protection and use standards are specified by management area. Cost effective fire protection programs will be developed to implement management direction based on on-site characteristics that effect fire occurrence, fire effects, fire management costs and fire caused changes in values.

Forest Plan Fire Management Standard #2

The Fire Management Action Plan will be guided by the following Forest-wide standards:

a. Management area standards.

b. Human life and property will be protected.

c. Fire will be used to achieve management goals according to direction in management areas. Implementation guides will be prepared for prescribed fire projects and programs identified in Table 10 (Forest Plan Appendix F) using unplanned ignitions.

d. Management area standards will be used in Escaped Fire Situation Analyses as a basis for establishing resource priorities and values.

e. The appropriate suppression response for designated old-growth stands in all management areas except in wilderness will result in preventing the loss of old growth. Fire policy in relation to old growth within wilderness will be provided in specific management direction developed for each wilderness area.

f. Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.

g. Forest Fuel Management Fund expenditure priorities are:

   (1) Natural fuels that pose a threat to human life and property

   (2) Unfunded activity fuel projects

   (3) Areas where fuels/fire behavior is a threat to management area objectives

Following is a description of how each alternative meets these Forest Plan standards. Forest Plan standards 2d and 2e relate to wildfire suppression policy and requirements that are outside the scope of this project, and therefore compliance with these standards is not described. This project does not determine Forest Fuel Management expenditure priorities, so compliance with standard 2g is not addressed.

No-Action Alternative

The No-Action Alternative would not use prescribed fire to help meet the goals of the management areas within the resource area. The alternative would not help develop cost-effective fire programs because it would allow far more intense potential fire behavior to exist in stands that, with treatment, would primarily exhibit low intensity, easily controlled fire behavior. Under the No-Action Alternative, severe fire effects, large wildfire management costs, and fire caused changes in values could reasonably be expected; these results could likely be prevented or lessened with action to treat forest fuels.

The No-Action Alternative would not take any preventative steps to protect human life and property within the resource area from an uncontrolled wildfire, even though a significant threat exists to those homes that are adjacent to heavy fuels on National Forest System lands. The continued succession of fuels and vegetation, mortality from insects and disease, and the exclusion of fire would create areas where the trend in fire

behavior characteristics would in time be inconsistent with the goals, objectives and standards established in the Forest Plan. No activity fuels would be created under the No-Action Alternative, so there is no need to treat activity fuels, which is consistent with the Forest Plan.

Alternative 2

Alternative 2 would use prescribed fire to help meet the goals of the management areas within the resource area, consistent with the Forest Plan. Alternative 2 would help develop cost-effective fire programs by making substantial progress toward reducing potential intensities of wildfire in areas affected by past fire suppression. By inference, the more area treated to restore and maintain stands toward historical species composition, the better the alternative meets the Forest Plan goals. Of the three alternatives, Alternative 2 would best meet the goals, objectives and standards of the Forest Plan because it would reduce the severity of fire effects, the costs of potential wildfire, and fire-caused changes in values on the most acres (2,423 acres total). Treatments under Alternative 2 would begin to trend stands away from potential fire behavior that could threaten human life and property in the resource area. Fuelbreak treatments included in Alternative 2 significantly contribute to meeting Forest Plan Management Standard 2b, to protect human life and property. The activity fuels created would be treated in a manner that is consistent with the standards of the Forest Plan.

Alternative 3

Although Alternaive 3 treats less area then Alternative 2 (1,977 acres total), it would use prescribed fire to help meet the goals of the management areas within the resource area, consistent with the Forest Plan. Alternative 3 would help develop cost-effective fire programs by making progress toward reducing potential intensities of wildfire in areas affected by past fire suppression. By inference, the more area treated to restore and maintain stands toward historical species composition, the better the alternative meets the Forest Plan goals. Alternative 3 would treat 446 fewer acres than Alternative 2, and therefores would not make as much progress at meeting the goals of the Forest Plan. Alternative 3 would reduce the severity of fire effects, the costs of potential wildfire, and fire-caused changes in values. Treatments under Alternative 3 would begin to trend stands away from potential fire behavior that could threaten human life and property in the resource area. Fuelbreak treatments included in Alternative 3 significantly contribute to meeting Forest Plan Management Standard 2b, to protect human life and property.The activity fuels created would be treated in a manner that is consistent with the standards of the Forest Plan.

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Specialist's Report on Forest Vegetation in the Prichard Murray Resource Area

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SPECIALIST'S REPORT ON FOREST VEGETATION IN THE PRICHARD MURRAY RESOURCE AREA

1. Regulatory Framework for Forest Vegetation

The regulatory framework for the management of vegetative resources on the Idaho Panhandle National Forests includes the:

- *1987 Forest Plan for the Idaho Panhandle National Forests*
- *Multiple-Use Sustained Yield Act of 1960*
- *Endangered Species Act of 1971*
- *National Forest Management Act of 1976*
- *Forest and Rangeland Renewable Resources Planning Act of 1974*
- *Idaho Forest Practices Act*
- *Forest Service regulations and policy*

Consistency with specific Forest Plan standards and vegetative/silvicultural requirements of RPA and NFMA is provided in section 5 of this Forest Vegetation report.

2. Methodology Used in the Forest Vegetation Analysis

2.A. Scale of the Forest Vegetation Analysis Area

The analysis area for existing vegetative conditions and to assess effects to forest vegetation follows the Prichard Murray Resource Area boundary, except when discussing allocated old growth. The analysis area for allocated old growth follows the boundary of Old Growth Management Units (OGMU) 109, 110, 112, 115, 116, 123 and 127 (PF Doc. VEG-30). Where appropriate, information is provided at both the resource area scale, old growth management unit scale and the Coeur d'Alene River Basin scale to provide a landscape perspective.

2.B. Analysis of Forest Vegetation Conditions

Methodology for Analysis of Existing Forest Vegetation Conditions

The interaction of successional development (as represented by habitat types in Copper et al., 1991; PF Doc. VEG-R1 and USDA, 1997; PF Doc. VEG-R15) and disturbances such as fire, insects, diseases, and human influences result in the species composition, structure and landscape arrangement of an ecosystem (PF Doc. VEG-5 and VEG-11). Clearly, existing conditions reflect past natural disturbances and management activities.

Part of this analysis included a comparison to reference conditions developed in the Geographic Assessment for the Coeur d'Alene River Basin (USDA IPNF, 1998; PF Doc. CR025). The purpose of the Geographic Assessment was to develop a scientifically based understanding of the processes and interactions occurring in the Coeur d'Alene River Basin, so that management activities can be developed to promote healthy and resilient ecosystems. In order to maintain healthy, sustainable ecosystems, it is important that species are well adapted to the environmental variability inherent in the ecosystem and to maintain forest structures necessary to support ecosystem diversity and productivity. The conditions in the Prichard Murray Resource Area are consistent with findings of the Geographic Assessment for the Coeur d'Alene River Basin (USDA IPNF, 1998, pp. 28-31, 33, 36-40; PF Doc. CR025), which include a substantial reduction in western white pine, ponderosa pine and western larch; a reduction in old forest structure; and an increase in smaller patches across the basin, with shrub/seedling/sapling stands demonstrating the most decrease in size.

These findings are consistent with the Columbia Basin Assessment (ICBEMP, 1997, pages 37 and 59-67; PF Doc. VEG-R10), the Northern Region Overview (USDA, 1998, PF Docs. VEG-R8 and VEG-R9), the Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year

Comprehensive Strategy (PF Doc. FF-24) and Implementation Plan (PF Doc. FF-25) and Analysis of the Management Situation for the Revision of the Kootenai and Idaho Panhandle Forest Plans (USDA, 2003, Chapter 3; PF Doc.VEG-R21).

In terms of vegetation, the Geographic Assessment identified the risks associated with conversion to shade tolerant, drought and fire intolerant species from shade intolerant, drought and fire tolerant species. Since a single resource risk cannot be considered in isolation, the Geographic Assessment identified the risks to hydrologic, aquatic, wildlife and recreation along with the interrelationships of these risks. The Geographic Assessment proposed a strategy for risk management that strove to be both integrated and adaptive. This approach is consistent with Interior Columbia Basin Ecosystem Management Project (ICBEMP), the National Fire Plan and 10-Year Comprehensive Strategy. The project interdisciplinary team considered these recommendations as they developed the proposed alternatives. The Geographic Assessment found that vegetative restoration and watershed restoration, with wildlife as an additional issue are a priority for restoration.

Another facet of the Prichard Murray forest vegetation analysis included a comparison to the desired condition for forest vegetation in the Resource Area, which was developed during the Ecosystem Analysis at the Watershed Scale (PF Doc. VEG-8). It is based on multiple resource objectives using direction of the Forest Plan and tiering from data and recommendations from the Geographic Assessment, UCRB and National Fire Plan/10 Year Strategy. This desired future condition was used for comparing the present condition of the Prichard Murray Resource Area with anticipated conditions under the No-Action and Proposed Action alternatives over time.

The following vegetation management ***Design features*** will be implemented with action alternatives. A silvicultural diagnosis has been completed and approved by a certified silviculturist at the time of this analysis. All vegetative treatments would have silvicultural prescriptions approved by a certified silviculturist before treatment. Silvicultural prescriptions would consider site-specific factors such as physical site, soils, climate, habitat type, current and future vegetative composition and conditions, as well as interdisciplinary team objectives, NEPA decisions, other regulatory guidance, and Forest Plan goals, objectives and standards. Region 1 Snag Management Protocols (USDA, 1994; PF Doc. VEG-R57) will be met (PF Doc. VEG-21). Woody debris guidelines (USDA, 1994; PF Doc. VEG-R61) following harvest will be met (PF Doc. VEG-21). White pine retention guidelines (USDA, 1994; PF Doc. VEG-R58) will be met. All regeneration areas would be regenerated with site-adapted species/seed source. Sites will be prescribed burned (the preferred treatment), mechanically treated or a combination of both to reduce fuels and shrub competition sufficient to establish desired regeneration. Burning will take place only when soil moistures are above 25%. In areas treated with regeneration harvest, site preparation for regeneration, fuel treatments, and planting/regeneration would occur within five years of harvest completion. Harvest unit layout will consider suitability limitations on a site-by-site basis on the ground. Harvest and site preparation treatments will consider the short and long term potential negative effects (including blow down, fire mortality, etc) of proposed activities on adjacent trees and stands with site by site prescription modifications, such as change in unit boundary, modification of prescribe burning prescriptions, etc.

Methodology for Analysis of Effects to Forest Vegetation

Of primary concern in terms of forest vegetation in the Prichard Murray Resource Area is the need for a healthy and resilient forest ecosystem. A healthy and resilient forest ecosystem will supply the balance of species composition, structure, landscape arrangement, growth and health sufficient to meet the multiple resource objectives for this Resource Area including fire/fuels (in this wildland urban interface and immediately adjacent areas), wildlife, recreation, aquatics, etc. The forest vegetation analysis addresses two of the three key issues identified in the Prichard Murray Resource Area: forest composition and forest structure.

The effectiveness of the alternatives in addressing **forest composition** is indicated through stand changes in:

- *Percent forest cover type (specifically from Douglas-fir, grand fir or western hemlock to the long-lived early seral species - western larch, white pine and ponderosa pine), either by basal area dominance in stands of trees greater than 5 inches diameter at breast height, or by trees per acre in stands up to 5 inches diameter at breast height. This will be analyzed at the resource area and CDA basin scales to allow comparison of current and desired conditions at multiple ecological scales.*

The effectiveness of the alternatives in addressing **forest structure** is indicated through stand changes in:

- *Percent of the area in each structural stage (shrub/seedling/sapling, small to medium timber, and mature/large timber) at the resource area and CDA basin scales to allow comparison of current and desired conditions at multiple ecological scales.*
- *Changes to 'within stand' structures immediately adjacent major roads, utility corridors and shared boundary between private and Forest Service*
- *Landscape arrangement, measured through changes in patch sizes. This will be analyzed at the resource area and CDA basin scales to allow comparison of current and desired conditions at multiple ecological scales.*

Allocated old growth is addressed as a part of the forest structure analysis (as a subset of the mature/large timber stage). A more detailed explanation of the methodology used for the analysis of allocated old growth is found in the Project Files (PF Doc. VEG-27, VEG-28, VEG-30 and VEG-R20).

The definitions for old growth and the direction for allocation of old growth are from the 1987 Forest Plan (USDA, 1987; PF Doc. CR002), the Regional Task Force Report "Old Growth Forest Types of the Northern Region" (Green and others, 1992, corrected 2/2005; PF Doc. VEG-R20), and Forest Supervisor letters of direction for implementing old growth standards (PF Doc. VEG-28). The table below is a synopsis from Green and others, 1992 (corrected 2/2005) to display some of the minimum standards used as part of the definitions for old growth types in the OGMU's 109, 110, 112, 115, 116, 123 and 127 — clearly these are not the only considerations for old growth allocation (see full document Green and others, 1992, corrected 2/2005; PF Doc. VEG-R20).

Table VEG-1. Minimum Standards for Old Growth Types in the Prichard Murray Analysis Area *(see* Green and others, 1992, corrected 2/2005*; PF Doc. VEG-R20).*

Forest Type	Habitat Group	Minimum # of trees per acre greater than threshold diameter (dbh)	Large tree threshold diameter (dbh)	Minimum age of large trees (years)	Minimum basal area (sqft/ac)
ponderosa pine, Douglas-fir, or western larch	warm-dry	8	21"	150	40
Douglas-fir, grand fir, western hemlock, western larch or white pine	moderately warm-moist	10	21"	150	80
subalpine fir and mountain hemlock	moderately warm-moist and cool-moist	10	17"	150	80
subalpine fir and mountain hemlock	cool-dry	10	17"	150	60

The old growth definition is considered valid when taking into account recent scientific information. In addition, the desired future condition for vegetation takes into account restoration of old growth, as part of the broader mature, large timber structural stage.

The review of OGMU's 109, 110, 112, 115, 116, 123 and 127 used Forest Plan definitions and standards and followed a 4-step methodology which included:

1) *a detailed review of allocated old growth in OGMU's 109, 110, 112, 115, 116, 123 and 127 in TSMRS (VEG-31, 32 and 34);*

2) *a detailed review of all stands in OGMU's 109, 110, 112, 115, 116, 123 and 127 to search for stands not previously allocated that currently meet allocation definitions and could be allocated (VEG-31);*

3) *the wildlife biologist and silviculturist reviewed landscape arrangement and consistency with Forest Plan Old Growth Standards, before final allocation in each OGMU was made (see VEG-34). In addition, August 2004 digital aerial photos were used to determine if changes (natural or man caused) had occurred that may change allocation since the last field exam. (Current landscape arrangement info (patch/block analysis) and work maps of future potential old growth is found at VEG-35); and*

4) *as part of the effects analysis, a review of proposed treatment units for potential old growth definition criteria also was accomplished (VEG-37).*

Validation of the data items used for old growth allocation is provided in PF Doc. VEG-4. Field reviews are an important aspect of this validation (see PF Doc. VEG-44).

2.C. Models, Information Sources and Other Tools Used in the Forest Vegetation Analysis

The **Forest Vegetation Simulator (FVS) model** and the suite of tools that support it were developed from the Prognosis model. FVS was originally developed in 1973 and has been used extensively across the U.S for vegetative analysis since 1983. The FVS analysis for the Prichard Murray Resource Area used the forest pest and fire/fuel extensions to predict forest stand dynamics through time given variable management regimes (PF Doc. VEG-6). FVS provided a variety of information for the Prichard Murray analysis including species composition, size of trees and fire/fuels parameters. Documentation of these FVS items are found in PF Docs.: VEG-6, USDA, 1994; VEG-R61, Dixon, 2002; VEG-R2, Crookston, 1999; VEG-R3, Frankel, 1998; VEG-R4, Reinhardt and Crookston, 2005; VEG-R5, and McGaughey, 2002; VEG-R6. Keywords, output, detailed tables of information and pertinent portions of FVS references used in this analysis are found in the project file (PF Doc. VEG-6, Dixon, 2002; VEG-R2, Crookston, 1999; VEG-R3, Frankel, 1998; VEG-R4, Reinhardt and Crookston, 2005; VEG-R5, and McGaughey, 2002; VEG-R6).

A patch analysis was used to describe and compare landscape pattern, arrangement and patch size. This analysis is found in the project file (PF Doc. VEG-7). A separate patch analysis was completed for old growth related Forest Plan Standards and analysis and is found in the project file (PF Doc. VEG-35).

The **timber stand management resource system (TSMRS) database** contains management information for National Forest System lands, including some past harvest in the Prichard Murray Resource Area from as early as 1910 to present. The Timber Stand Data Record System or TSMRS is a regional standardized approach that combines an automated database, index map (compartment map) and 'stand folder'. At the initiation of TSMRS in the mid 1970s, its purpose was 1) to provide information for silvicultural prescriptions, 2) to plan and schedule treatments, 3) to create required reports, 4) to maintain a historical record of treatments and 5) to provide information to update and revise the timber resource plan and harvest schedule. TSMRS has evolved over time, and portions have been replaced by new databases. Most recently, the FACTS database replaced the TSMRS activities table.

The Prichard Murray Resource Area information from before about 1976 was drawn from historic references, including maps, photos and newspapers. TSMRS activity acre figures represent acres of the specified activity, not stand acres. Some stands may have had multiple activities or harvests. Clearly, existing conditions reflect past natural disturbances and management activities, including harvest. A stand list of harvest, non-harvest and fire activities in the data base and basemap of stands is found in the Project File (PF Doc. VEG-2). A detailed description of individual data items and their validation methodology for the Prichard Murray vegetation analysis is found in PF Doc. VEG-4. Silvicultural diagnosis information

associated with the Prichard Murray Resource Area is found in PF Doc. VEG-3 and VEG-44. Information regarding existing vegetative conditions on private lands within the resource area is based on information provided by aerial photo interpretation and observations made by project team specialists.

The usefulness of any data tracking system is directly proportional to the reliability and completeness of the data entered. TSMRS is actually a summary database. It summarizes information at the stand scale from a variety of sources including stand exam field data (found in R1Edit, which has recently been replaced by the national database FSVeg), photo interpretation, contract accomplishments, historical records/maps and field observations. The Timber Management Control Handbook (USDA, 2002; PF Doc.VEG-R56) describes how each field in TSMRS is determined, as well as providing standardized definitions and protocols for each data field and code. Obviously, the reliability of any individual field from TSMRS is dependent on how that data field information is acquired i.e. the forest type field is automatically crossed from the most current stand exam field data, as it is available, and forest type is based on the plurality of tree numbers or basal area depending on size of the trees. However, without exam data, forest type may be based on field reconnaissance and/or photo interpretation.

A validation of two categories of vegetative information used for the Prichard Murray Resource Area was completed (PF Doc. VEG-4). The first of these categories involve selected TSMRS data fields. This includes a review of the following TSMRS data fields: forest type, habitat type, size class, year of origin, past disturbances, elevation, aspect, slope, and special use code (used to label allocated old growth). All of these are stand level parameters. PF Doc. VEG-4 reviews the data collection protocols for these data parameters as well as a current validation from a comparative sample of these items using combinations of recent stand exams, field reviews and aerial photo reviews. The second validation category of vegetative information used for the EA includes: stand trees per acre, stand basal area and tree age. These items are either taken directly from the field plot database FSVeg (which updated R1Edit) or are generated from standard summarizations of field data. These items are also stand-based parameters for which statistical information is available with standard summarizations or reports. PF Doc. VEG-4 reviews the data collection protocols for these and discloses a current validation of samples of this information using combinations of recent stand exams, field reviews and aerial photo reviews.

ArcView/ArcMap spatial computer software was used extensively to analyze existing conditions and compare alternatives. Copies of the base maps used (along with data associated with map polygons) are found in PF Doc. VEG-43. In addition, a stand base map and basic stand data as well as explanations on how to use available IPNF GIS data sets is found at http://www.fs.fed.us/ipnf/eco/yourforest/gis/index.html#veg.

Various silvicultural, ecology, fire/fuels and insect and disease **references** were used to develop this specialist report and many are listed in the list of references. A more extensive list of vegetative references is found in the reference portion of the project file for this specialist report. These references in addition to an even longer list of references not found in the project file are combined with specialist experience to allow a full range of vegetative information and understanding.

3. Overview of Vegetative Conditions in the Prichard Murray Resource Area

3.A. Setting

Vegetation is a fundamental part of terrestrial ecosystems. More than 80 years of fire research have shown that physical setting, weather and fuels combine to determine wildfire intensity and severity. Of these three factors, fuel (vegetation) is the only factor that can be changed through management (Graham et al., 2004, page iv; PF Doc. VEG-R13). Vegetation is a basic element of wildlife habitat and is a critical factor regulating hydrologic regimes. Ecosystem vegetative structures are a function of climate, physical site, seed and/or plant species available in an area, disturbance history and successional processes between disturbances. Most landscapes are a mosaic reflecting the interaction between disturbance history and succession. This interaction is a keystone process shaping the landscape vegetation mosaic (Zack and Morgan, 1994, page 5; PF Doc. VEG-R14). This Prichard Murray vegetative overview will summarize soils,

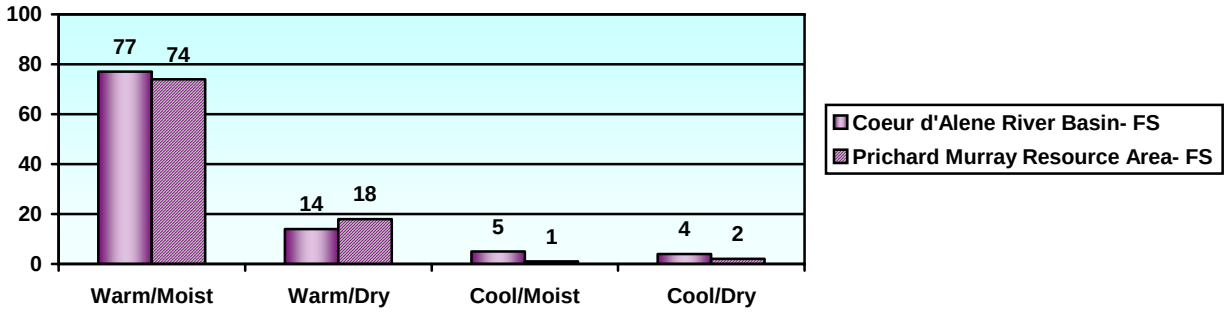
climate and patterns of successional development and disturbance in terms of general trends based on habitat type groups.

The vegetation in northern Idaho is a result of the productive ash cap soils and the prevailing climatic pattern. The loess, ash cap soils range from 6 to 16 inches deep across the Coeur d'Alene River Basin. These soils are highly productive due to both the availability of elements and ability to hold moisture. Of note is the current scientific hypothesis related to tree disease susceptibly and the availability of particular elements from specific meta-sedimentary parent materials/rock types, such as potassium. Further discussion of this subject is found in the Soils Specialist Report. The Prichard Murray Resource Area is dominated by parent material from the Burke, Lower Wallace and Prichard formations with some areas of tertiary gravels. All resource activities maintain soil productivity by abiding with the Forest Plan Standards and the Soil Nutrition Guidelines from the Soil Nutrition Cooperative (PF Doc. SR-17) (see Soils Specialist Report for more detail).

The climatic pattern for the area is characterized by westerly winds that carry maritime air masses from the northern Pacific across the northern Rocky Mountains during winter and spring. Precipitation occurs mainly between November and February, with only 12 percent of the annual precipitation occurring between July and September (USDA, 1998, page 12; PF Doc. CR-025). The inland maritime airflow provides northern Idaho with abundant moisture (25-60 inches per year) and moderate temperatures. Located close to the Idaho/Montana divide in the east central portion of the Coeur d'Alene River Basin, the Prichard Murray Resource Area receives an average of approximately 30-50 inches of moisture annually (PF Doc. VEG-39).

The interaction of successional development (as represented by habitat types - see PF Doc. VEG-5, VEG-11, VEG-R1 and VEG-R15) and disturbances such as fire, insects, diseases and human influences are key in determining species composition, structure and landscape arrangement of the ecosystem.

Figure VEG-1. Percent Habitat Type Groups on National Forest System lands in the Coeur d'Alene River Basin and the Prichard Murray Resource Area (PF Docs. VEG-10 and VEG-11).



3.B. Ecosystem Disturbances

Ecologist Aldo Leopold once referred to ecosystem health as the capacity of the land for self-renewal. Forest health has been defined as the condition of a forest when it is: resilient to change; biologically diverse over a large area and able to provide a sustained habitat for vegetation, fish, wildlife and humans (Deffer-Robinson et al, 2006, PF Doc. VEG-R69). Resiliency is the ability of the ecosystem to respond to disturbances. Resiliency is a measure of repetition or redundancy of ecosystem processes and therefore an indicator of ecosystem fragility (Borman and Likens, 1979 in: Toman and Ashton, 1996, page 370; PF Doc. VEG-R33). Resiliency is one of the characteristics that enable the ecosystem to persist in many different states or successional stages. For this analysis, ecosystem disturbance agents include fire, insects, disease, and timber harvest.

Fire in the Coeur d'Alene River Basin and the Prichard Murray Resource Area

Figure VEG-2. Area within Coeur d'Alene drainage following the 1910 fire.

Although fire is often discussed in context to habitat type groups (Figure VEG-1) an additional broader picture of fire as a disturbance agent and its spatial and temporal characteristics at various basin and watershed scales is needed. Prior to European settlement in the Coeur d'Alene River Basin, fire was the most important disturbance occurring across the landscape. Fire in this landscape is characterized as a mixed severity fire regime. The historic mixed severity fire regime is complex with both fuels and climate as major influences (Schoennagel, Verlen and Romme, 2004; PF Doc. VEG-R25). Zack and Morgan (1994; PF Doc. VEG-R14) describe fire history within the Coeur d'Alene River Basin (1.5 million acres in size, of which three quarters of a million is managed by the Forest Service). Their report indicates that fires covering greater than five percent of this forest occurred on an average of once every 19 years (pages 1 and 24 of Zack and Morgan 1994). Overall, Zack and Morgan (1994; PF Doc. VEG-R14) found there was great variation in fire frequencies, patterns and fire severity on the landscape scale. The variation in fire severity was due to different fuel types, burning conditions and terrain that allowed individual trees, patches of trees, and snags to survive even through the most severe fires. These remnants became the seed source for the regeneration following the fires.

Large patch size (tens of thousands of acres) of stand replacement fires was a common pattern throughout the basin over long periods of time, often burning entire watersheds or groups of watersheds in a single event. While this pattern was dominant, other non-stand replacement fires, as well as various insects and diseases, and the variable patterns of species and seed source left by stand replacement fire, would tend to create complexity to the more or less homogenous patches left by stand replacement fires.

Historic mining took place in the Prichard Murray area in the 1870 to 1900 period. The number of people in the area and the use of fire to clear areas for mining indicated some harvest and human caused fires occurred in this area. The major wildfires of 1889, 1910 and 1919 spread throughout portions of the Coeur d'Alene Basin. Based on tree and stand year of origin, these major fire events had an influence in the Prichard-Murray Resource Area, with each event covering about 18-25 percent of the resource area each and a third of the resource area burned previous to 1889. These fires tended to create very large patches (250 acres to multiple thousands of acres) of regeneration however areas of mixed severity also occurred. Viable seed sources and in turn regeneration also varied across this landscape. The Specialist's Report on Fire/Fuels provides a more detailed discussion of fire history in the Prichard-Murray Resource Area.

Diseases in the Coeur d'Alene River Basin and the Prichard Murray Resource Area

Disease trends 1988-2003 are reported for the IPNF in the 2003 Forest Plan Monitoring Report (USDA, 2003, page 13-14; PF Doc. CR-022). Additional information of disease status in the Prichard Murray Resource Area is based on annual aerial detection flights for insects and disease identification (PF Doc. VEG-40), stand exams and silviculturist field recon (PF Doc. VEG-44) and photo interpretation (PF Doc. VEG-44).

Root diseases are the primary disease group found in the Prichard Murray Resource Area. This group of diseases include: Armillaria, Annosus and Schweinitzii. In general, these diseases cause the tree roots to weaken to the point of eventual starvation of water and nutrients. Generally, crown thinning, windthrow, breakage, beetle attacks and mortality follow infection. Douglas-fir is the most susceptible species to these diseases in this area followed by grand fir and sub-alpine fir. Other species are also susceptible; however levels of resistance vary over their lives. Root disease and insects often act together in this ecosystem, with root disease weakening a tree that is then killed by insects or other cause. An extensive literature summarization related to root diseases is found at PF Doc. VEG-R67.

In the absence of fire, forest insects and diseases drive forest succession by affecting tree species, size, and stand density. Insects and diseases outside of the historic disturbance range are considered signs that the functions of these disturbance agents are not resilient over the long term.

Approximately 46% of the Coeur d'Alene River Basin has a moderate to high probability of insect and disease agents affecting the timber vegetation (USDA, 1998, page 29; PF Doc. CR-025).

Both insects and diseases continue to be dynamic components of most forested acres within the Prichard Murray Resource Area. Examination of many dead and dying trees within the Resource Area and vicinity by district personnel as well as Forest Protection Staff entomologists and pathologists revealed the presence of a number of important diseases and bark beetles.

In terms of successional development in mixed species stands, root diseases were a significant factor in reducing competition from Douglas-fir and grand fir to maintain western white pine, western larch, and on some sites, ponderosa pine. Douglas-fir tended to regenerate readily along with white pine, western larch and others in the early stages of stand development, but Douglas-fir dropped out as a significant component due to high rates of mortality caused by root disease (Byler and Zimmer-Gorve, 1990, page 103; PF Doc. VEG-R17). At this stage of stand development, western white pine, ponderosa pine and larch have a higher level of resistance to root disease than Douglas-fir and were able to capitalize on the increased availability of growing space. Fire exclusion and the loss of white pine, ponderosa pine and larch through white pine blister rust and harvest have reduced the opportunity for these long lived early seral species to become established in root disease areas. Root disease is currently the most prominent landscape-altering process in the Coeur d'Alene River Basin (USDA, 1998, p. 30; PF Doc. CR-025). Functions of pathogens and insects in forests can be divided into two parts: 1) the action, such as killing trees, decaying heartwood or reducing growth; and 2) the outcome, such as changing species composition of a stand or causing a change from a mature, closed canopy structure to a pole-size, low-density structure (USDA, 2000, pages 2-246 and 2-244; PF Doc. VEG-R34). Currently, in terms of forest succession, when Douglas-fir dies in moist stands, the result is an effective 50 to 150-year acceleration of succession to grand fir and/or hemlock climax. On dry sites, stands tend to cycle with continual Douglas-fir regeneration and low overstory canopy densities, because other seed sources often are not available. The rate of successional change is very important when discussing resiliency of

ecosystems. The condition of heavy root disease and ladder fuels promotes and increases the risk of stand-replacement fire (USDA, 1998, page 22; PF Doc. VEG-R8), which also has relevance to rate of successional change and ecosystem resiliency. There is no known historical comparative for the levels of Douglas-fir/grand fir and root diseases currently found in the Coeur d'Alene River Basin.

White pine blister rust is a non-native disease that was introduced into this area in the early 1900's. Blister rust is a fungal disease that forms cankers on branches or stems of trees that eventually kill or weaken the tree. In the decades following introduction, white pine was infected over the entire Coeur d'Alene River Basin; trees were either killed and/or harvest was accelerated to recover their economic value. White pine historically dominated approximately 45 percent of the Coeur d'Alene Basin, it currently is about 4 percent. Loss of mature white pine and the continuing mortality of younger trees due to blister rust have led to the increase in Douglas-fir, grand fir and hemlock now seen across the basin. Efforts were made to control blister rust through eradication of the alternative hosts, currant and gooseberry. Although these methods had been somewhat successful in the eastern United States, topography and landscape scale in the west prevented success and the program was dropped in 1968 (Neuenschwander et al., 1999, pages 5, 8, 10, and 12; PF Doc. VEG-R18). Emphasis shifted to development of genetically rust-resistant trees that can be planted throughout the natural range of white pine. There have been successes, both regionally and on the district, in genetically improving tree resistance, planting those trees and then using cultural treatments such as pruning to improve survival (Schwandt, Marsden and MacDonald, 1994; PF Doc. VEG-R19). These programs are continuing. White pine blister rust is present in the Prichard Murray watershed. Areas planted with white pine (and tended for maintenance of white pine) over the last 30 years as well as scattered remnant natural white pine trees are the most likely white pine to become a long-lived seral component over the very long term in the Resource Area depending on continued disease resistance.

A variety of **dwarf mistletoes** are present (and considered a management issue) locally on western larch and Douglas-fir, but are generally not considered a landscape-level problem in the Coeur d'Alene River Basin. Their presence is likely due to the number of mistletoe-infected trees that survived mixed severity fires. These mistletoe-infected trees then infected natural regeneration that resulted from the opening of growing space by fires. Mistletoe causes growth loss and sometimes mortality. Since mortality from this small parasitic plant is slow in large trees the primary concern is avoiding infection in young larch, which can be killed much more rapidly. Removal of heavily infected overstory trees can help avoid infection of the understory. Larch dwarf mistletoe, while only minimally present in the Prichard Murray Resource Area, is not considered a management issue either in immature/mature stands of western larch or in areas potentially planned for western larch regeneration.

Figure VEG-3. Combination of root disease and Douglas-fir beetle mortality viewed west of the Avista powerline (Rookie Creek watershed) in 2005.

Insects in the Coeur d'Alene River Basin and the Prichard Murray Resource Area

Insect trends 1988-2003 are reported for the IPNF in the 2003 Forest Plan Monitoring Report (page 13-14, PF Doc. CR-022). Insect status is based on annual aerial insect and disease detection flights (PF Doc. VEG-40), stand exams, field reconnaissance (PF Doc. VEG-44), and photo interpretation (PF Doc. VEG-44). Bark beetles common to the Coeur d'Alene River Basin include mountain pine beetle, western pine beetle, Douglas-fir beetle, and fir engravers. While the effects of disease most often create change over a longer period of time, insect mortality is often dramatic. These insects have always been present in this ecosystem and can have a dramatic effect when appropriate hosts and weather conditions are suitable. The greatest biological factor affecting bark beetle populations is often the availability of food, which is determined by the condition of their host species within the forest. Short-term increases in fuel loading (due to bark beetle caused tree mortality) may have historically led to increased moderate intensity fires and created small to large openings for the reintroduction of seral species. In some cases, insect infestations may have contributed to large stand-replacing fires (USDA, 1998, p. 30; PF Doc. CR-025).

Historically, mountain pine beetle played a major agent of change in mature white pine (USDA, 1998, p. 29; PF Doc. CR-025) and lodgepole pine. Outbreaks were recorded in the early 1900's that killed up to 50% of the mature white pine in some stands and spread over thousands of acres of the Coeur d'Alene River Basin (USDA, 1988, p. 30; PF Doc. CR-025). Mountain pine beetle is the most aggressive bark beetle of lodgepole pine. During the course of an outbreak, it may kill 90 percent or more of trees over 6 inches in diameter in a stand. Currently, in the Prichard Murray Resource Area, mountain pine beetles appear to be scattered and impacting individual trees and few large groups of trees. In addition, lodgepole pine only dominates 2% of the resource area. Substantial areas upstream of the resource area on Prichard Creek however, do have greater proportions of lodgepole pine in stands and dominating stands. These are currently seeing widespread mortality due to mountain pine beetle. This is similar to other areas of the Coeur d'Alene Basin with lodgepole pine.

Figure VEG-4. Looking across Rookie Creek at the west aspect of the Avista Power Line, fall 2003. Harvest since the 1910/1919 fires there has been minimal in this area and varying amounts of western larch is present.

Western pine beetles were common on drier portions of the upland forest in the Coeur d'Alene Basin, periodically killing individual trees or small groups of ponderosa pine. This insect has similar behavior in the ponderosa pine of the resource area.

Douglas-fir beetle and fir engravers have always been present throughout the Coeur d'Alene sub-basin. The substantial increase in dominance of Douglas-fir and grand fir across the Coeur d'Alene Basin increased the effects these bark beetles have overall. Douglas-fir beetle outbreaks can occur following disturbances such as windfall, snow breakage or fire. This damage took place in the Prichard Murray Resource Area as it did in other locations of the Coeur d'Alene River Basin following the 1996 ice storm. The Douglas-fir beetle epidemic following the ice storm of 1996-97 has subsided in the Coeur d'Alene Basin, however some Douglas-fir mortality is still occurring in the basin as well as in the Prichard Murray Resource Area due to a combination of root diseases and surviving Douglas-fir beetles. The Douglas-fir beetle tends to kill the large diameter (>14" size) Douglas-fir that are 80 years of age or greater. The presence of root disease in many of the Douglas-fir forest types has resulted in higher endemic levels of the Douglas-fir beetle and the propensity for rapid beetle population buildups during favorable conditions (Lockman and Gibson, 1998; PF Doc. VEG-R28). Fir engraver beetles typically kill mature grand fir during periods of drought. Drought conditions and fir engraver damage were common in the Coeur d'Alene Basin and Prichard Murray Resource Area from 2000 to 2004. It is now at endemic levels. It is important to note that the majority of the Resource Area forest trees fall within these highly susceptible species, age and diameter ranges.

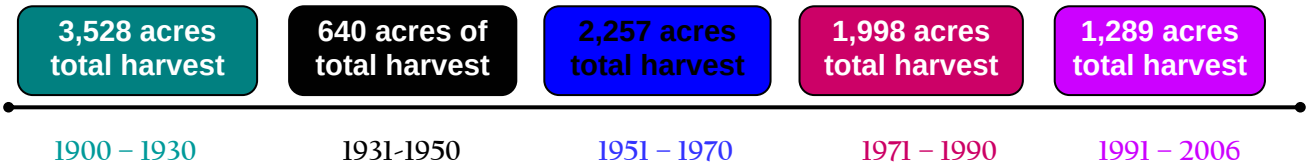
Timber Harvest in the Prichard-Murray Resource Area

Approximately 3,500 acres (about 20% of the resource area) of timber harvest occurred in the resource area following the 1889, 1910, and 1919 fires (due to the area's proximity to the towns of Prichard and Murray, which were very active mining communities at the turn of the century). This harvest was mainly salvage harvest which took place in areas reachable with technology of the time, which would include riparian areas and areas adjacent to streams. Because we do not know exact locations or the types of trees harvested with this harvest activity, it is not clear if this salvage changed successional pathways. However since these fires often killed most or all of the timber in the harvest areas, harvest likely had little effect on vegetative development. The 1950's to 1970 had approximately 1,150 acres each decade of combined liberation harvest (overstory removed to 'liberate' understory natural regeneration), salvage, commercial thinning, shelterwoods, and single tree selections. The 1970's to 2000 averaged about 1,100 acres each decade involving clearcuts, salvage, liberation and seed tree harvests. Since 2000 harvest activity has involved about 260 acres total dominated by salvage. These harvest activities took place on approximately 6,100 acres with some areas having multiple harvest entries. This represents about a third of the resource area. Also of consideration is that only about 20% of the resource area has had regeneration harvest over the last 100 years and the last substantial natural disturbance (wildfire) was over 90-120 years ago and occurred on about 70% of the resource area.

Approximately 1,900 acres (see PF Doc. VEG-14) have been harvested on private lands over the last 20 years within the Resource Area, however as stands mature and fuel treatments become necessary in the urban interface and immediately adjacent areas, additional harvest would likely take place.

The timeline below displays the activities on FS managed lands in the resource area since about 1900 (PF Doc. VEG-14). While some of these areas have had multiple harvest entries, it is not possible to track in the current database if the same acres were harvested (or had other non-harvest activities) on the re-entries because stands are often larger than recorded activity acres. It is reasonable to have multiple harvest entries on some areas because certain silvicultural systems require multiple entries and more than half of the harvest acres were for intermediate treatments. For additional information regarding the past activities and their environmental effects, please refer to the EA (Appendix B).

Figure VEG-5. *Occurrence of past timber harvest activities on FS managed lands in the Prichard Murray Resource Area from 1900 to 2006. The source of all harvest acres is the TSMRS database (PF Doc. VEG-14).*



Harvest Type	1900-1910	1911-1920	1921-1930	1931-1940	1941-1950	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2006	*Grand Total*
Clearcut						44	42	74	743	294		*1,197*
Clearcut w/reserves							33			88		*121*
Liberation						37	791	179	369			*1376*
Seed Tree Prep										6		*6*
Seed Tree Seed Cut										239	63	*302*
Shelterwood Final w/Reserves											7	*7*
Shelterwood Removal					20	99	46					*165*
Shelterwood Seed Cut						360	137		24	20	9	*550*
Improvement Cut					18						33	*51*
Salvage	173	928	733		113	339	1		344	188	107	*2,926*
Salvage- Dead Trees		234	181									*415*
Commercial Thin							35	265		45		*345*
Special Cut					25						16	*41*
Single Tree Selection	418	687	174		464	293						*2,036*
Group Selection										150	24	*174*
Grand Total	**591**	**1849**	**1,088**	**0**	**640**	**1,172**	**1,085**	**518**	**1,480**	**1,030**	**259**	**9,712**

4. Existing Conditions and Effects to Forest Vegetation

4.A. Forest Composition

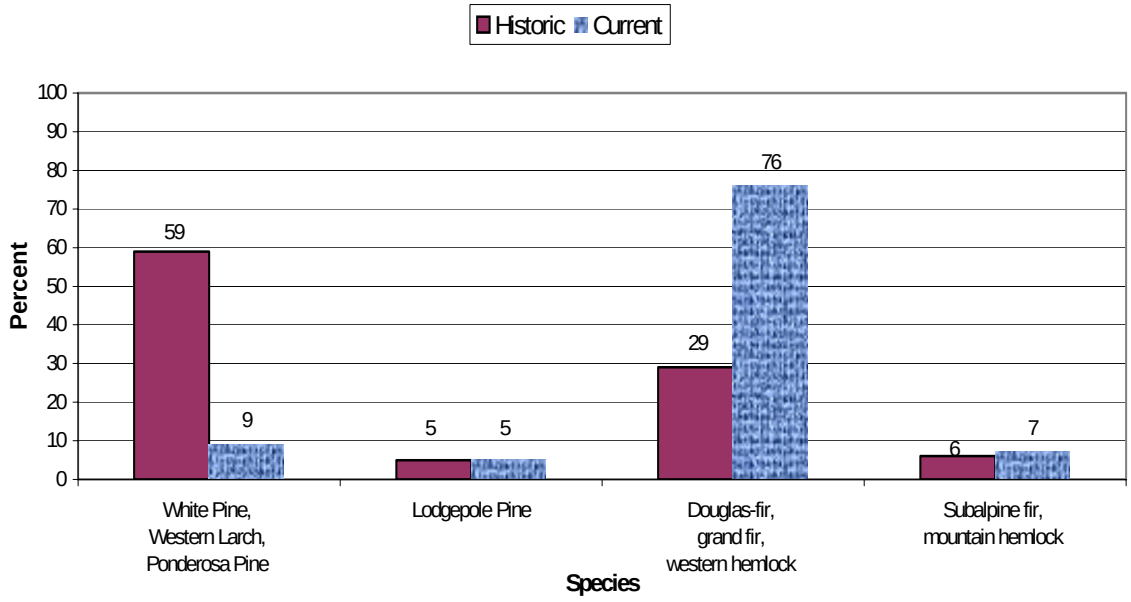
Existing Forest Composition in the Coeur d'Alene River Basin and Prichard Murray Resource Area

The findings of the Geographic Assessment indicate that there has been a tremendous change in species composition within the **Coeur d'Alene River Basin** over the last 100 years (USDA, 1998, pages 36-37; PF Doc. CR-025). This change is also consistent with the Upper Columbia River Basin (USDA, 1997; PF Doc. VEG-R10) and Northern Region Overview (USDA, 1998; PF Docs. VEG-R8 and VEG-R9). While the Forest Plan does not mandate management at the levels of historic species compositions and structures (or size classes), these are helpful reference points to understand what trends may be needed over the long term to create increased resiliency in the ecosystem. It should be recognized that it may not be desired or feasible to return to actual historic conditions.

Forest Cover Types: Forest cover types describe the dominant species in the stand. Long-lived seral species (western white pine, western larch and ponderosa pine) have declined within the Coeur d'Alene River Basin as a result of changes in the role of fire, white pine blister rust, and harvesting that tended to remove these species while leaving species such as grand fir, hemlock and Douglas-fir. Harvest of white pine was accelerated on the IPNF in the 1960's to early 1980's. At the entire Coeur d'Alene River Basin scale (all ownerships) the white pine cover type has substantially declined in the past 100 years (USDA, 1998, p. 36-37; PF Doc. CR-025), while grand fir and western hemlock cover types substantially increased (Geographic Assessment, pp. 31 and 36-37; PF Doc. CR-025). Larch forest types have also decreased, while

the Douglas-fir type increased (USDA, 1998, p. 37; PF Doc. CR-025). As a result of the suppression of fire in a very productive ecosystem, woody dead fuels and multi-story stand structures are building up. The Coeur d'Alene River Basin showed the largest increase in forest fuels of any sampled watershed in the Interior Columbia Basin Assessment Area. Wildfire risk appears to be growing (USDA, 1998, p. 29; PF Doc. CR-025).

Figure VEG-6. Current and Historic Forest Cover Types on National Forest System lands <u>in the Coeur d'Alene River Basin</u> (PF Doc. VEG-10).



Within the Prichard Murray Resource Area, given the fire history and loss of the white pine (on moist sites) over the last 100 years, the current forest cover types contain much more Douglas-fir and grand fir than the previous century. Currently Douglas-fir and grand fir dominate the landscapes on both dry and moist habitats. White pine, western larch and ponderosa pine combined represent only 4 percent of the forest cover types.

Table VEG-2. Forest Cover Types in the Prichard Murray Resource Area *(PF Doc. VEG-15 and PF Doc. VEG-8).*

Forest Cover Type	% of total FS lands in the Resource Area	Desired Future Condition
white pine, larch and ponderosa pine	4	35-45%
lodgepole pine	2	5-15%
Douglas-fir, grand fir, western hemlock and cedar	88	15-30%
subalpine fir and mountain hemlock	1	<5%
other (including nonforest)	3	~~~

Within the resource area, private lands make up 4,964 acres (about 20% of the resource area) and BLM managed lands make up 1,600 acres (about 6% of the resource area). Most of these areas are concentrated along riparian areas of Prichard Creek (and Prichard Creek tributaries) and the North Fork of the Coeur d'Alene River. The habitat types on private land are similar to those of the FS, with a mixture of moist western hemlock/grand fir and a smaller amount of the drier Douglas-fir and grand fir series. Forest cover types on private and BLM lands within the resource area are generally Douglas-fir, grand fir and western hemlock. Structural stages on private and BLM lands within the resource area are dominated by small/medium timber sizes.

Direct and Indirect Effects to Forest Composition (Forest Cover Types) under the No-Action Alternative

At first glance, it would be expected that the No-Action Alternative would result in basically the same species compositions and structures as currently found in the Prichard Murray Resource Area. However, this is not the case in the natural ecosystem. In the absence of fire, change will take place on more or less predictable successional pathways.

Without wildfire, forest cover types will trend toward climax species (Douglas-fir/grand fir/western hemlock abbreviated df/gf/wh) (Hagle, 2000, p.2-244; PF Doc. VEG-R34 and PF Doc. VEG-55). As with the rest of the CDA Basin, root disease will continue to be the most significant landscape altering process. Drought and fire resistant, shade tolerant tree species will dominant the landscape (USDA, 1998, p.29; PF Doc. CR-025). In an ecosystem that is subject to periodic droughts (USDA, 1998, p.31; PF Doc. CR-25), the scale of area under climatic stress makes it very likely to see future large-scale insect and disease problems that are historically unpresented (USDA, 1998, p.31; PF Doc. CR-025). Woody dead fuels and multi-story stand structures are building up in this very productive ecosystem.

The Coeur d'Alene River Basin showed the largest increase in forest fuels of any sampled in the Interior Columbia Basin Assessment Area. Wildfire risk appears to be growing (USDA, 1998, p.29; PF Doc. CR-025) in the Prichard Murray Resource Area as well as the CDA Basin. The most concise reference describing pathways is Byler and Hagle, 2000; PF Doc. VEG-R34--- FHP Report No. 00-09, 10 and 11). With wildfire, the efforts of fire depend on the specific conditions (fuels, fuel arrangement, weather conditions, etc.) at the time of a wildfire. If there is no change in the seed source availability of long lived seral species from the current or the pathways discussed above, the forest cover types and related pathway development following wildfire would be similar to without wildfire as discussed above.

Under the No-Action Alternative, there would be no activities to restore forest vegetation toward increased resiliency. Forest cover types in the short term will remain the same however in the longer term they will trend to increasing representation of Douglas-fir, grand fir and western hemlock (PF Doc. VEG-6). No action will continue the trend away from the desired condition (see Figure VEG-7).

Direct and Indirect Effects to Forest Composition (Forest Cover Types) under Action Alternative 2

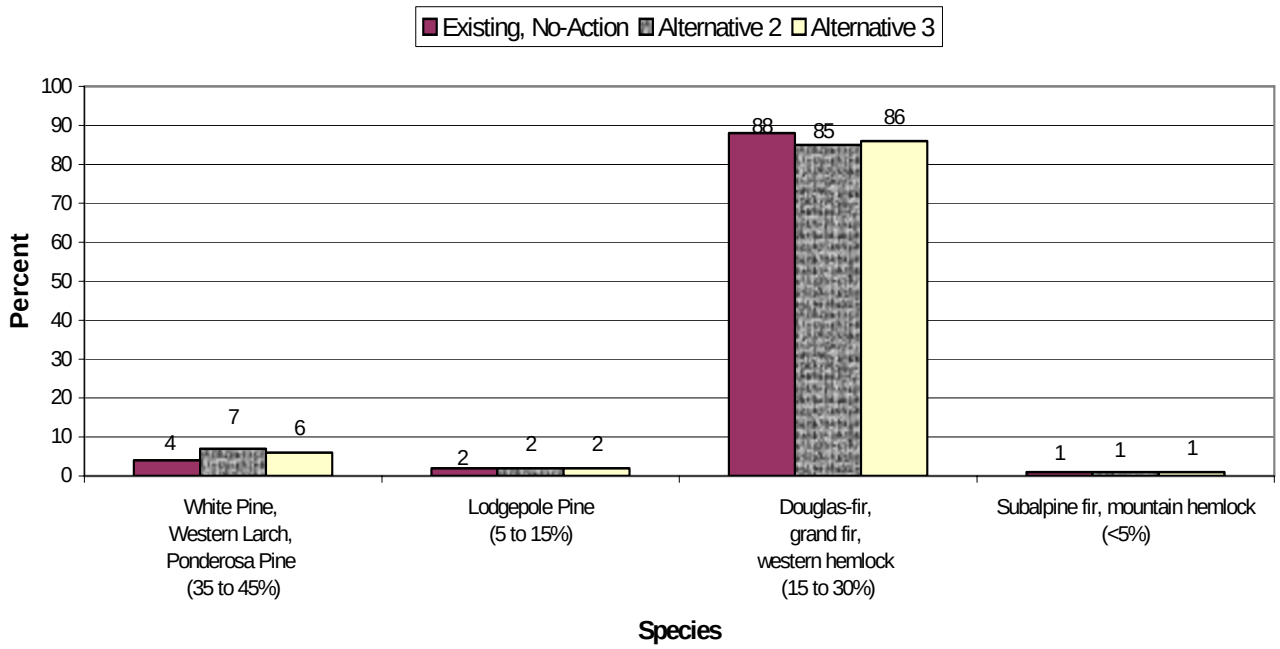
Commercial thinning activities would improve the stand species composition to long lived early serals (white pine/western larch/ponderosa pine abbreviated wp/wl/pp) on approximately 460 acres. This is because commercial thinning is focused in areas with a current component of wp/wl/pp. Regeneration and rehabilitation harvest would improve the species composition to long-lived serals on an additional 216 acres.. Directly, the commercial thinning, regeneration and rehabilitation activities of alternative 2 will show a trend toward healthy, sustainable ecosystems at the Prichard Murray Resource Area scale (increasing wp/wl/pp from 4% to 7% compared to the desired condition of 35-45%). Prescribed burning without regeneration activities converting to wp/wl/pp (on 1,725 acres- 80% dry habitat types and 20% moist habitat types) and fuel breaks do not change forest cover types. Modeling indicates a different species composition trend on the dry than moist habitats. On all except the driest habitat types, prescribed burning without activities to increase stand composition of wp/wl/pp trends stands away from the desired condition and toward decreased overstory tree cover and understories with increased climax species and shrubs (PF Doc. VEG-55). Prescribed burning on moist habitat types involves 342 acres, which is about 2% of the resource area. This is considered an indirect effect. On the driest sites (1,381 acres), this treatment does not seem to alter species compositions. Over the short term, prescribed burning does however reduce current fuel loadings on all sites. Overall considering direct and indirect effects, alternative 2 improves species composition toward desired conditions on 1% of the resource area. The changes in the resource area are not of a scale to show an improving trend at the Coeur d'Alene River Basin scale.

Direct and Indirect Effects to Forest Composition (Forest Cover Types) under Action Alternative 3

Commercial thinning activities would improve the stand species composition to long lived early serals (wp/wl/pp) on approximately 377 acres. This is because commercial thinning is focused in areas with a current component of wp/wl/pp. Regeneration and rehabilitation harvest would improve the species composition to wp/wl/pp on an additional 168 acres. Directly, the commercial thinning, regeneration and

rehabilitation activities of alternative 2 will show a trend toward healthy, sustainable ecosystems at the Prichard Murray Resource Area scale (increasing wp/wl/pp from 4% to 6% compared to the desired condition of 35-45%). Prescribed burning without regeneration activities (on 1,410 acres- 76% dry habitat types and 24% moist habitat types) and fuel breaks do not change forest cover types. Modeling indicates a different trend on the dry than moist habitats. On all except the driest habitat types, prescribed burning without activities to increase stand composition of wp/wl/pp trends stands away from the desired condition and toward decreased overstory tree cover and understories with increased climax species and shrubs (PF Doc. VEG-55). Prescribed burning on moist habitat types involves 342 acres, which is about 2% of the resource area. This is considered an indirect effect. On the driest sites (1,068 acres), this treatment does not seem to alter species compositions. Over the short term, prescribed burning does however reduce current fuel loadings on all sites. Overall, considering direct and indirect effects, alternative 3 does not improve species composition toward desired conditions of the resource area. The changes in the resource area are not of a scale to show an improving trend at the Coeur d'Alene River Basin scale..

Figure VEG-7. Comparison of Direct Changes to Forest Cover Types on FS managed lands in the Prichard Murray Resource Area (PF Doc. VEG-6, 15 and 23). (The desired future condition is in parenthesis)



4.B. Forest Structure

Existing Structure in the Coeur d'Alene River Basin and Prichard Murray Resource Area

Structural stages: Figure VEG-7 displays current forest structure and historic ranges of forest structure at the Coeur d'Alene River Basin scale. Approximately 70% of the resource area burned as stand replacement and mixed severity fires in 1889, 1910 and 1919. This has resulted in a similar age classes and structural stages (within 30 years) on much of the resource area. This is also the case for many other watersheds in the Coeur d'Alene Basin overall. Some level of structural diversity is needed to maintain ecological resiliency as well as desired wildlife habitats. The lack of structural diversity was addressed in the Forest Plan (USDA, 1987, page II-1 to 2; PF Doc. CR-001) with a goal to provide for future age distribution accomplished primarily with timber harvest.

Shrub/seedling/sapling stage

Forest stands less than 35 years old, most often resulting from natural events (such as fire) or past regeneration harvests. Stands usually have average tree diameters less than 5 inches at breast height. Some stands may have a considerable number of overstory trees; others may have no large tree component. This stage may also include stands that are non-tree cover such as shrubs and sod.

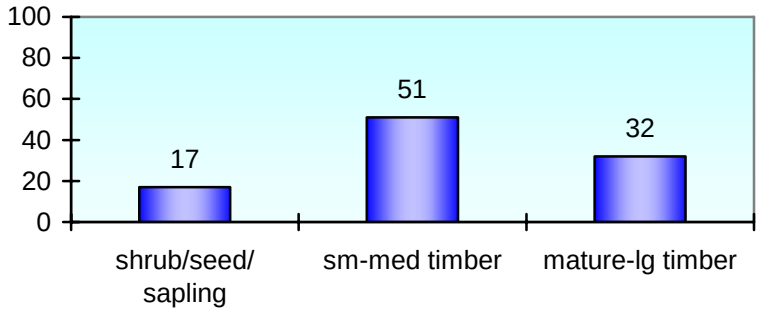
Small to medium stage

Stands generally 36 to 100 years old. These stands may have resulted from fires or may represent natural or artificial regeneration following harvest. Most of these stands can be expected to be quite dense, with high stocking levels and closed canopies. Average tree diameters are greater than 5 inches at breast height.

Mature/large stage

Stands over 100 years old, generally resulting from fires prior to 1900 and presently quite varied in appearance. Stand conditions differ in species composition, structure, and canopy closure as a result of disturbances caused by insect mortality, root disease and other pathogens, fires, past harvest activity, or growth potential of the site including soil conditions. Stands unaffected by these will be dense and have fairly closed canopies for the site. Stands affected by these disturbances may have canopies ranging from open to dense. Average tree diameters are greater than 9 inches at breast height. *A subset of the mature, large timber structural stage is allocated old growth (PF Doc. VEG-27, 28, 29, 30, 31, 32, 33, 34 35, 37 and 38).*

Figure VEG-8. Percent current and historic ranges of structural stages in the Coeur d'Alene River Basin (PF Doc. VEG-10).



CDA River Basin Historic Ranges	
Shrub/seedling/sapling	**15-50%**
Small-medium timber	**18-50%**
Mature-large timber	**23-66%**

Table VEG-3. Percent current structural stages and desired future conditions in the Prichard Murray Resource Area (PF Doc. VEG-16). *Currently, 16.2% of the resource area is allocated for old-growth management.*

Structural Stage	% of NFS lands in the PM Resource Area	PM Desired Future Condition
Shrub/seedling/sapling	7	10-30%
Small/medium timber	53	20-40%
Mature/large timber	38	40-55%

Figure VEG-8. Three examples of the forest structure in the vicinity of Road 942, the Avista powerline and Road 605 near King's Pass in the Prichard-Murray Resource Area.

The interplay of fires and insect and disease mortality has dramatically shaped the structural stages and within stand structure found within the Prichard Murray Resource Area today. Current structural stage percentages in the resource area are displayed in Table VEG-3 (PF Doc. VEG-16). Given successional development and current insect and disease conditions, multistoried, low density and broken canopies will become the predominant within stand structure at the basin and resource area scale. This within stand structure has increased risk of high intensity and severity wildfire. Currently the resource area average canopy cover, as modeled by FVS, is 60% overall.

Allocated old growth is a subset of the mature/large structural stage. A detailed review of the old growth in OGMU's 109, 110, 112, 115, 116, 123 and 127 took place with this analysis. Forest Plan old growth standards/definitions were used (PF Doc. VEG-27, 28, 29, 38) and validation (PF Doc. VEG-4) included recent field exams, field reviews and 2004 photo interpretation. This review found that 22 previously allocated stands no longer met old growth definitions; these stands were dropped from the old growth allocation (PF Doc. VEG-30, 31, 32 and 34). In addition, 24 stands not previously allocated, met old growth definitions and are now allocated (PF Doc. VEG-31, 33 and 34). Many stands currently meet the number of trees per acre over the defined habitat type group size threshold, but they do not meet the minimum age criteria to be allocated as old growth. Large areas of the OGMU's burned in 1889, 1910, and/or 1919. Clearly many stands in the OGMU's will qualify as old growth over the next 30-50 years (although this depends on future natural disturbances).

Table VEG-4. Old Growth Allocation in Prichard Murray Resource Area and Old Growth Management Units (OGMU's) before/after the allocated old growth review (PF Doc. VEG-30, VEG-31, VEG-32 and VEG-34).
Currently 16.2% of Prichard Murray Resource Area is allocated old growth.

OGMU	Compartment(s)	Total OGMU Acres	Allocated Old growth in 1999		Allocated old growth in 2006, before review		Allocated old growth in 2006, after review	
			acres	% of OGMU	acres	% of OGMU	acres	% of OGMU
109	152, 153	10,196	934	9.16	924	9.06	411	4.03
110	193, 194	12,127	2,309	19.04	2326	19.18	2,362	19.48
112	155, 195, 196	10,402	1,152	11.03	1135	10.91	1,506	14.48
115	191, 197	8,244	618	7.50	616	7.47	702	8.52
116	189, 192	8,265	897	10.85	895	10.83	965	11.68
123	183, 187	12,603	811	6.43	811	6.43	1,192	9.46
127	140, 182	9,346	1,777	19.01	1742	18.64	1,772	18.96
	TOTAL	**71,183**	**8,498**	**11.94**	**8449**	**11.87**	**8,928**	**12.52**

Landscape Arrangement: There have been changes over the last 100 years in the size and distribution (arrangement) of patches across the landscape of the Coeur d'Alene Basin (please refer to the Ecosystem Disturbances discussion above and PF Doc. VEG-1). The mean patch size has decreased since the early 1900's in the Coeur d'Alene Basin and patches have become more linear, with accompanying increases in edge and decreases in core/interior habitats (USDA, 1998, p. 42; PF Doc. CR-025).

In the Prichard Murray Resource Area, the extent and fire behavior of the 1860's, 1889, 1910 and 1919 fires created some large size patches. Within the Coeur d'Alene Basin, stand-replacement fires, while infrequent and displaying large patch sizes (originating after more severe fires), would often be modified by the low and mixed severity fires that occurred later in stand development. In terms of human changes to the landscape, about 20% of Forest Service managed lands in the Prichard Murray Resource Area has had regeneration harvest from 1951 to 2006.

Fire behavior is influenced by a large number of conditions, including weather,,vegetative conditions and the arrangements of these vegetative conditions at the stand and landscape scales. While fire behavior is strongly influenced by stand structure as it relates to live and dead fuel loadings and their configurations,

such as ladder fuels, an individual stand treated to a given prescription will probably be irrelevant to fire behavior and effects at the landscape scale because wildfires are often larger than individual treatment units (Graham et al., 2004, P. 29: PF Doc. VEG-R38). The spatial arrangement of vegetation influences both the growth of large fires and the variability of fire as it moves across the landscape. Creation of a vegetation mosaic, by design, allows the manager to control or at least ameliorate hazards of all kinds (Brackebusch, 1973; PF Doc. VEG-R23). Research shows the importance of changing the spatial pattern to the efficiency and effectiveness of treatment units in changing fire behavior at the landscape scale. Strategic area treatments create landscape fuel patterns that collectively slow fire growth and modify behavior while minimizing the amount of treated area required (Graham et al., 2004, p. 30; PF Doc. VEG-R13).

The desired patch size and arrangement for this resource area is based on the arrangement of moist and dry habitat types, likely fire-free intervals of 50-200 years or more with stand replacing fire intervals of about 200 years and a need to improve landscape fire resiliency within and immediately adjacent to the urban interface. The desired future condition for patch size is 100's-1000's acres in size (a minimum of 200-700 acres) with correspondence to broad landscape patterns of aspect, topography, etc. and creation of connectivity between patches where possible (PF Doc. VEG-7). This desired condition is within the context fire behavior for the Coeur d'Alene Basin. A patch analysis (PF Doc. VEG-7) was used to determine landscape pattern for the Prichard Murray Resource Area.

Direct and Indirect Effects to Forest Structure Under the No-Action Alternative

Structural stages: No action represents a continuation of the trend away from desired conditions (Figure VEG-10). Depending on health, most areas currently in the small medium size (these areas burned in 1910 and 1919 fires) will enter the mature/large size in the next 15-20 years. In 20 years almost 80% of the Prichard Murray Resource Area will be mature/large. Historically, mature/large areas were dominated by closed canopies (~70%+) of white pine and western larch on the moist habitat types (74% of the resource area), or more open canopies of ponderosa pine mixed with western larch and some Douglas-fir on dry habitat types. Prichard Murray landscape conditions now tend to be dominated on both moist and dry habitat types Douglas-fir and grand fir. Over time, low canopy conditions will dominate the landscape with many areas remaining stalled in small, young tree structures and/or multi-storied stands. The most concise reference describing expected development pathways is Byler and Hagle (2000; PF Doc. VEG-R34—FHP Report No. 00-09, 10 and 11.

The current modeled average canopy cover of 60% overall would decline to approximately 40% over the next 100 years (PF Doc VEG-6). Many of these stands are not likely to provide the same mature canopies/structures as stands containing large white pine, larch or ponderosa pine that were once a major component of the Coeur d'Alene River Basin and Prichard Murray Resource Area. Although mature/large timber stands may contain large trees and provide some old structural components, openings caused by root diseases and other pathogens and insects will be common. Within-stand structures are likely to be multi-storied with low and broken canopies and multi-aged over time. This mixed storied/mixed aged structural stage (dominated by df/gf/wh) may be more susceptible to disturbances ranging from fire to insects/diseases and windfall and certainly the effects of disturbances are not likely to follow historic pathways. For structural stages and within stand structure, no action represents a continuation of the trend away from desired conditions (Figure VEG-10). There would be no short term change in allocated old growth under the no action alternative.

Landscape Arrangement: Overall the current average patch size is 137 acres. If harvest had not taken place over the last 100 years, the modeled average patch size would have been 192 acres. The differences in the current and modeled without harvest numbers are valuable only as a trend. This trend is consistent with the rest of the Coeur d'Alene Basin (USDA, 1998; PF Doc. CR-025). Currently the average patch size of the mature/large structural stage is 173 acres, for the small/medium structural stage is 257 acres and for the shrub/seedling/sapling structural stage is 36 acres. The small/medium and mature/large classes are within the desired future condition ranges; the young class is not. Without major disturbance, the existing patch sizes and landscape patterns in the short term would remain similar to the existing condition. However, it is likely that disturbances that could alter the patch sizes in the longer term given current stand conditions. Therefore,

under the No-Action Alternative, some changes in structure within the patches/patterns can be expected, but the extent of change is not entirely predictable in the long term. In addition, over time the potential for large scale stand disturbances including wildfire will increase as the landscape becomes more homogenous (multi-storied with low and broken canopies and multi-aged over time) at the landscape scale and dominated by shade tolerant species.

Direct and Indirect Effects to Forest Structure Under the Action Alternatives

Structural stages: At the Prichard Murray Resource Area scale, a 3 to 7 percent per decade increase in the young structural stage and related decreases in older structural stages would be needed over the next 50 years to meet the desired future condition (see Table VEG-3 and PF Doc. VEG-8). Alternative 2 directly increases structural stage by 1.2% and alternative 3 by .8%. The action alternatives directly change structural stage by about 1 percent (see figure below and VEG-23). Proposed regeneration harvests change small/medium and mature/large structural stages to the seedling/sapling structural stage. Proposed regeneration harvest will provide a long-term improvement in stand (with 2 storied stands) and landscape structures and increase resiliency to native change agents (such as insects, pathogens and fire) due to species conversion to dominance by wp/wl/pp. Considering that during the last 5 decades an average of 4% per decade of the resource area moved into the young structural stage, these levels will need to be increased over the next few decades to meet the desired condition. For the decade 2001-2010, movement into the young structural stage would be 1.9% for alternative 2 and 1.6% for alternative 3. Overall, forest structures in the resource area will be similar to the no action alternative (explained above) and dominated by the untreated areas within the resource area, trending away from the desired condition. Proposed prescribed burning without regeneration to long lived early serals (wp/wl/pp), fuel breaks and commercial thinning would not change structural stage. Modeling indicates that on all except the driest habitat types, prescribed underburning without regeneration activities trend stands toward less resilient multi-storied stand structures at a faster rate than no action (PF Doc. VEG-55). Prescribed burning on moist habitat types involves 342 acres, which is about 2% of the resource area. This is considered an indirect effect. On the driest sites (1,068 acres), these treatments do not seem to alter structural stage or the rate of change. Over the short term, prescribed burning does however reduce current fuel loadings on all sites. Overall, alternatives 2 and 3 show small trend toward healthy, sustainable structures within the Prichard Murray Resource Area (Figure VEG-9 displays the structural changes by alternative as well as the desired ranges). This improvement is not sufficient to show an improving trend at the Coeur d'Alene River Basin scale.

Alternative 3 does not propose harvest or prescribe burn treatments in any allocated old growth. Alternative 2 proposes commercial harvest and prescribe burn treatments in some areas of allocated old growth. In summary, Alternative 2 proposes:

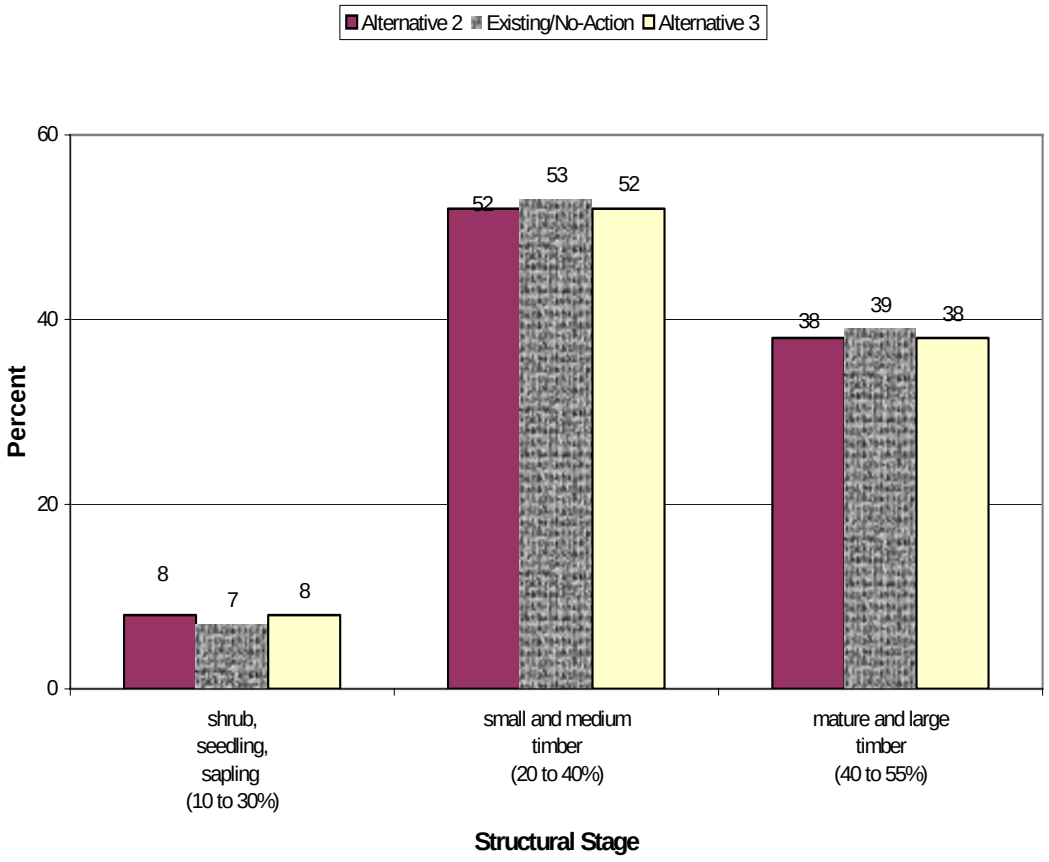
- *310 acres of prescribe burning without commercial harvest with the objective of fuel reduction;*
- *80 acres of commercial harvest improvement cutting/stocking control followed by prescribed burning with the objectives of increasing resiliency of the older/larger trees by removing trees that may be competing with the older/larger trees and fuel reduction; and*
- *a 48 acre shelterwood regeneration commercial harvest and prescribed burning with the objectives to reduce fuels and establish long lived early seral species in a stand with low current overstory and very high levels of past and current insect and disease mortality.*

The noncommercial and commercial improvement cutting/stocking control harvest will continue to be maintained as allocated old growth as they will be designed to maintain characteristics to meet old growth definitions. The 48 acres regeneration harvest will be dropped from old growth allocation because the stand will move to the seedling/sapling structural stage. The OGMU's involved with these Alternative 2 treatments are above the 5% defined level in Forest Plan OG standard 10c and d. When the 48 acres treatment is dropped from allocation in OGMU 112, the OGMU will still be above the 5% defined in this standard. The differences related to alternative treatment within allocated old growth are disclosed at PF Doc. VEG-37 and discussed in the Consistency with Forest Policy and Legal Mandates in the Forest Plan

Standards for Old Growth Standard 10d section of this specialist report. Additional information regarding Forest Plan Old Growth Standards is found at the end of the Vegetation section.

In 100 years, areas with proposed regeneration treatments would have about 60 percent canopy cover. The stands treated with daylight/commercial thinning would have about 50 percent canopy cover. In 100 years, areas without treatment would have about 40 percent (PF Doc. VEG-6). Future treatments over the next 20-40 years may include commercial thinning (in some cases this would be the second commercial thinning), regeneration harvest or precommercial tending treatments such as precommercial thinning, release, improvement harvest and/or understory prescribed burning.

Figure VEG-10. Comparison of changes in the percent forest structure on lands managed by the Forest Service in the Prichard-Murray Resource Area (PF Doc. VEG-16 and 10). *Desired range is provided in parenthesis.*



Within stand structural changes: The purpose and need of the proposed action included reduction of fuels and creation of a landscape mosaic of healthy stands. Fuel reduction is generally proposed to adjust fire behavior (if and when it may occur) and influence burn severity (what is left after the fire). Forest structure is one of many factors influencing fire behavior and burn severity (PF Doc. VEG-R83 and VEG-R84). Forest structure is ecologically relevant at both the landscape (discussed below) and within stand scales. Treatments to forest structure to reduce burn severity are not economically possible at the landscape scale. Instead these treatments are focused in areas of high human value. For the Prichard Murray Resource Area, these include areas immediately adjacent to major roads (escape routes), utility corridors and shared boundary between private and Forest Service. Table VEG-6 displays the success of action alternative to treat these areas.

Table VEG-5. Treatment of 'within stand structure' under the Action Alternatives (PF VEG-56).

Treatment Area	Alt. 2	Alt. 3
Treatment along major roads	51%*	40%
Distance treated along major roads in moist old growth stands (feet)	1,631	0
Distance treated along major roads in dry old growth stands (feet)	4,844	0
Total distance treated along major roads in old growth (feet)	6,475	0
Treatment along active utility corridors	100%	100%
Treatment along private/Forest Service boundary (south, southeast and southwest aspects only)	35%	35%

** Modifying Alternative 2 to treat only old growth in the driest habitat types would result in 48% treatment along major roads.*

Landscape Arrangement: In the Prichard Murray Resource Area, the extent and fire behavior of the 1910, 1889 and previous fires created large patches that now represent the older age classes in the resource area. Proposed changes in patch size by alternative are displayed in the Table VEG-5.

Table VEG-6. Changes in Average Patch Size (acres) in the Prichard Murray Resource Area.

Structural Stage	% of Prichard Murray Resource Area	Existing average patch size and No Action patch size (acres)	Average patch size under Alternative 2 (acres)	Average patch size under Alternative 3 (acres)
Young	7	36	36	36
Small/Medium	53	257	248	248
Mature/Large	38	173	171	172
	Overall	137	133	133

The desired future condition for patch sizes is hundreds to thousands of acres (with a minimum of 200 to 700 acres and connectivity where possible). The current patch size of the young size class while small is only slightly smaller than if past regeneration harvests would not have taken place because the landscape has a number of natural nonforest shrub-dominated features that tend to decrease the overall patch size of this stage. Currently the patch size of the small/medium structural stage is within the desired range and the mature/large structural stage is close to the minimum of the desired range. The average patch size of proposed regeneration treatments is 66 acres for Alternative 2 and 81 acres for Alternative 3 (these are patches created by treatments not necessarily unit sizes). Activities under the action alternatives do not meaningfully change average patch size of any of the structural stages. The action alternatives neither positively nor negatively trend from the current condition, which is within or close to the desired condition.

The amount of allocated old growth within the Prichard Murray resource area is 3,007 acres or 16.2% (PF Doc. VEG-34). The allocated old growth within the Prichard Murray resource area involves 13 patches with an average patch size of 255 acres (PF Doc. VEG-35). Allocated Old growth within the seven OGMU's involved in the Prichard Murray resource area is 8,928 acres or 12.5% (PF Doc. VEG-34). This includes 35 patches with an average patch size of 284 acres (PF Doc. VEG-35). The patch size of future old growth would develop over the next 50 years from stands currently in the small/medium stage that combine with current allocated old growth. Depending on disturbance, these areas have the potential of becoming large patches of old (well over 300 acres in size). Several potential locations (across a range of habitat types, species, wildlife habitat needs, etc.) of the small/medium and mature/large structural stages were mapped as potential future old growth by the silviculturist (PF Doc. VEG-35). Over time the addition to allocated old growth will result in 22% of the Prichard Murray resource area allocated as old growth. These areas represent 1,086 acres total with average block size (in some cases after linking to current allocated old growth) of 1,139 acres and range in block size from approximately 914 to 1,393 acres. These areas, in addition to proposed treatment areas, allow a full range of options for successional development pathways in large patches to meet needs of future planning within the context of the desired landscape arrangement in this wildland urban interface area.

The prescribed treatments strive to trend treatment patches toward the size and extent of fire disturbances before the 1900's on these landscapes. Models and observations of landscape-scale fire behavior and the impact of fuel treatments clearly suggest that a landscape approach is more likely to have a more substantial impact on fire spread, intensity, perimeters and suppression capability than an approach that treats individual stands in isolation. Treating small or isolated stands without assessing the broader landscape will most likely be ineffective in reducing wildfire extent and severity (Graham et al., 2004, page 29; PF Doc. VEG-R13). While fire severity increased with treatment age but decreased with unit size in the analyses of the Rodeo/Chedeski (pages 1 and 9; Finney and McHugh, 2004; PF Doc. VEG-R62) and the Hayman Fires (Graham, 2003, pages 9 to 18; PF Doc. VEG-R35), no single management prescription will achieve multi-resource objectives across all stands within a landscape. Silvicultural systems using density and species management, along with the judicial use of prescribed fire, are key to managing western forests (Graham et al., 2004, page 23; PF Doc. VEG-R13). Treatment areas focus on areas with the highest insect and disease mortality and current risk (regeneration treatments) as well as areas to increase overall health and resiliency (both regeneration and thinning treatments) in a connected landscape block arrangement using the inherent arrangement of habitat type groups, aspect, and current structure (PF Doc. VEG-8) along with the desired arrangement to decrease fire risk in the wildland urban interface.

Thinning and shelterwood type harvests (including the irregular group shelterwoods over large areas) are intended to simulate the extent and stand arrangement of fire disturbances that occurred historically in this area, and provides for the retention of individual trees and groups of trees that may have survived a fire. Harvest does not duplicate all aspects of fire disturbances because trees killed by fires prior to Euro-American settlement were not harvested. Generally with fire disturbances before the early 1900's the dead trees remained standing until decay progressed to a point where they fell over. Some snags may have stood for decades. Natural regeneration after fire was dependent on surviving, scattered remnant trees (usually fire-resistant species), seeds that survived on live and dying trees, or seeds carried by wind and animals from adjacent seed sources while action alternatives provide desired planted regeneration.

The figures below are generated through the Stand Visualization System or SVS (McGaughey, 2004; PF Doc. VEG-R30), which is a tool included with FVS (discussed earlier under Forest Vegetation Analysis Methodology) depicting stand conditions based on individual stand components, such as trees, shrubs and down material. The images produced by SVS modeling, while somewhat abstract, provide an easily understood representation of stand conditions, silvicultural treatments and forest management alternatives.

Figure VEG-11. SVS Model Depiction of a NO ACTION Scenario for a typical stand proposed for thinning and regeneration combination now and in 50 years if no treatment takes place. Note that a portion of the stand has western larch (yellow trees) and the other half is Douglas-fir/grand fir with loss of canopy due to root disease over the 50 year period. Also note that drawings are not to scale. (PF Doc. VEG-6)

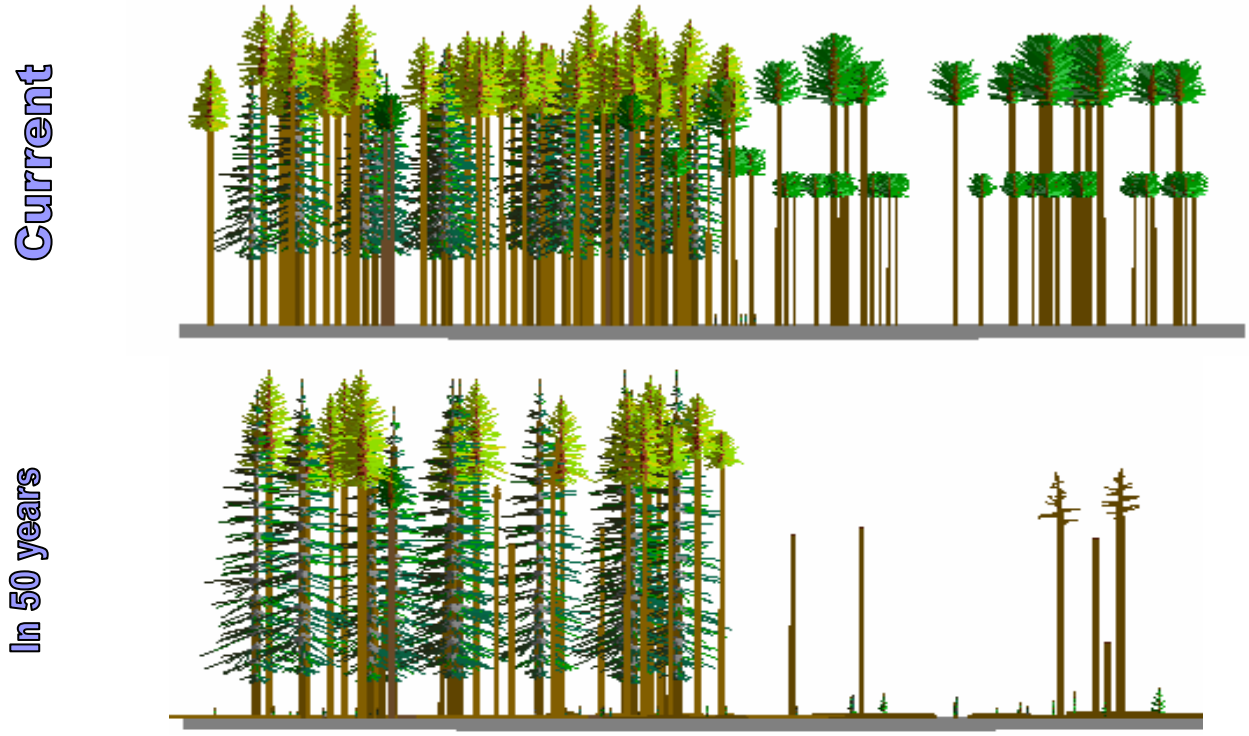


Figure VEG-12. SVS Model Depiction comparing a typical stand proposed for thinning now and after treatment. Note that drawings are not to scale. (PF Doc. VEG-6)

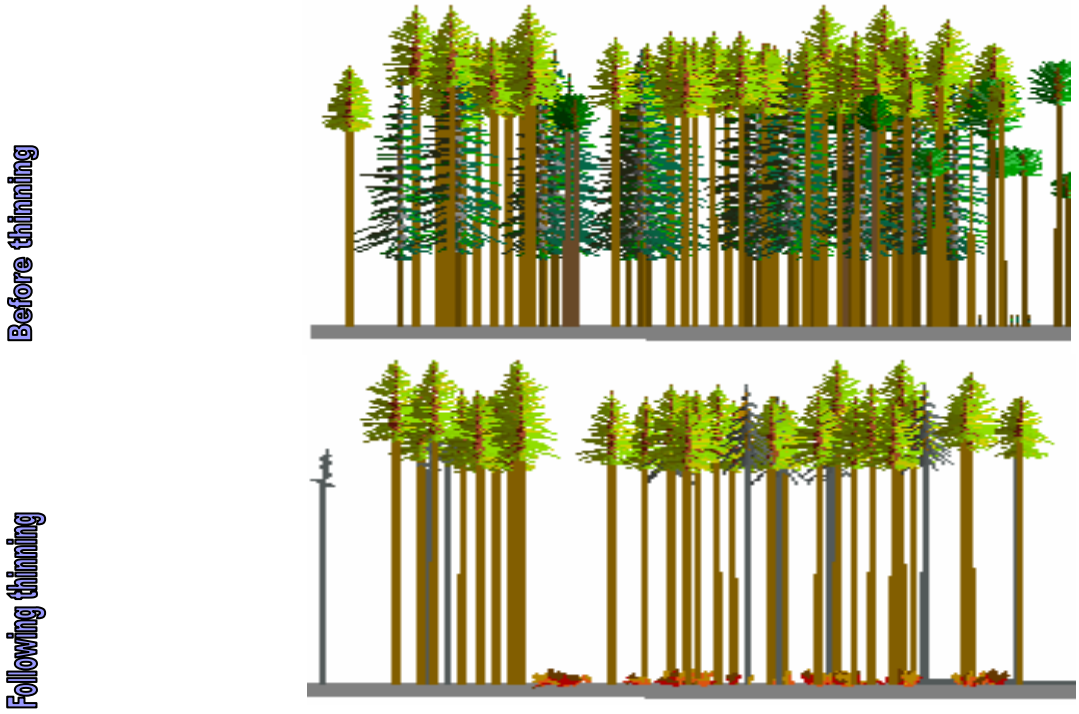
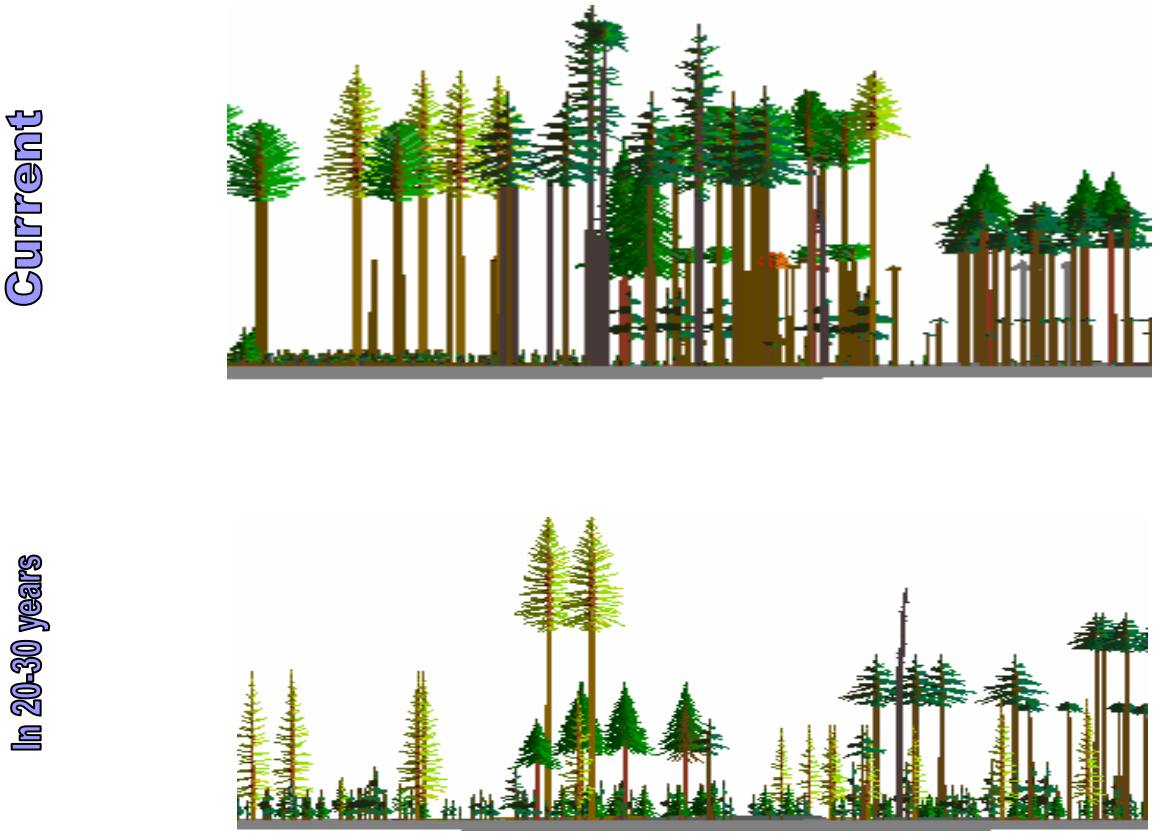


Figure VEG-13. SVS Model Depiction of a typical stand proposed for regeneration now and what that stand will look like 20-30 after treatment. Also note that drawings are not to scale. (PF Doc. VEG-6)



Forest Service policy FSM 2471.1 (PF Doc. VEG-25) directs land managers to normally limit the size of harvest openings created by even-aged silvicultural methods to 40 acres or less. With some exceptions, creation of larger openings is allowable with Regional Forester approval. Alternative 2 includes one unit that could exceed the 40-acre harvest created opening size, as displayed in the table below. Alternative 3 does not include units that will exceed the 40-acre harvest created opening size. Note- the design of the half commercial thin (resulting in no regeneration opening) and half group shelterwood opening units in Alternative 2 and 3 are combinations that will not result in regeneration openings greater than 30 acres.

The proposed openings trend toward the scale and pattern comparable to the desired condition developed to attain increased fire resiliency in the wildland urban interface and immediately adjacent lands within the context of inherent landscape patterns (aspect, slope, habitat type, etc.) and fire history of both the Coeur d'Alene Basin and Prichard Murray Resource Area (PF Doc. VEG-8). Openings fit the definition of a shelterwood harvest; units would have up to 25 trees per acre in groups (1/2 to 5 acres in size) and single trees at irregular spacing. Following harvest and prescribed burning, the regeneration openings of the unit would have scattered areas of live and dead trees.

Treatments were designed to take advantage of the current landscape arrangement of resilient components (both on the stand and landscape scales) and treatments centered on areas where fuel treatment is a priority and areas with the highest concern in terms of insect and disease mortality, risk and location of man-made structures (powerline, homes, egress roads, etc.). The spatial patterns of fuel treatments in landscapes would most likely determine their (the areas of fuel treatments) effectiveness in modifying wildfire behavior (Hessburg et al., 2000 In: Graham et al., 2004, p. 29; PF Doc. VEG-R13). Alternative 2 treats a total of 2,423 acres (13% of the resource area) for an average treatment patch size of 58 acres (PF Doc. VEG-7). Alternative 3 treats at total of 1,977 acres (11% of the resource area) for an average treatment patch size of 55 acres (PF Doc. VEG-7). Fuel treatments are expected to change fire behavior but not necessarily stop fire (Graham et al, 2003, p. 11; PF Doc. VEG-R35). Treating small or isolated stands without assessing the broader landscape would most likely be ineffective in reducing wildfire extent and severity (Graham et al., 2004, p. 29; PF Doc. VEG-R13). Random fuel treatment arrangements are extremely inefficient in changing fire behavior requiring perhaps 50 to 60 percent of the area to be treated compared to 20 percent in a strategic fashion (Finney, 2001 In: Graham et al., 2004, p. 30; PF Doc. VEG-R13).

Most of the proposed regeneration units have high Douglas-fir component with root disease mortality. The design and size of treatment units under both action alternatives focused on fire, vegetative, wildlife and visual objectives within other resource management objectives and constraints. Fire resource concerns included landscape arrangement of fuels over the short and long term in the wildland urban interface and areas immediately adjacent (refer to the Specialist's Report on Fire/Fuels, PF Doc. SR-01). Vegetative objectives focused on areas where potential existing long lived serals would be treated to increase resiliency and areas with high insect and disease mortality and risk.

Table VEG-7. Units with openings exceeding 40 acres under the Action Alternatives (PF VEG-25).

Unit #	Alternative	Unit Acres	Total Opening (Acres)	Additional Information
16	2	48	48	Shelterwood harvest unit of Douglas-fir/grand fir dominated stand (with root disease mortality).

4.C. Cumulative Effects to Forest Vegetation

Cumulative effects are conditions that would result from the proposed action in addition to the incremental impacts of past, ongoing and reasonable foreseeable actions. The spatial scale of planned activities is important to consider in the discussion of effects. Scales and hypothetical scale sizes include: plant (the plant and close proximity), site (less than few acres in size), stand (2-50 acres in size), landscape (50 to 100's or 1000's of acres), watershed (such as the Prichard Creek) and basin (such as the Coeur d'Alene Basin). This vegetative effects analysis focused on the stand, landscape, watershed and basin scales. The cumulative effects analysis is also focused at these scales.

Forest vegetation in the majority of the Resource Area will be dominated by the vegetative trends discussed under no action. In terms of important management activities, fire suppression of areas developing along ecological successional pathways is the primary action to be considered when evaluating cumulative effects to vegetation. A full discussion of the cumulative effects of fire suppression is provided in the Specialist's Report on Fire/Fuels (PF Doc. SR-01). Discussion of successional development trends is found at CR-025.

The existing condition is a function of past natural disturbances and management activities combined with successional growth. This existing condition was used for analysis of the proposed action. All Forest Service activities associated with past timber sales or other decisions have not been completed within the Prichard Murray Resource Area (there are currently ongoing activities). Over the next 5 years, planned ongoing activities include: 31 acres of prescribed burning; 1 acre of hand piling and burning of fuels; 16 acres of planting; 116 acres of replanting; 55 acres of release; 4 acres of road ripping; 2 miles of road obliteration; 668 acres of precommercial thinning; 453 acres of pruning and numerous acres of exams (PF Doc. VEG-2). Planned activities more than 5 years from now include: 667 acres of precommercial thinning and 513 acres of pruning (PF Doc. VEG-2). This analysis considers that activities part of previous decisions (such as burning, planting, replanting and release scheduled in the next 5 years) will be implemented. The effects have been previously analyzed and are considered as part of the Prichard Murray existing condition. Other planned activities (such as precommercial thinning and pruning) will be analyzed previous to specific decisions and implementation.

Planned activities such as weed treatments, road ripping or road obliteration have no cumulative effect to vegetative composition, structure, arrangement and disturbance types at the stand and landscape or larger scales. At the plant and site scales, roads proposed for permanent closure or decommissioning would eventually provide forest cover, although they would be likely to go through a prolonged period (about 20 years) of grass, forbs and/or shrub dominance.

The planned fuel break projects only have vegetative effects directly adjacent to the treatment. This is most often not even at the stand scale. The intent and design of these projects is to directly change fuels and fire effects in the area immediately adjacent to the treatment, and most often only have very limited effects at the stand, landscape and watershed scales. In other words, the mosaic of vegetation that results from these treatments would create interruptions that would reduce the potential for high intensity fire on only a very limited scale in this resource area. These fuel management activities would extend or reinforce the positive trends of the proposed action which result in improved trends of fire effects, vegetative composition/structure and fuels at broader scale. The effects to vegetative composition, structure, and arrangement depend on the type and scale of the disturbance or fire and the conditions and arrangements at the time of that disturbance.

Site preparation, pre-commercial thinning, pruning, weeding, release and/or understory slashing reasonably would occur during the next 5-20 years within areas treated by the proposed action. These activities will maintain the positive trends of the proposed action at the stand, landscape and watershed scales. Effects of treatments (such as weeding or release) associated with regeneration establishment within proposed treatment areas is included in alternative analysis. Tending activities (such as pre-commercial thinning or pruning) that follow regeneration establishment will be prioritized and analyzed in detail before implementation. The overall objective of all of these activities is to allow the long-lived early seral species

white pine, western larch and ponderosa pine to better compete with the more shade tolerant species on site. These activities trend and maintain the trend to desired forest composition and structure. These tending activities would also improve the growth and vigor of desired (naturally regenerated and/or planted) trees, and/or prepare for other activities that will improve the fuel configuration of stands. Pruning of white pine reduces the potential of infection by white pine blister rust and also improves the tree's ability to survive infection by removing infected branches. Pruned trees have a better chance of reaching maturity and contributing to the desired forest structure and composition (Schwandt et al., 1994; PF Doc. VEG-R19). Thinning, pruning and understory slashing may also prepare trees and sites for underburning while stands are pre-commercial in size in the case of ponderosa pine and western larch. Administrative access will be necessary to accomplish long-term tending activities and will be vital to economically attain desired stand conditions. Because these activities often do not generate funding, monies are often not available to establish or reestablish some level of access to complete these tending activities. Future decisions concerning administrative access must consider that 'walk in only' access increases the cost (both contract and agency) of stand tending activities by 20-50% above the same activities with road access. This is due to the extra time required to access sites in addition to associated increased health risks related to the increased length of time to attain emergency medical treatment for workers.

Future timber harvest on private lands within the resource area is reasonable, and becomes more likely as stands initiated following the 1889, 1910 and 1919 fires mature. Private land harvests in and around the resource area commonly have the objective of salvage and/or partial harvest to remove trees of high economic value. Road construction/reconstruction associated with these harvests may require rights-of-ways across FS managed lands. A rights-of-ways exchange has been proposed for the Fancy Gulch area and the Coeur d'Alene Placer in the Alder/Gold Gulch area. These have not been analyzed or approved. Regeneration in private harvested areas is usually natural and results from the seed source of trees remaining following harvest. This natural regeneration is most often dominated by Douglas-fir, grand fir and western hemlock. Regeneration limited to these species will not contribute to the trend toward desired species composition of the action alternatives and the landscape arrangements are determined by ownership patterns rather than a strategic fashion to change fire behavior. Vegetative recovery within road prisms depends on the long term use of the roads. Roads not maintained as open roads would eventually provide forest cover, although they would be likely to go through a prolonged period (about 20 years) of grass, forbs and/or shrub dominance. Roads maintained as open generally do not produce forest cover and may allow access for human uses including berry picking, salvage/firewood gathering, etc. on Forest Service managed lands as well as private lands. These uses do not change vegetative composition, structure or arrangement at the stand and landscape or larger scales because they are the activities that are usually intermittent and dispersed as well as the activities usually represent small percentages of stands.

Timber harvest is also foreseeable by the BLM within the resource area in the Dream Gulch/Alder Gulch area. This harvest has yet to be proposed to the public, however, the BLM has indicated that the proposed treatment parcels involve about 100 acres and treatment will include understory removal as well as salvage, mechanical treatment of fuels and broadcast burning with reforestation activities occurring. These actions will create more resilient areas within the Prichard Murray Resource Area however the scale of the treatment will dwarfed at the landscape scale.

5. Consistency with Forest Policy and Legal Mandates

Forest Plan direction provides that timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished by maintaining stand vigor and diversity of plant communities and tree species (USDA, 1987, page II-8; PF Doc. CR-02). Direction regarding vegetation is also guided by the Forest Plan standards for old growth (USDA, 1987, page II-29; PF Doc. CR-02), timber (USDA, 1987, pages II-31 to 32; PF Doc. CR-02), forest protection (USDA, 1987, pages II-38 to 39; PF Doc. CR-02) and individual management areas (USDA, 1987, pages III-1 to 87; PF Doc. CR-02).

Forest Plan Standards for Old Growth

Old Growth Standard 10a: A definition for old growth has been developed by a Regional Task Force and is being used by the Forest (Green et al., 1992; PF DOC VEG-R20).

This standard applies to two landscape scales; the old growth management unit (OGMU) scale (for this resource area includes OGMU's 109, 110, 112, 115, 116, 123 and 127) and the IPNF scale. Allocation of old growth within the Prichard Murray Resource Area and related old growth management units is based on current and widely accepted science and follows current old growth definitions from the Forest Plan (PF Doc. VEG-28), the Regional Task Force Report including "Old Growth Forest Types of the Northern Region" (Green and others, 1992, corrected 2/2005; PF Doc. VEG-R20) and Forest Supervisor letters of direction for implementing Forest Plan old growth standards (PF Doc. VEG-28). This standard is fully met under all alternatives.

Old Growth Standard 10b: Maintain at least 10 percent of the forested portion of the IPNF as old growth.

The 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004, PF Doc. CR-026) discloses that the IPNF total allocated old growth at the end of 2004 was 278,552 acres (12.1% of IPNF forested acres). The IPNF Forest Plan old growth allocation of 10% (231,000 acres) was distributed among the districts as documented in the Forest Supervisor's May 7, 1991 letter regarding the "Forest Plan Explanation: Implementing Old Growth Standards" (PF Doc. VEG-28). The Coeur d'Alene River Ranger District was responsible for allocating 56,000 acres for old growth management (with 18,000 acres on the former Fernan Ranger District and 38,000 on the former Wallace Ranger District). The Coeur d'Alene River Ranger District had a total of 65,260 acres (USDA, 2004, p. 71; PF Doc. CR-026).

The 2004 Forest Plan Monitoring and Evaluation Report also discuss the use of a multi-scale approach on the IPNF to monitor old growth based on two separate, independent tools:

1) Forest Inventory and Analysis (FIA) data is used to calculate forest-wide and mid-scale old growth percentages; and

2) an IPNF stand map displays all stands allocated for old growth management, with old growth data recorded in the TSMRS database.

Based on the FIA data summarized in the 2004 Forest Plan Monitoring and Evaluation Report, the IPNF proportion of old growth is 12.85% (with 90% confidence intervals of 10.55% to 15.27%). The FIA old growth estimate was revised in 2006 as part of the Draft Comprehensive Evaluation Report (CER) which is part of the set of documents for the IPNF Proposed Land Management Plan (see http://www.fs.fed.us/kipz/documents/plmp/index.php). The CER document 'Estimates of Old Growth Percentages and Snag Density on the Idaho Panhandle National Forest' (PF Doc VEG-R22) found 11.8% of the IPNF was old growth (with a 90% confidence interval of 9.5% to 14%). As discussed above, the amount of allocated old growth based on the IPNF stand map and recorded in TSMRS is 12.1%. Together, these two monitoring tools offer compelling evidence that the IPNF is meeting Forest Plan standards for the amount of old growth to be retained.

Full discussion of the multi-scale approach (including statistics) to assess old growth on the IPNF is found in the 2004 IPNF Forest Plan Monitoring and Evaluation Report, pages 66 through 74 (PF Doc. CR-026). In addition, the following items are included in the project file (PF Doc. VEG-28 and 29) to allow understanding of the assessments of old growth on the IPNF and the methodology and findings used for the FIA old growth findings: Review of Old Growth Assessments for the IPNF, Zack, 2006; Estimates of Old Growth Percentages and Snag Density on the IPNF, Bush and Lundberg, 2006; Calculating Years to Grow to Breast Height for Estimating Old Growth Percentages from FIA Data, Zack, Berglund and Bush, 2006; and 1/10/06 table of findings for IPNF FIA Summary Database Landscape Areas and map.

In 2006 several wildfires burned in areas of allocated old growth on the IPNF. These fires burned in mosaics which resulted in areas of total overstory/understory mortality, as well as areas of underburning with variable

amounts of overstory/understory mortality. The effects of these fires to allocated old growth cannot yet be fully assessed. Field observations of areas burned in 2006 indicate significant areas of the allocated old growth within fire perimeters likely will still meet old growth definitions. However, given the worst case scenario that all areas of old growth within the fire perimeters could no longer be allocated as old growth, the 2004 Forest Plan Monitoring and Evaluation Report level of IPNF allocated old growth of 12.1% would drop to 11.9% (see PF Doc. VEG-33). Even given this worst case scenario, this Forest Plan standard would still be fully met.

Alternative 1 (no action) and Alternative 3 **DO NOT** propose activities in allocated old growth. Alternative 2 proposes treatment of 438 acres of allocated old growth (310 acres of prescribed burning without commercial harvest, 80 acres of commercial thinning/improvement harvest with prescribed burning and 48 acres of commercial regeneration harvest). The noncommercial and commercial thinning/improvement harvests will continue to be maintained as allocated old growth as they will be designed to maintain characteristics to meet old growth definitions. The 48 acres of regeneration harvest will be dropped from old growth allocation because the stand will move to the seedling/sapling structural stage. Based on the numbers above, from the 2004 Forest Plan Monitoring Report (PF Doc. CR-026) and the 2006 wildfires worst case scenario, when the Alternative 2 regeneration harvest treatment areas is dropped from old growth allocation or, in terms of the worst case, if all the treatment units were dropped from old growth allocation, the resulting IPNF old growth would be 11.9% (still well above the 10% required) and 63,138 acres of allocated old growth on the Coeur d'Alene River Ranger District (still well above the 56,000 acres required). All alternatives are consistent with this Forest Plan standard.

Old Growth Standard 10c): Select and maintain at least five percent of the forested portion of those old growth units that have five percent or more of existing old growth.

and

Old Growth Standard 10d: Existing old growth stands may be harvested when there is more than 5% in an old growth unit, and the Forest total is more than 10%.

These standards apply at the Old Growth Management Unit (OGMU) scale only. The Prichard Murray Resource Area is within a portion of OGMU's 109, 110, 112, 115, 116, 123 and 127 (PF Doc. VEG-30). As displayed in Table VEG-4, OGMU's 110, 112, 115, 116, 123 and 127 currently have more than five percent of the OGMU allocated as old growth (PF Doc. VEG-34). As displayed in Table VEG-4, OGMU 109 only has 4% of the OGMU allocated because after a concerted effort, no additional old growth was found that met minimum old growth definitions/criteria. The five percent standard would be fully met under all alternatives. Consistency with the 10 percent standard is addressed under standard 10b.

Alternative 1 (no action) and Alternative 3 **DO NOT** propose activities in allocated old growth. Alternative 2 proposes treatments in 438 acres of allocated old growth (310 acres of prescribed burning without commercial harvest, 80 of commercial thinning/improvement harvest with prescribed burning and 48 acres of commercial regeneration harvest). The noncommercial and commercial improvement cutting/stocking control harvest will continue to be maintained as allocated old growth as they will be designed to maintain characteristics to meet old growth definitions. The 48 acres regeneration harvest will be dropped from old growth allocation because the stand will move to the seedling/sapling structural stage. The OGMU's involved with these Alternative 2 treatments are above the 5% defined level in Forest Plan OG standard 10c and d. When the 48 acres treatment is dropped from allocation in OGMU 112, the OGMU will still be above the 5% defined in this standard. The large 2006 wildfires did not occur within OGMU's 109, 110, 112, 115, 116, 123 and 127 (PF Doc. Veg-33). Consistency with the 10 percent standard is addressed under standard 10b. All alternatives are consistent with this Forest Plan standard.

Table VEG-8. Alternative 2 proposed treatment units in allocated old growth.

Unit	Proposed Treatment	Treatment Unit Acres	Habitat Type Group	Acres of Treatment Unit in Allocated Old Growth	OGMU	% Old Growth in OGMU if treated and dropped from allocation
38	Prescribe burn (only)	127	Douglas fir	104	123	8.1
41	Prescribe burn (only)	67	Douglas fir	67	123	8.1
49	Prescribe burn (only)	85	Douglas fir	34	112	12.7
50	Prescribe burn (only)	105	Douglas fir	105	112	12.7
16	Shelterwood and prescribe burn	48	Grand fir	48	112	12.7
10	Stocking control (thin) and prescribe burn	161	Douglas fir	52	116	10.7
11	Stocking control (thin) and prescribe burn	13	Grand fir	13	116	10.7
12	Stocking control (thin) and prescribe burn	16	Grand fir	13	116	10.7
14	Stocking control (thin) and prescribe burn	13	Grand fir	2	116	10.7

Old Growth Standard 10e: Old growth stands should reflect approximately the same habitat types series distribution as found on the IPNF.

This standard applies at the IPNF scale. A demonstration of compliance with this standard is found in the 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004; page 92, PF Doc. CR-026), which concludes, "Old growth on the IPNF does reflect approximately the habitat type series distribution of the forest…old growth distribution is less than proportional to habitat type series distribution only in the Douglas-fir and grand fir series, which occupy the driest 21% of the land…The low proportion of old growth in these dry habitat type series is a function of the combined effects of the huge, severe 1910 burn and other big early 20th century fires, subsequent suppression of low severity fires, early 20th century timber cutting, root diseases and bark beetles have contributed to the low proportion of old growth in these two habitat type series," (USDA, 2004, page 72; PF Doc. CR-026). Alternative 1 (no action) and Alternative 3 **do not** propose activities in allocated old growth. Alternative 2 proposed treatments in 438 acres of allocated old growth; this is 0.16 percent of the total IPNF old growth allocation. The relative scale of the small number of acres proposed for treatment will not result in meaningful change in how old growth stands reflect the approximate habitat types distribution at the IPNF scale. Alternative 2 treatments in allocated old growth strive to maintain old growth on dry habitat type types by reintroducing prescribed fire and/or managing the unnatural in growth of dense smaller trees and trending toward more resilient species composition. A more detailed discussion of these objectives and needs is found at USDA, 2004, page 72 and73; PF Doc. CR-026. The active restoration activities of Alternative 2 will increase the resilience of current allocated stands and allow flexibility for future decisions about old growth allocation. All alternatives would be consistent with this Forest Plan standard.

Old Growth Standard 10f: One or more old growth stands per old growth unit should be 300 acres or larger. Preferences should be given to a contiguous stand; however the stand may be subdivided into stands of 100 acres or larger if the stands are within one mile. The remaining old growth management stands should be at least 25 acres in size. Preferred size is 80 plus acres.

This standard applies at the OGMU scale. The Prichard Murray Resource Area is within OGMU's 109, 110, 112, 115, 116, 123 and 127. Supporting documentation for the following discussion is found in PF Doc. VEG-35. A summary of compliance to this standard is found below. In brief, at least one effective patch greater than 300 acres is found in each OGMU; 34 of 35 total patches are greater than 25 acres each, and 25

of 35 total patches are over 80 acres in size. Therefore, old growth standard 10e is fully met. In addition, the silviculturist identified approximately 1,086 acres of additional future old growth (PF Doc. VEG-35). All of these additions linked blocks of current allocated old growth and the average patch size of this additional future old growth was 1,139 acres.

Table VEG-9. Disclosure of criteria to meet Forest Plan Standard 10(f).

Criteria	Old Growth Management Units						
	109	110	112	115	116	123	127
# patches	2	3	5	2	6	7	10
Smallest patch size	123	68	34	414	63	23[2]	69
Largest patch size	288	2137	821	716	414	493	530
# contiguous patches >/=300 acres[1]	0	1	2	2	2	2	1
# of patches >/=80 acres	2	2	3	2	5	3	8
# of patches >/=25 acres	2	3	5	2	6	6	10

[1] *If there are no 300-acre patches, there should be stands greater than or equal to 100 acres (even though not contiguous), with a total of more than 300 acres within one mile. OGMU 109 is the only OGMU involved that does not have any contiguous patches greater than 300 acres. One patch in OGMU 109 is within 1 mile of a patch in OGMU 10 that is 297 acres in size.*

[2] *A narrow riparian patch separates this 23-acre patch from a larger 493-acre patch.*

Old Growth Standard 10g: Roads should be planned to avoid old growth management stands to maintain unit size criteria.

This standard applies at the OGMU scale and for this analysis includes OGMU's 109, 110, 112, 115, 116, 123 and 127. No permanent road construction or temporary road construction is proposed in allocated old growth under action alternatives. This standard would be met under all alternatives. A foreseeable action however is the Fancy and Coeur d'Alene Placer 'exchange of rights-of-ways and road building. These actions do involve right-away exchange and some road building through allocated old growth. These actions are part of a separate decision and are not proposed with the Prichard Murray analysis or decision.

Old Growth Standard 10h: A long-term objective should be to minimize or exclude domestic grazing within old growth stands.

This standard applies at the OGMU scale and for this analysis includes OGMU's 109, 110, 112, 115, 116, 123 and 127. The proposed activities would not include any new domestic grazing allotments in the Prichard Murray Resource Area nor in allocated old growth. There are currently no grazing allotments in the area. It is unlikely that grazing would occur within mature or allocated old growth structures in the Prichard Murray Resource Area in the future since mature and old growth structures do not normally provide sufficient forage for these animals. This standard is met under all alternatives.

Old Growth Standard 10i: Goals for lands to be managed as old growth within those lands suitable for timber production are identified in the management area prescriptions.

This standard applies at the IPNF spatial scale. A demonstration of compliance with this standard is found in the 2004 Forest Plan Monitoring and Evaluation Report (USDA, 2004, pages 91-92; PF Doc. CR-026) where a table displaying both the goals by management area and current allocation of old growth in these management areas on the IPNF. "Only the four …management areas have specific Forest Plan old growth goals...Current old growth allocations meet and far exceed these Forest Plan goals." Alternative 1 (no action) and Alternative 3 **do not** propose activities in allocated old growth. Alternative 2 proposes treatments in 438 acres of allocated old growth. These acres represent 0.16% of the IPNF old growth allocation and would not result in a measurable change in the any of the four management areas with specific Forest Plan old growth goals or the overall IPNF old growth allocation. Old growth standard 10i is met under all alternatives.

Forest Plan Standards for Timber

Timber Standard 1. Both even aged and uneven aged silvicultural systems will be employed on the IPNF and will meet resource and vegetation management objectives identified in the Forest Plan.

Treatments associated with the action alternatives are fully described above (Direct and Indirect Effects to Forest Vegetation under the Proposed Action). Treatments would include shelterwood, commercial thinning, pruning (limbing, piling in fuelbreaks), and prescribed burning. Shelterwoods are considered even aged. Commercial thinning, pruning and prescribed burning can be intermediate treatments for both even and uneven aged silvicultural systems. This standard is met under Alternative 2 and 3. Utilization of these treatment methods complies with Forest Plan standards (USDA, 1987, pages III-3; PF Doc. CR-002 and VEG-26) and Forest Plan Vegetation Management Silvicultural Practices (USDA, 1987, pages A-2 to 10; PF Doc. CR-002 and VEG-26). In addition, these actions are consistent with the Forest Plan which states that prescribed fire be used to meet silvicultural objectives (USDA, 1987, page III-4; PF Doc. CR-002 and VEG-26). Western larch, blister rust resistant white pine and ponderosa pine would be planted. This complies with Forest Plan direction that reforestation will normally feature seral tree species utilizing a mixture of species (USDA, 1987, p. II-32; PF Doc. CR-002 and VEG-26). These actions would promote stand structures and compositions, which reduce susceptibility in the present and future to insects, diseases, and wildfire.

Uneven-aged management was considered as a treatment method in the Prichard Murray Resource Area. To be successful, uneven aged management (or individual tree selection/group selection) requires healthy stands with a high percentage of long-lived seral trees to manage. Most stands in the Prichard Murray resource area do not meet these criteria (see PF Docs. VEG-8, VEG-3, VEG-9 and VEG-15). In addition, the uneven aged stand structure involves development of stand structures that have substantial amounts of ladder fuels within the stand over the long term, which can be a concern when addressing a stand's potential fire behavior in this wildland urban interface.

Timber Standard 2. Timber stands that are substantially damaged by fire, wind throw, insect or disease attack, or other catastrophe may be harvested where this salvage is consistent with silvicultural and environmental standards. All management areas are open to this potential salvage activity except Management Areas 11 and 14.

Salvage of trees damaged by prescribed burning would only occur with appropriate NEPA analysis; however, such salvage is not planned to occur in the Prichard Murray Resource Area. This standard is met under all alternatives.

Timber Standard 3. Recommended changes in timber resource land suitability from the approved Forest Plan will be based upon the criteria contained in 36 CFR 219.14(a) (2006 36 CFR 219) and the rationale displayed in environmental assessments. Changes from suitability classification will be done in accordance with the procedures outlined in Appendix M.

An analysis of suitability related to concerns for potential regeneration success for resource management was completed for the Prichard Murray Resource Area (PF Docs.VEG-17). This analysis found that 11 percent of the resource lands are not suitable for timber management because of potential regeneration concerns. These areas average approximately 21 acres in each stand, scattered across the resource area. Suitability and limitations due to regeneration concerns within harvest units will be further assessed on a site-by-site basis during unit layout. Regeneration harvest will not take place on sites with potential regeneration success concerns.

This analysis will only propose regeneration harvest in areas capable of regeneration success and timber production based on a on the ground site-by-site assessment as part of the unit layout process based on the Forest Plan (USDA, 1987; PF Doc. CR-002, and FSH 2409.13 (PF Doc. VEG-17) and 36 CFR 219.28 (PF Doc. VEG-17). No change in suitability classification is proposed under any alternative (PF Doc. VEG-17). This standard is met under all alternatives.

Timber Standard 4. Reforestation will normally feature seral tree species, with a mixture of species usually present. Silvicultural practices will promote stand structure and species mix that reduce susceptibility to insect and disease damage.

All regeneration harvests would be regenerated with site-adapted long lived early seral species/seed source. All treatments would retain (to the extent possible) and promote resilient long-lived seral species and structures; therefore this standard is met under all alternatives.

Timber Standard 5. Project design will provide for site preparation and slash hazard reduction practices that meet reforestation needs of the area.

Site preparation and/or fuel treatment may include a combination of prescribed underburning, and hand slashing and/or hand piling depending on post harvest conditions and silvicultural treatment needs; therefore this standard is met under all alternatives.

Timber Standard 6. Timber harvest schedules and access will be coordinated with intermingled landowners where applicable.

Access to private property in the Prichard Murray Resource Area would be maintained under action alternatives (PF Doc. TRAN-01); therefore this standard is met under all alternatives.

Timber Standard 7. Openings created by even-aged silviculture will be shaped and blended to forms of the natural terrain to the extent practicable; in most situations they will be limited to 40 acres. Creation of larger openings must conform to current Regional guidelines regarding public notification, environmental analysis and approval.

and

Timber Standard 8. An area of National Forest land will no longer be considered an opening when vegetation meets management goals established for the management area in accordance with the Regional Guide. Lands in other ownership within or adjacent to National Forest land will be included in the analysis when planning openings.

The 2003 Forest Plan Monitoring Report item reviews the maximum size for harvest areas at the IPNF scale (PF Doc. CR-022). For the Prichard Murray Resource Area proposal, the public was informed on August 22, 2005 that regeneration openings in excess of 40 acres were proposed (PF Doc. PI-46). A letter of approval to exceed the 40-acre opening size, with appropriate interdisciplinary analysis and documentation, will be received from the Regional Forester prior to project implementation. The proposed openings will create opening of the landscape of the scale and pattern that are similar to the historic disturbance regimes for this resource area. Proposed harvest openings greater than 40 acres are identified and discussed above (Proposed Treatment Opening Sizes portion of section B), in the EA (Direct and Indirect Effects to Forest Vegetation under the Proposed Action) and in the Project Files (PF Doc. VEG-25). This standard is met under all alternatives.

Timber Standard 9. The silvicultural prescription for each stand will establish the level of management intensity compatible with the management area goals. Preferred species management as identified in the silvicultural prescription will consider both biological and economic criteria.

All vegetative treatments have silvicultural diagnosis (PF Doc. VEG-3) and prescriptions approved by a certified silviculturist prior to project implementation. The silvicultural diagnosis and prescriptions integrate site-specific factors (such as physical site, soils, climate, habitat type, fuels and current vegetative composition and conditions) as well as interdisciplinary objectives (including fuels management) and Forest Plan goals, objectives and standards. This standard would be met under all alternatives.

Forest Plan Standards for Forest Protection

Forest Protection Standard 1. Use integrated pest management methods that provide protection of forest resources with the least hazard to humans, wildlife and the environment.

and

Forest Protection Standard 2. Use silvicultural methods and schedule practices that reduce the development and/or perpetuation of pest problems.

As described earlier in this section, loss of the long-lived early seral components (western larch, white pine and ponderosa pine) in the ecosystem is a major reason for the lack of vegetative resiliency. Use of various regeneration and intermediate treatments to trend toward species compositions with increased resilience is a major objective of the Proposed Action. In combination with alternative design features (Chapter 2, Features Designed to Improve Vegetation Management or Chapter 2 Forest Vegetation section B. Direct and Indirect Effects to Forest Vegetation Under Alternative 2 and 3), these treatments would minimize adverse effects associated with pests. Alternative 2 and 3 would meet these two Forest Plan standards. The No-Action Alternative would not use integrated pest management methods or reduce the perpetuation of pest problems; therefore the no action alternative would not meet Forest Protection Standards 1 and 2.

Forest Protection Standard 3. Vegetation management will favor the use of fire, hand treatment, natural control, or mechanical methods wherever feasible and cost effective. Direct control methods, such as chemical or mechanical, may be used when other methods are inadequate to achieve control.

Proposed vegetative treatments would utilize a combination of fire, hand treatment and natural and mechanical methods. Forest vegetative treatment using chemicals (excluding weed treatments) is not proposed under either alternative; therefore this standard is met under the action alternatives.

Consistency with NFMA and RPA)

1. **Assure that technology and knowledge exists to adequately restock lands within fire years after final harvest.** An analysis of potential regeneration success concerns for resource management was completed for the Prichard Murray Resource Area (PF Doc. VEG-17). This analysis found 11 percent of federally managed lands in the Prichard Murray Resource Area are not suitable for resource management because of potential regeneration concerns. These areas average approximately 21 acres in each stand, scattered across the resource area. Limitations due to regeneration concerns within harvest units would be further assessed on a on the ground site-by-site basis during unit layout. Regeneration harvest would not take place on sites with potential regeneration success concerns. Overall regeneration success on the Coeur d'Alene River Ranger District is 96 percent for the period 1976 to 1999, with 79 percent success within 5 years of regeneration harvest (PF Doc. VEG-19). The IPNF Forest Plan Monitoring and Evaluation Report (USDA, 2003, page 10; PF Doc. CR-022) states, "over the last 11 years (1983-1993) of monitoring, our reforestation success rate has averaged 88 percent." This NFMA/RPA requirement is met.

2. **Be chosen after considering potential effects on residual trees and adjacent stands.** The analysis considered the effects on residual trees and adjacent stands; therefore this requirement is met (PF Doc. VEG-3). Under the action alternatives, harvest and site preparation treatments will consider the short and long term potential negative effects (including blow down, fire mortality, etc) of proposed activities on adjacent trees and stands with site by site prescription modifications, such as change in unit boundary, modification of prescribe burning prescriptions, etc. This NFMA/RPA requirement is met.

3. No timber harvest, other than salvage sales or sales to protect other multiple-use values, shall occur on lands not suitable for timber production.

Guidelines for determining suitability are found in the Forest Plan (USDA, 1987; PF Doc. CR-002, and CFR 219.28, FSM 1921.17 and FSH 2409.13 (PF Doc. VEG-17). The 2003 Forest Plan Monitoring Report addresses changes to timberland suitability at the IPNF scale (USDA, 2003, page 11; PF Doc. CR-022). The proposed harvest units are within the productive habitat types as described by the Forest Plan. An analysis of suitability for resource management was completed for the resource area (PF Doc. VEG-17). This analysis will only propose regeneration harvest in areas capable of regeneration success and timber production based on the ground site-by-site assessment as part of the unit layout process based on the Forest Plan and FSH 2409.13 (PF Doc. CR-022 and VEG-19).

The arrangement of the unsuitable areas is scattered across the resource area. Harvest unit layout will consider suitability limitations on a site-by-site on the ground basis. Timber harvest will not occur in unsuitable sites; therefore this NFMA/RPA requirement is met.

4. Even-aged Management. When timber is to be harvested using an even-aged management system, a determination that the system is appropriate to meet the objectives and requirements of the Forest Plan must be made. Where clearcutting is to be used, it must be determined to be the optimum harvest method.

Under the action alternatives, there is the potential for both future use of both even- and uneven-aged silvicultural treatments with shelterwood, commercial thinning, pre-commercial thinning and pruning. While a shelterwood tends to develop an even-aged stand, the presence and/or some development of three or more age classes (uneven-aged) is possible and desirable as stand resiliency increases in the future on these sites. Commercial thinning, precommercial thinning and pruning are neither even nor uneven aged by definition but intermediate treatments for both systems. All treatments under the action alternatives would be silviculturally appropriate (PF Doc. VEG-3) and are within the timber and vegetation management practices outlined in the Forest Plan goals, objectives, management area direction and practices (USDA, 1987. Appendix A; PF Doc. CR-002). Silvicultural diagnosis and target stand descriptions have been completed (PF Doc. VEG-3 and VEG-9); no clearcutting is proposed (refer to the Proposed Action description and to Timber Standard 1, above); and growth has generally culminated in stands proposed for regeneration harvest (PF Doc. VEG-3, 6, 44, R17, R18, R21, R34, R55, R67, R69 and R73). NFMA/RPA requirements are met.

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Specialist's Report on TES Plants in the Prichard-Murray Resource Area

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SPECIALIST'S REPORT ON THREATENED, ENDANGERED AND SENSITIVE PLANTS IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework for TES Plants

Federal legislation, regulations, policy and direction that require protection of species and population viability, evaluation and planning process consideration of threatened, endangered and other rare (Forest Service "sensitive") plants species include the Endangered Species Act (1973) as amended; the National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service manual 2670.1-2673.4 (PF Doc. TES-1); Forest Plan, 1987 (PF Doc. TES-2, pp. II-1, 5, 6, and 27); and direction from the Regional Watershed, Wildlife, Fisheries and Rare Plants program and Washington Office.

2. Methodology Used in the Analysis for TES Plants

Methodology Used in Assessment of Existing Plant Conditions: The geographic scope of the analysis for sensitive plants is the Prichard Murray Resource Area boundary. A pre-field review was conducted of aerial photos, topographical maps, Idaho Department of Fish and Game Conservation Data Center (ICDC, 2002; PF Doc. TES-3) element occurrence records, Timber Stand Management Records System (TSMRS), U.S. Fish and Wildlife Service National Wetlands Inventory Maps (USDI, 1987; PF Doc. TES-4) and recent literature.

This assessment describes the extent of all rare plant guilds in the Resource Area. The potential for Threatened, Endangered, Sensitive, and Forest Species of Concern (FSOC) plant occurrence in the Resource Area was based on an assessment of potential habitat for the species that may occur on the Coeur d'Alene River Ranger District (Project File Doc. TES-13). The Coeur d'Alene Threatened and Sensitive plant species list is broken into eight general habitat guilds; moist forest, wet forest, dry forest, grassland, alpine/subalpine, alluvial/deciduous shrub, aquatic, and peatland (Mousseaux, 1998; PF Doc. TES-5). TSMRS queries were used to identify potentially suitable Sensitive plant habitat by guild in the Resource Area (PF Doc. TES-6). Photo interpretation, USFWS Wetland Maps, and personal knowledge of similar habitats were used to refine data derived from TSMRS. Areas considered to be potentially suitable habitat for Sensitive plants were identified on a topographic map (PF Doc. TES-17). High potential habitats where project work is proposed were field surveyed. Most of the necessary field surveys have been completed and documentation is contained in the project files (PF Doc. TES-16).

Methodology Used in Assessment of Environmental Consequences to TES Plants: Analysis was conducted using results of past sensitive plant surveys, current distribution and condition of sensitive plant species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the likely effects to existing populations and habitat from the proposed activity based on current knowledge and professional judgment. It included a broad-scale assessment of the distribution and suitability of sensitive plant habitat relative to proposed activities and a detailed analysis of each proposed activity and the need for mitigation, including field surveys. Discussion of effects will focus on the wet forest, moist forest, and dry forest guilds, as these are the habitats most likely to be affected by proposed activities. The Project Files include lists of stands where activities are proposed under each alternative, including potentially affected plant guilds and acreage (PF Doc. TES-35). The cumulative effects analysis area for TES plants is the Prichard Murray Resource Area. Effects to sensitive plant species or suitable habitat from proposed activities are generally described as very low, low, moderate or high, with the following definitions:

> ***very low*** *= no measurable effect on individuals, populations or habitat*
>
> ***low*** *= individuals, populations and/or habitat not likely affected*
>
> ***moderate*** *= individuals and/or habitat may be affected, but populations would not be affected, and habitat capability would not over the long term be reduced below a level which could support sensitive plant species*
>
> ***high*** *= populations may be affected and/or habitat capability may over the long term be reduced below a level which could support sensitive plant species*

Indicators used to measure effects on Sensitive plants and suitable habitat include: the effects of harvest treatments, the amount of each proposed activity, the extent of ground disturbance resulting from activities, and the proximity of known sensitive plant occurrences and suitable habitat to proposed activities. The following table displays the risk of effects to rare plants from various types of disturbance and activities. The level of risk to Sensitive plants from various types of disturbance was used in the evaluation of environmental consequences.

Table TES-1. Summary of risk to sensitive plants and Forest Species of Concern from proposed activities in highly suitable habitat, by plant guild.

Proposed Activity or Event	Rare Plant Guild potentially affected	Risk of Adverse Impacts to Sensitive Plant Occurrences (without mitigation)
Loss of < 50% canopy due to insects or disease	Wet Forest/ Moist Forest / Dry Forest Guild	Low to Moderate
Loss of > 50% canopy due to insects or disease	Wet Forest/ Moist Forest / Dry Forest Guild	Moderate to High
Regeneration harvest, including site prep.	Moist Forest / Dry Forest Guild	High
Commercial thinning and selective harvest using ground based equipment	Moist Forest / Dry Forest Guild	High
Helicopter and Roadside Selection harvest	Moist Forest/ Dry Forest	Low
Full Road Obliteration	Wet Forest/ Moist Forest / Dry Forest Guild	High
New road construction	Wet Forest / Moist Forest / Dry Forest/Peatland	High
Road reconstruction/reconditioning	Wet Forest / Moist Forest / Dry Forest	Low
Channel crossing removal (culverts)	Wet Forest / Moist Forest	Low to Moderate
Road closure, ripping, seeding	All	Low
In-stream fisheries/watershed restoration (structure placement w/equipment)	Deciduous Riparian/Wet Forest/Peatland	High
Fuel reduction by underburning	Wet Forest/ Moist Forest / Dry Forest	Moderate to High
Fuels reduction - mechanical	Moist Forest / Dry Forest	Moderate to High
Fuel break construction	Wet Forest / Moist Forest / Dry Forest	Moderate to High
Noxious weed prevention and treatment	Dry Forest / Moist Forest	Low to Moderate
Stand replacing wildfire	Wet Forest / Moist Forest / Dry Forest	Moderate to High

** Some Dry Forest sensitive plant species may be dependent on periodic low levels of disturbance from fire, such as that which occurred historically in some dry forest habitats. The timing of an underburn relative to soil moisture in suitable habitat and the flowering and fruiting of the plant species of concern also influences potential effects.*

For unsurveyed habitat that is highly suitable to support Sensitive plants, presence is assumed. Protection of large occurrences and contiguous, unoccupied highly suitable habitat is assumed to be an effective conservation strategy (Burgman, et al 2001, PF Doc. TES 37). Examples of conservation strategies for Region 1 include Lichthardt, 1995 (PF Doc. TES-38), Lichthardt 2003 (PF Doc. TES-8), and Lorain, 1991 (PF Doc. TES-39). As described in "Features Designed to Protect Rare Plants" (Chapter 2), populations would be protected, while some isolated individuals may be impacted by activities. For occurrences that are likely to be discovered during field surveys prior to project implementation, mitigation measures would be designed by the project botanist to ensure populations are protected.

Effects to population viability from disturbance events (natural or man-caused) are difficult to quantify with certainty for all Sensitive plant species and FSOC. Specific knowledge of population ecology is lacking for several species addressed in this analysis, particularly the sensitive moonworts and certain orchid species: round-leaved rein orchid and phantom orchid. Much of the current knowledge regarding sensitive plant species is based on observational (non-empirical) and even anecdotal information. Recent literature and monitoring reports on several species, including deerfern (IPNF, PF Doc. TES-7), clustered lady's-slipper (Lichthardt 2003; PF Doc. TES-8), Henderson's sedge, Constance's bittercress (Lichthardt 1998; PF Doc. TES-9) and Idaho strawberry (Crawford 1980, PF Doc. TES-10), provide a greater understanding of the relationship of habitat disturbance to the persistence of these species.

3. Existing Plant Conditions

Existing Threatened and Endangered Plant Species: There are no federally listed Endangered plants for the Idaho Panhandle National Forests. A Threatened species, as determined by the US Fish and Wildlife Service, is any species that is likely to become an Endangered species within the foreseeable future throughout all or a significant portion of its range. Currently, the US Fish and Wildlife Service (USDI 2004, PF Doc. TES-11) lists two species as Threatened for the Idaho Panhandle National Forests, water howellia (*Howellia aquatilis)* and

Spalding's catchfly (*Silene spaldingii*). There are no documented occurrences of these species on Idaho Panhandle National Forest lands, although suitable habitat is suspected to occur.

Existing Candidate Plant Species: Candidate species are those species which the U.S. Fish and Wildlife Service believes sufficient information is available on biological vulnerability and threats to support proposals to list them as Endangered or Threatened. Slender moonwort (*Botrychium lineare*) was listed as a Candidate species by the U.S. Fish and Wildlife Service on June 6, 2001(USDI 2001; PF Doc. TES-12). Candidate species are not addressed in Biological Assessments. According to Forest Service Manual direction, the Forest Plan and National Forest Management Act, potential effects of Forest Service projects on Candidate species will be considered in environmental planning. Slender moonwort is addressed as a Sensitive species in this document because of concerns for its viability throughout its range.

Existing Sensitive Plant Species and Forest Species of Concern: The subbasins of northern Idaho contain a wide array and diversity of habitats and plant communities, many of which contain plant species that are known or thought to be rare. Of the estimated 1,200 to 1,500 plant species known or thought to occur here, about 10% are considered rare or uncommon. Sensitive species are determined by the Regional Forester as those species for which population viability is a concern, as indicated by a current or predicted downward trend in population numbers or in habitat capability which would reduce the species' existing distribution. Twenty-eight species of Sensitive plants are known or suspected to occur within the Coeur d'Alene subbasin (refer to Table 3-TES-2). Plant species identified as "Forest Species of Concern" (FSOC) are species that may not be at risk on a range-wide, regional or state scale, but may be imperiled within a planning area, such as a National Forest (USDA 1997, PF Doc. TES-14, p. 5). FSOC are addressed in effects analyses to provide for maintenance of population viability as directed in NFMA. Biological Evaluations are not required to address FSOC. A discussion of habitats for FSOC is included with the description of rare plant guilds.

Threatened and Sensitive plants and Forest species of concern can be assigned to one or more rare plant guilds (Mousseaux). These guilds are artificial assemblages based on similar habitat requirements used for the purpose of analysis. For the Coeur d'Alene River Ranger District, the rare plant guilds are aquatic, deciduous riparian, peatland, wet forest, moist forest, dry forest, grassland, and subalpine. Rock outcrops, seeps and springs are microsites that can support certain sensitive plants, such as *Grimmia brittoniae* and *Mimulus alsinoides*, however, these can occur across all guilds and are not identifiable at a coarse scale. Refer to the Project Files (PF Doc. TES-5) for specific plant guild descriptions. Rock outcrops and seep habitats are detected through field surveys and aerial photo interpretation. The following table lists Region 1 Sensitive and Threatened plant species by habitat guild that are known or suspected to occur in the Coeur d'Alene sub-basin.

Table TES-2. Coeur d'Alene Threatened, Endangered and Sensitive Plants by Rare Plant Habitat Guild (October 2004)*

Status and Species	Common Name	Habitat Guild
Threatened		
Howellia aquatilis	water howellia	Aquatic
Silene spaldingii	Spalding's catchfly	Dry grassland/grassy openings in Dry Forest
Sensitive		
Asplenium trichomanes	maidenhair spleenwort	rock seeps in Moist/Wet Forest
Blechnum spicant *	deerfern	Moist/Wet Forest
Botrychium ascendens *	upswept moonwort	Wet Forest
Botrychium crenulatum *	dainty moonwort	Wet Forest
Botrychium lanceolatum *	triangle moonwort	Wet Forest/Moist Forest
Botrychium lineare	slender moonwort	Wet Forest/Moist Forest
Botrychium minganense *	Mingan moonwort	Wet Forest/Moist Forest
Botrychium montanum	western goblin	Wet Forest
Botrychium paradoxum	paradox moonwort	Wet Forest/Moist Forest
*Botrychium pendunculosum**	stalked moonwort	Wet Forest
Botrychium pinnatum *	northwestern moonwort	Wet Forest/Moist Forest
Botrychium simplex	least moonwort	Wet Forest/Moist Forest
Buxbaumia aphylla	leafless bug-on-a-stick moss	Subalpine
Buxbaumia viridis *	green bug-on-a-stick moss	Wet Forest
Cardamine constancei *	Constance's bittercress	Deciduous Riparian/Moist/Wet Forest
Carex chordorrhiza	string-root sedge	Peatland
Carex livida	livid sedge	Peatland
Cypripedium fasciculatum *	clustered lady's slipper	Moist/Wet/Dry Forest
Grimmia brittoniae	Britton's Grimmia	Rock outcrops in Moist Forest
Hookeria lucens	clear moss	Wet Forest
Hypericum majus *	large Canadian St. John's wort	Peatland
Mimulus alsinoides	chickweed monkeyflower	rock cliffs/seeps in Wet/Moist/Dry Forest
*Rhizomnium nudum**	naked Mnium	Wet Forest/Moist Forest
Rhynchospora alba	white beakrush	Peatlands
Scheuchzeria palustris *	pod grass	Peatlands
Schoenoplectus subterminalis	water clubrush	Peatlands
Thelypteris nevadensis	Sierra woodfern	Wet Forest Seeps
Waldsteinia idahoenesis *	Idaho barren strawberry	Moist and Wet Forest

**Species with documented occurrences in the Coeur d'Alene sub-basin, includes Forest Service and other ownership.*

*** Based on the Regional Forester's TES species list,October 2004..*

Extent and Type of Suitable TES Plant Habitat: Potentially suitable habitat for six of the eight Rare Plant Guilds is present in the Resource Area. The extent of the habitats is displayed in the table below. There is no suitable habitat present for the Aquatic and Peatland Guilds. The project files contain descriptions of Rare Plant Guilds and species with potential for effects from proposed activities in the Prichard Murray Resource Area (PF Doc. TES-5).

Table TES-3. Rare Plant Guilds in the Prichard Murray Resource Area.

Rare Plant Guild	Acres of potentially suitable habitat in resource area	Percent of resource area in potentially suitable habitat
Moist Forest	3,902	21
Wet Forest	13	<1
Dry Forest	2,860	15
Grassland	5,443	29
Subalpine	118	<1
Deciduous Riparian	Trace	Trace
Peatland	0	0
Aquatic	0	0

** Table acreage and % area pertains to National Forest System Lands only.*

Plant Surveys and Documented Occurrences: Features designed to protect Threatened, Endangered, and Sensitive Plants (Page EA-11) provide for field surveys to be completed in all previously un-surveyed areas of potentially suitable habitat where activities would take place. In addition, some previously surveyed areas may be resurveyed, as deemed necessary. The need for field surveys is based on habitat suitability and the risk of effects to Sensitive plants and habitat due to project activities. Table 3-TES-1 illustrates the risk to Sensitive Plants and Forest Species of Concern from various types of disturbance. Field surveys would be completed prior to project implementation. Regional direction (Leonard 1992; PF Doc. TES-15) states that the need for and extent of field reconnaissance should be commensurate with the risk associated with the project, the species involved, and the level of knowledge already in hand. Approximately ninety percent of the Resource Area has been field surveyed for this project. Copies of the surveys are contained in the project files (PF Doc. TES-16). One new Sensitive plant occurrence was discovered during surveys; two occurrences , one Sensitive species and one FSOC, were previously documented in the Prichard Murray Resource Area. There are no occurrences of Threatened and Endangered plants in the Resource Area.

Table TES-4 Rare Plant Occurrences Documented in the Resource Area.

Species	Species Status	Number of Occurrences
Deerfern (*Blechnum spicant*)	Sensitive	1
Devil's matchstick lichen *(Pilophorus acicularis*)*	Forest Species of Concern	1
Idaho barren strawberry (*Waldsteinia idahoensis*)	Sensitive	1

* Species is documented from private land within the Resource Area.

Rare Plant Species with Potential for Effects from Project-Related Activities

Analysis indicates that the Dry Forest, Moist Forest, and to a lesser extent, the Wet Forest Plant Guild and associated species have the greatest potential to occur in the Prichard Murray Resource Area, and may be affected by project-related activities.

The remaining plant guilds were not analyzed in detail due to a lack of potential effects on these guilds and species. A small amount of Alpine/Subalpine habitat is present near Murray Peak, but would not be affected by any proposed activities. Potential Grassland habitat was indicated in the coarse-filter data analysis, however, it was found to be unsuitable during field surveys. Deciduous Riparian habitat is present in the North Fork of the Coeur d'Alene River and Prichard Creek, but would not be affected by any project related activities. Suitable habitat for Aquatic and Peatland Guilds does not exist in the Resource Area.

A complete description of Rare Plant Guilds and species of the Coeur d'Alene River Basin and a map of potential Sensitive plant habitat is contained in the Project File (PF Doc. TES-5 and TES-17)). Suitable Threatened, Sensitive and Forest Species of Concern plant habitat that may be affected by proposed activities would be surveyed prior to project implementation to determine presence or absence of these species.

Dry Forest Plant Guild

Dry Forest Guild habitat is the predominant Rare Plant Guild in the Resource Area, occupying approximately 23 percent of the Forest Service lands (Table 3-TES-3). Clustered lady's-slipper orchid (*Cypripedium fasciculatum*), is a Sensitive plant of the dry forest guild that may occur based on the presence of abundant suitable habitat. This plant species is of particular concern because of its rarity, growth habitat and vulnerability to certain types of disturbance. Bank monkeyflower (*Mimulus clivicola*), a Forest Species of Concern (FSOC), and member of the Dry Forest Guild, has been documented nearby the Resource Area and may be affected by proposed activities.

Clustered lady's slipper orchid (*Cypripedium fasciculatum*), is found in portions of eight western states: California, Oregon, Washington, Idaho, Montana, Wyoming. Colorado, and Utah. Distribution is patchy throughout its range and populations tend to be small. In Idaho there are 116 documented Element Occurrences (EO's) extending from Kootenai County, south to the South Fork of the Clearwater River. In Idaho the habitat preference includes both moist western red cedar/hemlock forest and dry Douglas-fir/grand fir. On the Coeur d'Alene portion of the IPNF, the habitat preference is primarily dry forests.

There are 17 element occurrences of clustered lady's-slipper orchid documented on the IPNF, 7 of which occur on the Coeur d'Alene River Ranger District. Of these, one occurrence is a historical population that has not been relocated since 1934 (ICDC 2002, PF Doc. TES-3). An additional occurrence in the Coeur d'Alene subbasin is found on private land near the eastern shore of Coeur d'Alene Lake. Most of the occurrences in the Coeur d'Alene subbasin are found in Dry Forests, with a Douglas-fir/ ninebark habitat type, in association with ponderosa pine. It is also documented from moist western red cedar and grand fir forests. This species is not known to occur in the Resource Area, however it is likely to occur based on habitat suitability. The closest occurrence to the Prichard Murray Resource Area is approximately 25 miles west in the Marie Creek drainage.

Clustered lady's-slipper is a rhizomatous, perennial orchid. As in other members of the orchid family, this species requires a symbiotic relationship with fungi in the soil for reproduction and development. It reproduces mainly by seed, but also may increase to a limited extent by rhizome. Because of its dependency on fungal associates, reproduction is typically low. Clustered lady's-slipper requires shade, either from overstory trees and/or shrubs, and a level of duff or litter. The amount of shade and duff necessary to sustain the species has not been established, and probably varies depending on habitat type, and other site factors. Natural or management-related disturbances that could affect soil fungi and overstory shade have the potential to impact clustered lady's-slipper survival. Disturbances of primary concern include fire, various types of timber harvest, thinning, and ground disturbance associated with these activities (Lichthardt 2003, PF Doc. TES-8, pp. 22-25). Observers generally agree that the rhizome of Clustered lady's-slipper is shallow (1-5 inches below the mineral soil surface) but differ as to how much protection this affords (Lichthardt 2003, PF Doc. TES-8, pp. 22-25).

Bank monkeyflower (*Mimulus clivicola*), a Forest Species of Concern (FSOC), has approximately 50 documented occurrences on the IPNF and 23 in the Coeur d'Alene River subbasin. Prior to 1999, it was listed as a Sensitive species on the IPNF. Additional information on threats and new occurrences lead to the listing change and its retention as a Forest Species of Concern.

Bank monkeyflower is a regional endemic of the Pacific Northwest, which is distributed from northern Idaho and adjacent Washington, southward to the southern end of the Snake River Canyon (Lorain, 1993, PF Doc. TES-18, pp. 6-7). The species is a small, herbaceous annual that occurs within a narrow set of environmental conditions. Plants are found almost exclusively on southerly aspects with slopes of 60 percent or greater and seasonally moist, exposed, mineral soils. Bank monkeyflower most often occurs in openings in ponderosa pine, Douglas-fir or, occasionally, grand fir forest dominated by a grass or shrub understory. The elevation range at which the species is found varies from 2,200 to 4,900 feet. The closest occurrence is in Pony Gulch, approximately 1 mile south of the Resource Area. There is suitable dry, open Douglas-fir/Ponderosa pine forest present in the Resource Area, mainly on steep, south-facing slopes.

Moist Forest Plant Guild

Moist Forest Guild rare plant habitat occupies approximately 21 percent of the Forest Service lands in the Resource Area, mainly on east to north and northwest slopes, and near drainage bottoms. The most likely species in this guild to occur based on the presence of suitable habitat are the Sensitive plants deerfern (*Blechnum spicant*), Mingan moonwort (*Botrychium minganense),* Naked Mnium (*Rhizomnium nudum*), and Idaho barren strawberry *(Waldsteinia idahoensis),* and the FSOC plant Henderson's sedge (*Carex hendersonii*). The Sensitive plant Clustered lady's slipper (*Cypripedium fasciculatum*) may also occur in moist forest habitats, in addition to the Dry Forest Guild association discussed in the previous section.

Deerfern (*Blechnum spicant*) is a long-lived, evergreen, perennial fern favoring moist forest and riparian areas in cedar/hemlock forest. The distribution of deerfern is interruptedly circumboreal. It is found chiefly in the Cascade Mountains but has disjunct populations in Idaho and British Columbia. There are 27 occurrences of

deerfern documented on the IPNF. Seven are known to occur on the Coeur d'Alene River Ranger District. One occurrence is present in the Resource Area in Daisy Gulch, but would not be affected by proposed activities.

Moonworts (*Botrychium ascendens, B. crenulatum, B. lanceolatum, B. minganense, B. montanum, B. paradoxum, B. pedunculosum, B. pinnatum, and B. simplex*) are fern-like plants that are found in a variety of habitats ranging from damp meadows and boggy areas to moist coniferous western hemlock and cedar forest (Lorain 1990, PF Doc. TES-21, p. 7). On the IPNF they occur most often on shallow sloped sites in densely shaded moist to wet forest habitats. There are approximately 75 occurrences of moonworts on the IPNF, and 28 on the Coeur d'Alene River Ranger District. No moonwort occurrences are documented from the Prichard Murray Resource Area, but they may occur there based on potentially suitable habitat. A documented occurrence is approximately five miles east in Vendetta Gulch.

Slender moonwort (*Botrychium lanceolatum*), a Candidate species for Federal listing, and a Forest Service Sensitive species is one of the more distinctive moonworts. The habitat has been described as "deep grass and forbs of meadows, under trees in woods, and on shelves on limestone cliffs, mainly at higher elevations" (Wagner and Wagner 1994, PF Doc. TES-36). However, a specific habitat description for this species is problematic because of its formerly widespread distribution ranging from sea level in Quebec to nearly 3,000 meters, 9,840 feet in Boulder, Colorado (USDI 2000, PF Doc. TES-22, p. 2). Although slender moonwort was previously documented from Oregon, Colorado, Idaho, Montana and California, only two populations in two states (Montana and Colorado) are thought to exist currently. The Idaho population, documented from Upper Priest River on the Idaho Panhandle National Forests, was last observed in 1925 and has not been relocated. The likelihood of slender moonwort occurring in the Prichard Murray Resource Area is very low. Rare plant surveys on the District to date have not detected any occurrences of this species.

Henderson's sedge (*Carex hendersonii*) is a perennial forb of low elevation (less than 3,500 feet), moist forest habitats. The principal range of this species is west of the Cascade Mountains from southwestern British Columbia to northwestern California. It has a disjunctive distribution in northern Idaho, extending from the Selway River, north to the Coeur d'Alene subbasin. It is most often found on the IPNF in western redcedar/hemlock and grand fir forests, often near streams or seeps, and on moist benches upslope from streams. Lichthardt and Moseley, 1994 (PF Doc. TES-19, pp. 10, 11, and 23) suggest that there may be genetic differences between plants on mesic versus moist sites, making this an important consideration for population protection. Henderson's sedge is sometimes found associated with elk trails; ungulates or rodents may be important vectors for seed dispersal, since seed heads are commonly nipped off just below the flag leaf (Lichthardt and Moseley 1994, PF Doc. TES-19, p. 23).

There are 34 documented occurrences of Henderson's sedge on the IPNF and 32 on the Coeur d'Alene River Ranger District (ICDC 2002, PF Doc. TES-3). Most of the occurrences are centered near the Hayden Creek drainage. A "source" population in Stump Creek, a tributary of Hayden Creek, is important to the viability of the species in the Coeur d'Alene subbasin. Stable source populations are thought to supply seed to replace ephemeral populations and individuals in surrounding, less optimal habitat (Pulliam 1988, PF Botany, TES-20). The closest occurrence of Henderson's sedge is near the boundary of the Resource Area at the mouth of Prichard Creek.

Naked Mnium (*Rhizomnium nudum*) is a moss of cool, moist to wet places in mid to higher elevation coniferous forests. This species is often found to inhabit seepages and moist areas adjacent to streams. There are four occurrences documented from the IPNF and two from the Coeur d'Alene River Ranger District, one of which is located ten miles east of the Reource Area near Thompson Pass; there is a possibility of its occurrence.

Idaho barren strawberry (*Waldsteinia idahoensis*) is a Sensitive plant found in moist grand fir and western redcedar forests on toe slope to midslope positions (Crawford TES-10, p. 149). It is known from a few locations on the Clearwater and Nez Perce National Forests, as well as the IPNF. Five occurrences are documented from the IPNF; all are on the Coeur d'Alene River Ranger District. One large occurrence is located within the Resource Area near the mouth of Short Creek, but is not close to or within proposed activity areas. The other four occurrences are close to or bordering the Resource Area. One is near the Resource Area border West of Unit 25, a burn only unit. It may be affected by proposed activities.

Wet Forest Plant Guild

The Wet Forest Sensitive Plant Guild occupies a trace amount of acreage in the Resource Area, and is restricted to river and stream bottoms. These areas have been subjected to considerable alteration from road building, logging and mining in the past. Bogs, springs, and seeps are uncommon in the Resource Area due to the predominance of Dry and Moist Forest Guild habitats. Wet Forest Guild habitats would be protected from timber harvesting by riparian buffers, as described in the EA, page EA 12. (Features Designed to Protect Aquatic Resources), therefore, the likelihood is low that project related activities would affect plants of this guild. Aquatic restoration activities in drainages along Road 990, and the foreseeable new road construction in Fancy Gulch may impact a minor amount of wet forest guild habitat. These areas would be surveyed prior to project implementation, and appropriate mitigation measures applied as needed. There are two Forest Species of Concern, ball bearing lichen (*Sphaerophorus globosus*), and devil's matchstick lichen (*Pilophorus acicularis)* that are in the Wet Forest Guild. Devil's matchstick lichen has been documented on private land within the Resource Area in the vicinity of Buckskin Gulch. Ball bearing lichen is present near the Resource Area in a riparian habitat. Deerfern (*Blechnum spicant*), Henderson's sedge (*Carex hendersonii*), and moonworts (*Botrychium spp.*) may occur in both wet and moist forests, and were discussed under the Moist Forest Guild.

Ball bearing lichen (*Sphaerophorus globosus*) is a primarily coastal lichen species with rare disjunct occurrences in northern Idaho. The habitat for this species is tree bark or wood in moist, low to mid elevation forests (TES-40; McCune and Geiser 1997, p. 269). There are two documented occurrences on the IPNF; one occurrence is located three miles northeast of the Resource Area in East Fork Eagle Creek. There is a possibility that it could be present.

Devil's matchstick lichen (*Pilophorus acicularis)* is documented from only two locations in Idaho. This species occurs on private land in the Prichard Creek drainage near Alder Creek. This lichen is a rare coastal disjunct, occurring on non-calcareous rock, often in roadcuts, and infrequently on wood (TES-40; McCune and Geiser 1997, p. 238). It may occur on Forest Service lands in the Resource Area, but was not located during field surveys.

Deciduous Riparian Guild

Short-spored jelly lichen (*Collema curtisporm*), a Forest Species of Concern, is an epiphytic lichen with disjunct populations in the Pacific Northwest and Scandanavia. This species is found on black cottonwood in frequently inundated floodplains. It has a narrow habitat specificity and relatively low number of known occurrences. There are approximately 25 reports of *Collema curtisporum* in Northern Idaho, which forms the core of the species range in North America. Nine occurrences are reported for the Coeur d'Alene River Ranger District, with one occurrence located one mile south of the Resource Area in Beaver Creek. Habitat for *Collema curtisporum* is restricted to deciduous riparian areas. This habitat would not be affected by project related activities because of mitigation measures to protect fisheries steams (refer to the EA, page EA-12, Features Designed to Protect Aquatic Resources).

Grassland Plant Guild

The Threatened plant Spalding's catchfly (*Silene spaldingii*) is a perennial herb endemic to the Palouse region of southeast Washington and adjacent Oregon and Idaho and is disjunct in northwest Montana (Lesica 1997, PF Doc. TES-24, P. 1). This species is suspected to occur on the IPNF. Field surveys of potential habitat that were completed for recent projects such as the Douglas-fir Beetle FEIS, 1999, Small Sales FEIS, 2000, and Iron Honey FEIS 2001, did not detect any occurrences of this species.

Suitable habitat for Spalding's catchfly consists of grasslands dominated by native perennial grasses such as Idaho fescue (*Festuca idahoensis*) and rough fescue (*Festuca scabrella*), with associated species such as bluebunch wheatgrass (*Pseudoroegneria spicata*) snowberry (*Symphoricarpos albus*), ninebark (*Physocarpus malvaceus*) and Nootka rose (*Rosa nutkana*). Depending on soil moisture characteristics, some sites have few to no shrubs or trees present, whereas other sites may have scattered individual ponderosa pine or Douglas-fir (USFWS 2000, p. 2; PF Doc. TES-28). Spalding's catchfly sites range from 1,750 to 5,100 feet. Soils are generally "moderately deep" to "deep." The closest documented occurrences to the project area are in Spokane

County, Washington. No occurrences of this species have been documented during field surveys conducted on the IPNF, or for this project. Potentially suitable habitat predicted using satellite imagery (SILC), upon field review was found to be unsuitable, mainly because of the presence of thin, rocky soils and rock outcrops. Some areas were found to be noxious weed infested, which lowers habitat suitability, though does not preclude the possibility of the species occurrence.

4. Environmental Consequences to TES Plants

Effects to TES Plants Common to All Alternatives

There are no federally listed Endangered plants listed for the IPNF, therefore, there would be no effect to any Endangered plant species with project implementation.

There would be no effect to the Threatened species water howellia (*Howellia aquatilis*) and Spalding's catchfly (*Silene spaldingii*) under any alternative. There is no suitable habitat present and no possibility for these species to occur in the Resource Area.

There would be no effect to Threatened, Sensitive or Forest Species of Concern plants or habitat of the Grassland, Aquatic, Peatland, Deciduous Riparian, and Alpine/Subalpine Rare Plant Guilds from implementation of any alternative, as these guilds and species either do not occur, or would not be affected by implementation of proposed activities. The following table summarizes the acres of suitable rare plant habitat affected in each alternative.

Table TES-5. Summary Acres of Suitable Rare Plant Habitat Affected by Alternative*.

Rare Plant Guild	Alt. 1	Alt. 2	Alt. 3
Moist Guild	0	277	111
Wet Guild	0	0	0
Dry Guild	0	1,967	1,182
Grassland	0	0	0
Subalpine	0	0	0
Deciduous Riparian	0	0	0
Peatland	0	0	0
Aquatic	0	0	0
Total Guild Acres	**0**	**2,244**	**1,293**

**Acreage figures refer to FS lands only and were derived from Timber Stand Management Records System data .*

Effects to TES Plants Under Alternative 1 (No Action)

Direct and Indirect Effects to TES Plants Under Alternative 1

Alternative 1 (No Action) would have no direct impact on any Threatened, Sensitive, or Forest Species of Concern (FSOC) plants. While there would be no direct impacts to these species with this alternative, there would also be no improvement made to vegetative and watershed conditions, which could in the long term provide suitable sensitive plant habitat.

Under Alternative 1, no restoration activities would be implemented to restore dry site ecosystems and reduce the risk of high severity, stand-replacing fires. In the future with no action, wildfires in the Resource area will likely be more widespread and of higher severity. While there would be no direct effects to Threatened, Sensitive and FSOC occurrences and habitat with Alternative 1, there would be a complex variety of indirect effects. In the long term, the dry forest and moist forest habitat guilds would be the most affected. The current vegetative condition is such that stand structure, function and species composition are outside the natural range of variability for the Coeur d'Alene River Basin (see also the Specialist's Report on Forest Vegetation, pages 13-18). The long-term suppression of wildfire, a keystone process in the ecosystem, has strongly influenced the vegetative conditions and plant community composition. Fuel levels and dense stand conditions have rendered the forest more at risk of high severity, stand-replacing fires. Unhealthy forest conditions currently prevail in portions of the Resource Area, with associated high rates of insect and disease related mortality. Current species composition has rendered the forest ecosystem much less resilient in terms of disease than historically. Although

management efforts to improve the vegetative and hydrologic conditions would be a long-term process, no strides towards more favorable conditions in the Resource Area would be made under Alternative 1.

Alternative 1 would not implement any management activities to trend watershed and vegetative conditions toward the desired condition and more historic levels. Identified risks associated with certain roads, and road channel crossings would not be treated and hydrologic conditions in some drainages would not be improved. Suitable rare plant habitat in riparian areas would not be restored or improved with this alternative, but would remain vulnerable to random catastrophic events such as flooding and landslides.

Indirect effects to Threatened, Sensitive, and FSOC plant habitat and populations under Alternative 1 are likely for certain guilds and species. In stands with declining canopy cover due to mortality from insects and diseases, the likely effects to certain sensitive plant guilds and species present could range from a beneficial response, due to factors like increased levels of light and available moisture, a neutral response, species persist but there is no evident change in population levels, to an intolerant response because of factors like loss of shade and decrease in relative humidity.

Indirectly, there would be an increased risk to sensitive plants and habitat due to the gradual increase in fuel loads through time, and with continuing fire suppression. The greater the fuel loading, the greater the risk of a high intensity burn and stand replacing fire, with possible loss of rare plants and habitat. The effects to rare plants resulting from a fire would range from beneficial to intolerant, depending on factors like the severity of the fire, the species ability to survive the event, and compete in early successional habitat. The ability to analyze these effects for all sensitive plant species is limited given our current level of knowledge. The following section provides general information on how herbaceous plants respond to fire.

There is little specific information for the Coeur d'Alene basin on understory plant community composition or rare plant occurrence in pre-settlement times. Available information on shifts in forest stand structure and composition and disturbance patterns suggests that many changes have taken place in understory shrub and forb communities and grasslands. Photo-comparison and fire history studies suggest that fire exclusion has allowed a greater portion of inland forests on the landscape to develop as dense stands (USDA 2000, PF Doc. TES-29, p. 116). The spatial continuity of these stands may allow insects and disease epidemics and stand replacement fires to become larger than in the past. At the same time, seral grassland species (shrubs, aspen, and seral conifers) are being replaced by thickets of shade-tolerant conifers. Due to excessive fuel loadings and fire suppression in much of the forest, when fires occur, they are likely to burn more intensely.

Fire behavior, fire duration, the pattern of fuel consumption, and the amount of subsurface heating all influence injury and mortality of plants, and their subsequent recovery. Post-fire responses also depend on the characteristics of the plant species on site, their susceptibility to fire and, and the means by which they recover after fire (USDA 2000, PF Doc. TES-29, p. 9).

A low severity fire (moderately burned, moderate duration, moderate ground char) that only consumes some of the surface fuels may kill laterally growing rhizomes or roots near the surface, or stem buds that are not well protected. It has little effect on buried plant parts and can stimulate significant amounts of post-fire sprouting. In contrast, a high severity fire (heavily burned, long duration, deep ground char) removes the duff layer and most of the woody debris, particularly rotten material. It can eliminate species with regenerative structures in the duff layer, or at the duff-mineral soil interface, and may lethally heat some plant parts in the upper soil layers, particularly where concentrations of heavy fuels or thick duff layers are consumed (PF Doc. TES-29, p. 20).

Whether herbaceous plants recover after fire depends largely on whether their regenerative structures are exposed to lethal temperature. Similar to woody plants, their survival depends on depth below the surface, whether they are located in combustible material, and the subsurface moisture regime at the time of the fire (USDA 2000, PF Doc. TES-29, p. 21). In addition, plants regenerate by a variety of means including vegetatively by means of resprouting or spreading with rhizomes, or by seed. Some plants have seed accumulate in the soil for long periods of time in the form of a "seed bank," which only germinates after a disturbance such as fire.

Long-term impacts to **deerfern** could occur in the event of a high severity fire. Deerfern is apparently able to survive light surface fires, and may recolonize by sprouting from rhizomes or by spores from adjacent

populations. Its response to severe wildfire has not been documented. Fire intervals in the cool, wet forest habitats the species prefers are estimated to be several hundred years, so that large-scale fires are usually catastrophic. Cumulative impacts on deerfern from a potential future wildfire would be difficult to predict.

Clustered lady's-slipper occurs in dry forest habitats in the Coeur d'Alene basin. It has been found in mid to late-seral Douglas-fir forests in which ponderosa pine is an associate. These dry forest types historically experienced frequent low-intensity fires, so this species is adapted at some level to fire regimes naturally occurring in these type forests. While clustered lady's-slipper may be able to survive low-intensity fires, high intensity fires that would remove canopy cover and eliminate or reduce the duff level may lead to mortality and an inability to reproduce (Lichthardt 2003, PF Doc. TES-8; and Kagan 1990, PF Doc. TES-30). This species has a shallow rhizome that is 1-5 inches below the mineral soil and can be killed by the direct effects of an intense fire (Lichthardt 2003, PF Doc. TES-8). Harrod et al, 1995, (PF Doc. TES-31, pp. 313-314) monitored clustered lady's-slipper on plots burned by the Rat Creek fire on the Wenatchee National Forest. There was a decrease in the number of plants where the duff layer was removed by the fire. There was an accompanying decrease in the percent cover of plants and the number of fruits per stem on the burned plot. Harrod et al states that optimum habitat for clustered lady's-slipper is not found in early successional communities, most populations occurring in areas with relatively closed canopies that develop later in succession. Results of the study indicated that this species is fire-intolerant and should not be managed with prescribed fire.

Constance's bittercress reacts favorably to openings in the forest canopy as long as the ground is not severely scarified by equipment (Crawford 1980). It does not tend to flower under shaded conditions, but may be able to maintain itself indefinitely by vegetative growth as long as competitive pressures are not too great (Lichthardt and Moseley 1994). Populations along the St. Joe and Selway rivers which were affected by crown fire have been observed to multiply vegetatively in response to increased sunlight, but successful flowering and seed set was low due to hot, dry conditions later in the summer.

Bank monkey-flower, a dry forest guild species, is present in dry, open forest habitats in the project area. It favors steeply sloping (greater than 60%) southeast to southwest aspects with a thin soil layer. These habitats historically have had a higher frequency of non-stand replacing fires than have the moist and wet habitats. This annual plant's reliance on a soil seed bank for reproduction may contribute to its ability to survive low intensity fire.

Henderson's sedge occurs in moist to wet forest guild habitats that burned with stand replacing and mixed-severity fires on a longer return interval than in dry forest habitat. In the Resource Area it occurs in the lower elevations along streams and in seepy areas. It extends into upland forest where moist habitats exist. This species ability to survive a high severity fire would depend on the amount and distribution of "refugia" where individuals could survive and recolonize suitable habitat.

Lichthardt and Moseley, 1994, (PF Doc. TES-19, p. 23) considered stable valley-bottom, or "source" populations, to be important as a seed source to replace ephemeral populations and individuals in less optimal surrounding habitats. Little information is available on the response of Henderson's sedge to burning.

All the other moist forest, dry forest, and wet forest guild species have populations in mid and late successional habitats, preferring more closed canopy conditions. Some of these species such as moonworts (*Botrychium* species), round-leaved rein orchid, and phantom orchid, have factors like obligate soil mycorrhizae relationships that are likely to be affected by canopy reduction of greater than 50%, and moderate to severe (duff-removing) fires. Stand-replacing fires were an important part of ecosystem processes in northern Idaho and the Coeur d'Alene Basin prior to the beginning of suppression efforts in the 1930's. While not much is known about the historic condition of rare plant communities, it is evident that with the decrease in the quality and amount of highly suitable habitats, and increase in fragmentation due to human activities, the ability of most rare plants to recolonize following disturbance has been reduced.

Cumulative Effects to TES Plants Under Alternative 1

Cumulative effects under Alternative 1 include those resulting from no action, as well as past, ongoing, and reasonably foreseeable future actions that are listed in the EA, Appendix B.

Wet Forest Guild

Cumulative impacts to wet forest habitat would be low. The amount of wet forest guild habitat is very low in the Resource Area. Wet, riparian area habitat that that is at risk because of unstable road conditions would not be improved under Alternative 1, so these conditions would change very slowly over time.

Moist Forest Guild

Cumulative impacts to highly suitable moist forest habitat related to loss of canopy cover are predicted to be low where stands have been sufficiently opened to promote establishment of early seral understory vegetation. The most likely cumulative impacts would be to those species with a broader habitat range (moonworts, round-leaved rein orchid, phantom orchid and clustered lady's slipper) which seem to require dense shade and/or soil mycorrhizae and which may not compete successfully with early seral forbs. Cumulative impacts to moist forest habitat where canopy cover has not been significantly reduced would be low.

Cumulative impacts resulting from recent insect and disease activity in moist forest habitat could include high-intensity, duff-replacing wildfires from predicted high fuel loading in untreated areas. Such a fire, if it were to occur, would be detrimental to obligate mycorrhizal species such as the moonworts, phantom orchid, clustered lady's slipper, and round-leaved rein orchid. Populations of these species could be destroyed if such a fire were intense enough to remove a significant amount of duff and organic material. The prospect of recolonization of affected habitat by any of these species would depend on the extent and duration of habitat alteration and the availability of an adjacent seed source. Cumulative impacts to these species related to stand-replacing wildfire are predicted to be low to moderate.

Dry Forest Guild

Cumulative effects to Dry Forest Guild species and habitat with Alternative 1 are expected to be low. Dry forest habitats would be inherently more at risk of stand replacing wildfire with fire suppression, and in the absence of harvest or fuels reduction treatments. Since dry forest species are adapted to habitats, which, historically, experienced a greater fire frequency, some would likely survive a stand replacing fire in scattered microsites. Successful recolonization for species after such disturbance events would be more difficult than it was historically due to fragmentation and overall habitat reduction.

Alpine/ Subalpine Guild

Cumulative impacts to Alpine/Subalpine habitat would be low. The amount of Alpine/Subalpine guild habitat is very low in the Resource Area. Changes to this guild over time with no management would be low because of the long fire return interval in these habitats.

Effects to TES Plants Under Alternatives 2 and 3

Direct and Indirect Effects to TES Plants Under Alternatives 2 and 3

Activities proposed under Alternative 2 and 3 would directly affect moist and dry forest guild habitat. Effects to plant guilds due to specific treatments are described below under effects common to the action alternatives. Commercial timber harvesting in the form of regeneration treatments and thinning would have approximately the same level of impact to rare plant guilds in both alternatives. Regeneration harvesting accompanied by reforestation with seral species would contribute to restoring dry site, fire adapted vegetation that is more resilient and similar to historic forest conditions.

The effects of new road construction and fuels treatments to suitable rare plant habitat would be slightly greater under Alternative 2, than with Alternative 3.

The direct effects of Alternative 2 would be greater than those of Alternative 3 in terms of the acreage of suitable habitat affected by ground disturbing activities and fuels reduction. Ground-based yarding, new road

construction, and mechanical fuels treatments present a greater risk of impacts in the form of soil displacement and introduction and spread of noxious weeds, than non-ground disturbing systems.

Direct and Indirect Effects of Project-Related Activities on TES Plants Common to the Action Alternatives

Timber Harvesting: Direct impacts of timber harvest can include elimination of individual plants through ground disturbance. Indirect impacts to sensitive plants can include changes in fuel loading, duff levels, moisture regime, and light levels. Effects to sensitive plants would vary according to species and harvest prescription. Most timber harvest would take place in moist forest habitats, so most of the effects would be confined to moist forest guild species. Fewer acres of dry forest, as opposed to moist forest guild habitat, would be potentially impacted by harvest in any alternative. Since Riparian Habitat Conservation Area guidelines would be followed for all action alternatives, most wet forest habitat would be excluded from harvest activities. Stream restoration work, road construction and road obliteration activities could potentially impact wet forest habitat. The Table G-TES-4 displays the acres of suitable sensitive plant habitat potentially affected by timber harvest.

The effects of timber harvesting on deerfern are not yet fully understood. Blake and Ebrahimi (PF Doc. TES-7) noted that deerfern populations in Washington state have withstood timber harvest and related treatment. Although populations studied in Idaho have been found to be genetically and phenologically similar to plants studied on the west coast, disjunct and peripheral populations may behave differently.

Commercial Thinning: Selective harvesting would take place in all action alternatives. The effects of selective harvest would be similar to the effects of mortality induced by insect and disease agents, as in Alternative 1, No Action. There would be some direct effects from selective harvest in suitable habitats for sensitive plants of the moist and dry forest guilds, especially those that are intolerant of changes in the moisture and light regime (i.e. mycotrophic species, moonworts and orchids). The other species are not likely to be adversely affected by selective harvest treatment. Commercial thinning of larch would take place in some alternatives. Commercial thinning, as an intermediate harvest method, is similar to selective harvest in the amount of tree canopy cover removed, but it differs in that it would result in a more uniform spacing of trees than with selective harvest. The effects of commercial thinning on sensitive plants would generally be the same as selective harvest.

Regeneration Harvest: Approximately 80% of the overstory canopy would be removed with regeneration treatments. Regeneration harvest would take place in all action alternatives. Live green trees, as well as dead and dying trees would be cut in order to provide conditions suitable for reforestation with long-lived seral tree species. Fuels treatment would occur in all regeneration units, consisting of slashing, underburning, or hand or machine piling and burning. Regeneration harvest would directly affect moist and dry forest guild sensitive plant habitat. The limited data and observations available indicate that most species in these Rare Plant Guilds are intolerant of major canopy removal. Bank monkey flower, while not likely to be affected by an increase in sunlight due to canopy removal, could be impacted by excessive ground disturbance. Mycotrophic species such as moonworts and sensitive orchids are very vulnerable to regeneration harvest. The most detrimental sort of regeneration harvest treatment appears to be with ground based equipment, followed by a hot burn, which consumes a lot of the organic matter on the site, or with mechanical fuels treatment. The action alternatives display various fuels treatment and harvest combinations.

Yarding System Methods: The yarding methods proposed for the action Alternatives consist of helicopter, skyline, and tractor yarding. Helicopter yarding would have an insignificant effect on sensitive plants and habitat because there would be little or no ground disturbance. Some damage to the live crowns of leave trees would be expected, but it would be minimal. The effects of skyline yarding would be intermediate between helicopter and tractor yarding. Skyline would necessitate construction of corridors for yarding purposes in which long narrow canopy openings would be created. Some ground disturbance would result from the yarding process. Tractor yarding would cause the most detrimental and long lasting impacts to the sensitive habitat, but mainly on designated skid trails. Here, compaction and soil displacement would be the primary negative effects, but they would be limited according to Region 1 and Forest Plan Standards and Guidelines. In all alternatives, Forest Plan Standards and Guidelines for soils would be met, including, woody debris retention on site and minimizing soil displacement and compaction (refer to Specialist's Report on Soils, page Soil-20).

New Road Construction, Road Reconstruction, and Reconditioning: New road construction, road reconstruction, and reconditioning would take place in all action alternatives. These activities vary in the potential for effects to moist, wet, and dry forest guild habitats and species. New road construction is a high ground disturbance activity, constituting a high risk to sensitive species in these guilds. Prior to new road construction, previously unsurveyed, highly suitable habitat in the activity area would be surveyed and any new occurrences deemed critical to species/population viability would be protected. In contrast, road reconstruction and reconditioning are low risk activities in terms of direct or indirect effects to sensitive plants and habitat. For these activities, existing road prisms would be treated which are already disturbed and of very low habitat suitability. While there are a few sensitive plant occurrences on the IPNF on old roads or cutbanks, they are, in general, individuals isolated from the main occurrence.

Fuels Treatment: Various methods of fuels reduction are proposed under action alternatives, all having the potential to directly and indirectly impact sensitive plants and habitat. Slashing and lop and scatter fuels treatments would have a negligible effect on sensitive plant species. Underburning for fuels reduction would be done within harvest unit boundaries only. Spring burning has the potential to impact rare plant individuals, particularly clustered lady's slipper, bank monkeyflower, and moonwort species. Specific implementation features (identified in the EA Page-11) would protect populations and highly suitable habitat that may be discovered during field surveys prior to project implementation. There would be a risk of increasing certain noxious weed species with burning, depending on the proximity to existing infestations and the cover type of the area treated (refer to Noxious Weeds Specialist's Report). Regeneration units would generally have control lines constructed to contain the fire. Fire line construction has the potential to impact sensitive plants and habitat through vegetation and ground disturbance. There would be no ignition within designated Riparian Habitat Conservation Areas, effectively buffering riparian wet forest habitats from this type of activity. Impacts to moist forest habitat would be very low. Specific features of all action alternatives (described in EA Pages 10-13) would protect documented populations and mitigate for new ones discovered prior to implementation.

Watershed Rehabilitation, Including In-stream Work, Road De-commisioning, and Replacement of Road Channel Crossings: Watershed rehabilitation activities have the potential to directly and indirectly impact moist, wet and dry forest guild habitats. Road channel crossing removal would have effects mainly to moist and wet forest habitat and is considered to be a low to moderate risk activity for sensitive plants, depending on the amount of ground disturbance. Road channel crossing upgrades that would be done during reconstruction are considered to be lower risk activities to sensitive plants. In-stream channel work would constitute a short term risk to sensitive plant habitat, but would have long term benefits because channel stability and riparian community habitat would be improved. Stream rehabilitation and road reclamation work have the potential to impact deerfern habitat.

Weed Treatment and Prevention: Noxious weed treatment and prevention would be performed according to guidelines outlined in the Coeur d'Alene River Ranger District Noxious Weed Final Environmental Impact Statement and Record of Decision (USDA Forest Service, 2000, PF Doc. TES-33). As described in this document, integrated weed control methods would be used, including herbicide spraying, manual, cultural (seeding/fertilizing) and biological. Weed treatment and prevention measures would reduce, but not eliminate the risk of weed spread in the project area. Effects to Threatened, Sensitive plants and Forest Species of Concern (FSOC) would be very low because of mitigation measures to protect these species as outlined in the Noxious Weeds FEIS. Additional information on the noxious weed treatment is contained in the Project File (PF Doc. NW-1).

Tree Planting: Tree planting would result in a minor amount of soil disturbance with hand tools. Risk of incidental effects to sensitive plants as a result of tree planting are predicted to be very low.

Cumulative Effects to TES Plants Common to All Alternatives

The cumulative effects analysis for TES plants and FSOC considered the effects of past, present and reasonably foreseeable future actions listed in the EA, Appendix B. There is little existing information regarding documented rare plant occurrence or habitats in the Prichard Murray Resource Area. Prior to 1988 the USFS did not conduct rare plant surveys, and occurrence reports to the Idaho Conservation Data Center were incidental (IPNF 2003; TES-40). Past activities on Federal lands prior to policies affording protection of rare plants, have

affected populations and habitat of sensitive plant species. Current activities proposed on Federal lands are required by law and policy to address sensitive plant species. Populations, when found, are managed for. Activities on State and private lands are not required to protect these species, therefore, loss of populations and modification of habitat is likely occurring.

Cumulative Effects to TES Plants as a Result of Reasonably Foreseeable and Ongoing Activities Common to All Alternatives

Reasonably foreseeable and ongoing projects in the cumulative effects analysis area are identified in EA - Appendix B. Projects include timber harvest on federal lands, new road construction, timber stand improvement, repairs on National Forest System roads, prescribed fire, noxious weed treatment, recreation, road access, and fuels treatment.

The new road construction in Fancy Gulch would permanently impact a small amount of moist and wet forest habitat. This area would be field surveyed prior to ground disturbing activities to determine presence or absence of Sensitive plants and the need for protection measures.

Weed control is a reasonably foreseeable future action. Guidelines for weed treatment would be consistent with those contained in the Coeur d'Alene River Ranger District Noxious Weeds FEIS, 2000. There is an increased risk of weed spread under all action alternatives, particularly in regard to certain species such as St. Johnswort and spotted knapweed, in susceptible habitats where prescribed fire is proposed. Weed increase may indirectly impact sensitive plants and highly suitable habitat where present in proposed treatment areas. Features Designed to reduce the spread of Noxious Weeds (EA page 11) would reduce the risk of weed spread.

Implementation of projects on National Forest System lands would contribute insignificant impacts to sensitive plants or suitable habitat, since Federal lands are managed to maintain sensitive plant populations. Sensitive plant and habitat assessment are conducted for all ground and/or vegetation disturbing on in the District. While individuals of some sensitive plants may occasionally be impacted, cumulative impacts to species and habitats are expected to be low.

Determination of Effects for Sensitive Plant Species

Based on the above analysis, and with the provisions for surveys and protection of sensitive plant populations (Features Designed to Protect Rare Plants, EA-Page 11), the following table represents the determination of effects to sensitive plants for each alternative. A description of habitat guilds (PF Doc. TES-5) and list of sensitive species (PF Doc. TES-13) is included in the Project Files.

Table TES-6. Summary of determination of effects on Sensitive plant species, by guild, for each alternative.

Species Guild	Alt. 1	Alt. 2	Alt. 3
Moist Forest Guild	NI	MIIH	MIIH
Dry Forest Guild	NI	MIIH	MIIH
Wet Forest Guild	NI	NI	NI
Subalpine Guild	NI	NI	NI
Peatland Guild	NI	NI	NI
Deciduous Riparian Guild	NI	NI	NI

NI = No Impact
MIIH = May Impact Individuals or Habitat with no trend to federal listing or loss of species or population viability
WIIH = Will Impact Individuals or Habitat with a likely trend to federal listing and/or loss of population or species viability
BI = Beneficial Impact

5. Consistency with Forest Policy and Legal Mandates Related to TES Plants

All of the proposed activities with the requirements for surveys and implementation of mitigation measures would meet the intent of the Forest Plan. The No Action Alternative would also meet the intent of the Forest Plan.

A Forest Plan management goal is to "manage habitat to maintain populations of identified sensitive species of animals and plants" (Forest Plan, II-1, TES-34).

A Forest Plan standard for sensitive species is to "manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations which could lead to Federal listing under the Endangered Species Act" (Forest Plan, II-28, PF Doc. TES-34).

Alternatives in the EA have analyzed the distribution of habitat for rare plants, including Region 1 Forest Service Sensitive plants, Forest Species of Concern, and Threatened plants. The Idaho Conservation Data Center was consulted for information on rare plant occurrence in the State. Alternative design considered the documented occurrence of rare plant species in the Resource Area, and the potential effects of proposed activities. Features Designed to Protect Rare Plants (EA, Ch II) provide for rare plant surveys to be conducted in all areas of suitable habitat where activities would occur prior to project implementation. Mitigation measures for rare plants would protect occurrences that may be discovered during surveys. Documentation of field surveys for rare plants are included in the Project File in TES-16.

The Forest Plan also identifies the need to "Determine the status and distribution of Threatened, Endangered and Rare (sensitive) plants on the IPNF" (Forest Plan, II-18, PF Doc. TES-34).

Two species of Threatened plants are listed by the USFWS for the Coeur d'Alene River Ranger District (USDI 2003; PF Doc. TES-11). Although there is potentially suitable habitat, no Threatened species have been discovered on Forest Service lands. There are no Endangered plant species currently listed for the IPNF or Coeur d'Alene River Ranger District. All projects on the Coeur d'Alene River Ranger District are analyzed for effects to Threatened plant species. Potentially suitable habitat is surveyed prior to project implementation. Projects that may have effects to Threatened plants are consulted on with the U.S. Fish and Wildlife Service according to Section 7 Guidelines under the Endangered Species Act, 1999.

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Specialist's Report on Noxious Weeds in the Prichard-Murray Resource Area

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June 2007

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SPECIALIST'S REPORT ON NOXIOUS WEEDS IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework for Noxious Weeds

Federal legislation, regulations, policy and direction that require development and coordination of programs for the control of noxious weeds, and evaluation of noxious weeds in the planning process include: The National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service Manual (Chapter 2080, as amended, 1995 (FSM 2000; PF Doc. NW-22) ; Executive Order #13112 (February 1999); the 1987 Idaho Panhandle National Forests, Forest Plan (PF Doc. CR-002); and the Idaho Panhandle National Forests Weed Pest Management EIS (1989).

The Forest Service Handbook (FSH 3409; PF Doc. NW-4), on Forest Pest Management defines a strategy for managing pests, including noxious weeds, as "A decision-making and action process incorporating biological, economic, and environmental evaluation of pest-host systems to manage pest populations". (FSH 3409.11 6/86; PF Doc. NW-4) This strategy is termed Integrated Pest Management (IPM). The Forest Plan provides the following direction for implementing an Integrated Pest Management program: "Noxious weed control will be based on an integrated pest management approach, which includes but is not limited to the current practices of inventory, monitoring, some hand-pulling, and some biological control. Noxious weed control will be conducted in cooperation with counties, other agencies, and private landowners." The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally un-infested areas. The noxious weeds management strategy for the Coeur d'Alene River Ranger District was outlined in the "Noxious Weeds Final Environmental Impact Statement" (IPNF, 2000; PF Doc. NW-2). It follows the general IPNF strategy. All weed treatments conducted on the Coeur d'Alene River Ranger District are conducted according to the guidelines contained in the EIS. Some additional key objectives of this strategy include:

- *Protect the natural condition and biodiversity of the Coeur d'Alene River Basin ecosystem by preventing or limiting the spread of aggressive, non-native plant species that displace native vegetation.*
- *Eliminate new invaders before they become established.*
- *Protect sensitive and unique habitats.*
- *Reduce weed sources at potential dispersion sites, such as recreation sites, trail heads, and dispersed campsites, and along main travel routes (roads and trails).*
- *Comply with Federal and State laws regulating management of noxious weeds.*

Noxious weeds are those plant species that have been officially designated as such by Federal, State, or County officials. In *Weeds of the West* (Whitson et al. 1992; PF Doc. NW-3), a weed is defined as "a plant that interferes with management objectives for a given area of land at a given point in time." The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States or the public health" (P.L. 93-629; PF Doc. NW-4). The Idaho Noxious Weed Law defines a "noxious weed" as any exotic plant species established or that may be introduced in the State which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a State-wide or County-wide noxious weed (Idaho Code 24 Chapter 22; PF Doc. NW-5). Both Federal and State laws define noxious weeds primarily in

terms of interference with commodity uses of the land. However, the impacts of noxious weeds on non-commodity resources such as water quality, wildlife and natural diversity are of increasing concern.

Characterization

The recent scientific assessment of the Interior Columbia Basin found that herbaceous and shrub wetland vegetation types in the Upper Columbia River Basin (including riparian habitats) have declined in area from historical conditions, in part due to invasion by certain noxious weed species (Quigley and Arbelbide 1997; PF Doc. NW-6). Wetland habitat in the analysis areas is also vulnerable to decline from encroaching weeds. Rangelands and dry forest types within the analysis areas and surrounding region were described in the above assessment as having low ecological integrity, again in part due to noxious weed invasions (Quigley, Haynes et al. 1996; PF Doc. NW-7).

The spread of noxious weeds can primarily be attributed to human-caused dispersal such as vehicles and roads (Roche and Roche 1991; PF Doc. NW-8), contaminated livestock feed, contaminated seed, and ineffective re-vegetation practices on disturbed lands (Callihan et al. 199; PF Doc. NW-9). Vallentine (1988; PF Doc. NW-10) explains that some of the worst noxious plant problems are caused by weed species such as leafy spurge, Canada thistle, the knapweeds, and dalmatian toadflax. The introduction of these and other noxious weeds has occurred throughout the Coeur d'Alene River Basin, especially in urban and agricultural areas, along major highways and travel routes, and areas within the forest that have experienced disturbance from intense recreation, roading, and timber harvest (USDA Forest Service, Toward An Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, February, 1998, pages 39-40; PF Doc. NW-11). Non-native species can impact the native flora and reduce native biodiversity, especially in diverse habitats like riparian zones, sensitive communities like wetlands, or inherently rare communities like subalpine balds, fens and seeps.

Roads and trails serve as corridors for the dispersal of many noxious weed species. Noxious weed seeds and plant parts are moved along road systems by vehicles, people, wildlife and livestock, allowing the establishment of noxious weeds into previously uninfested areas. Improved roads can act as conduits for the invasion of adjacent ecosystems by converting natural habitats to those highly vulnerable to invasion (Gelbard and Belnap, 2003; NW-12) Many of the road systems within the project area contain infestations of noxious weed species such as spotted knapweed, toadflax, and St. Johnswort.

In disturbed forested habitats, most weed species tend to proliferate in early successional stages and are reduced in density as canopy cover closes (Zack 1999; PF Doc. NW-13). However, in the interim, these transitory populations serve as seed sources for continued species expansion. Some species, such as spotted knapweed, produce large quantities of seed, which may remain dormant in the soil for many years until disturbance from fire, timber harvest or other disturbance provides favorable conditions for their germination and growth.

2. Affected Environment for Noxious Weeds

A limited program of noxious weed treatment has been ongoing on the Coeur d'Alene River Ranger District since 1989. Until 1996, few weed surveys were done on the Coeur d' Alene River Ranger District. In 1996, noxious weed surveys were conducted at 76 sites. Over 1,800 acres of potential habitat for infestation were documented for these sites, with an estimated 822 acres of actual infestation (IPNF 2000; PF Doc. NW-2). The major noxious weed species and weeds of concern identified include:

- meadow hawkweed (*Hieraceum pratense*)
- spotted knapweed (*Centaurea biebersteinii*)
- orange hawkweed (*Hieraceum aurantiacum*)
- dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*)
- Canada thistle (*Cirsium arvense*)
- St. Johnswort (*Hypericum perforatum*)
- yellow toadflax (*Linaria vulgaris*)
- oxeye daisy (*Leucanthemum vulgare*)
- common tansy (*Tanacetum vulgare*)
- Viper's bugloss (*Echium vulgare*)
- tansy ragwort *(Senecio jacobaea)*

All of the above listed species are documented from, or are suspected to occur in the Prichard-Murray Resource Area. Other species that would be considered for treatment if found to be present include leafy spurge (*Euphorbia esula*), hound's-tongue (*Cynoglossum officinale*), rush skeletonweed (*Chondrilla juncea*), sulfur cinquefoil (*Potentilla recta*), purple loosestrife (*Lythrum salicaria*), bull thistle (*Cirsium vulgare*), yellow star thistle (*Centaurea solstitialis*), musk thistle (*Carduus nutans*), and diffuse knapweed (*Centaurea diffusa*).

Weed infestation data was collected for the preparation of Noxious Weeds EIS (2000) and during the course of road and rare plant inventories on Forest Service lands in 2005, and has been used in prioritizing weed treatments. This information is contained in the rare plant survey documentation in the project file (PF Doc. TES-16). Spotted knapweed (*Centaurea biebersteinii*), meadow hawkweed (*Hieraceum pratense*), St. Johnswort (*Hypericum perforatum*), and Canada thistle *(Cirsium arvense)* are the most common weeds identified during the course of field surveys. Forest Road 208 was identified as a priority site for weed treatment in the Coeur d' Alene River Ranger District Noxious Weeds EIS (IPNF 2000; PF Doc. NW-2). It has been treated annually by the Shoshone County noxious Weed Control department, in cooperation with the Forest Service, under a cooperative agreement. Roads within the Prichard-Murray Resource Area that are not otherwise treated, would be considered for treatment and addition under the provisions of the weed EIS, given availability of funds.

Vegetative communities within the Coeur d'Alene sub-basin vary from dry and semi-dry to moist forest habitats and wetlands. A description of these communities and their susceptibility to weed invasions can be found in Project File Document NW-14. The suitability of a site to weed invasion depends on the weed species, climatic factors that are expressed in the cover vegetation type, and the type of activity, when applicable. Table 1 of PF Doc. NW-14 has been adapted from the scientific assessment of the Interior Columbia Basin, and displays susceptibility of the Resource Area's major vegetative community types to invasion by several weed species of concern.

Forty-eight percent of forest cover types in the Prichard-Murray Resource area are in the weed-susceptible Douglas-fir, and ponderosa pine types. These dry forest cover types, as shown in NW-14, are highly susceptible to weed invasion by such species as spotted knapweed, diffuse knapweed, bull thistle and Canada thistle. These species are currently infesting many sites in the Resource Area.

As shown in Table III-1 (PF Doc. NW-14), "Broad scale cover types in the project area and their susceptibility to invasion by noxious weed species", certain cover types have a high degree of vulnerability to invasion by several weed species. A "high" risk rating indicates that a particular weed can successfully establish and become dominant in a cover type in the absence of intense or frequent disturbance. Weed species considered *invaders* in some of the forest cover types found in the Resource Area include spotted knapweed, diffuse knapweed, bull thistle, Canada thistle and sulfur cinquefoil.

Other weed species are considered *colonizers*, able to invade and establish in certain cover types after soil disturbance or canopy removal. Insect and root disease affected forest cover types within the Resource Area fall into this "moderate susceptibility" category for many weed species of concern, including oxeye daisy, Dalmatian toadflax, orange and meadow hawkweeds, leafy spurge and yellow star thistle.

Based on the information regarding susceptibility of broad scale cover types, Table NW-1 represents the amount of habitat vulnerable to invasion by one or more weed species. Acres under Alternative 1 are the forest cover types existing on National Forest System lands in the Resource Area. Acres under Alternatives 2 and 3 represent the change in cover types predicted to result from proposed activities.

Table NW-1. Changes in percent susceptible vegetative cover types, by alternative*.

Forest Cover Type	Alternative 1 (percent)	Alternative 2 (percent)	Alternative 3 (percent)
Douglas-fir	47	45	46
Grand fir	35	34	34
White pine/Western larch	3	6	5
Ponderosa pine	1	1	1
Lodgepole pine	2	2	2
Western redcedar, western hemlock	6	6	6
Subalpine fir, Mountain hemlock and other	6	6	6

**Figures represent National Forest system and Bureau of Land Management lands only in the Resource Area.*

The Prichard-Murray Resource Area contains a major river drainage and many streams and tributaries. The diverse habitats and shifting dynamics of riparian zones make them uniquely susceptible to weed invasions. The richest plant communities along a river system are the most vulnerable to invasion (Planty-Tabbacchi et al. 1996; PF Doc. NW-15). Research has shown that the number of native species, as well as their total biomass, would decrease within locations infested by noxious weeds. Orange and meadow hawkweed, knapweed, blueweed, purple loosestrife, and common tansy are common riparian area invaders in the subbasin. Weeds have been brought into these areas by vehicle travel on roads and cattle grazing. Drainages provide a means of dispersing weed seeds for long distances. Most of the listed Sensitive plants for the Coeur d'Alene River Ranger District are associated with moist to wet forests, and are at risk of losing suitable habitat due to weed invasion in these areas.

3. Environmental Consequences to Noxious Weeds

Methodology Used in the Analysis of Environmental Consequences to Noxious Weeds

Analysis was conducted using results of past noxious weed surveys, documented distribution of weed species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the risk of weed spread and introduction of new weed invaders from the proposed activity, based on current knowledge and professional judgment.

Indicators used to measure impacts on weed spread and introduction include the number of acres proposed for ground-based timber harvest and/or fuels treatment, the number of miles of proposed new road construction and reconstruction, and the proximity of proposed treatment areas to known weed infestations.

Effects to Noxious Weeds as a Result of Implementing Alternative 1 (No-Action)

Direct and Indirect Effects to Noxious Weeds Under Alternative 1: With the No Action Alternative, there would be a natural reduction in forest canopy cover due to forest insect and disease induced mortality. Canopy loss would make conditions in the dry Douglas-fir and ponderosa pine/larch cover types more suitable to certain common weed species such as St. Johnswort, thistles, toadflax, and spotted knapweed. Where these species are already established in affected areas, they would likely increase. However, these effects would be limited because of the lack of ground disturbance occurring with this natural event. The direct effect of the loss of canopy and resulting indirect effect of increased light and a warmer, drier micro-environment, would be most pronounced on dry, Douglas-fir, ponderosa pine/larch habitat types. There would be little direct, indirect, or cumulative effect to moist forest and riparian habitats. In habitats with a developed shrub layer, the shrub cover would increase, limiting the risk of weed encroachment. Douglas-fir cover types with grass/forb understories would be affected to a greater degree by invading weeds.

Indirectly, the lack of fuels treatment in Alternative 1 would, over time, increase the risk of high severity fire in the event of a wildfire. High severity burned areas have more exposed mineral soil that would be susceptible to weed invasion.

Cumulative Effects to Noxious Weeds under Alternative 1: Cumulatively, areas where continued tree mortality results in significant canopy loss would be at greater risk of weed spread, particularly in dry habitats which are already open to semi-open and dominated by grass-forb understories. Stands with higher rates of fuels accumulation would be at increased risk of a severe wildfire, exposure of mineral soils and increased risk of weed spread. The cumulative effects of Alternative 1 are expected to be low.

Effects to Noxious Weeds as a Result of implementing Alternative 2

Direct and Indirect Effects to Noxious Weeds from Project-related Activities under Alternatives 2 and 3: The predicted direct and indirect effects of the action alternatives would be very similar. Effects under Alternative 2 would be slightly greater than under Alternative 3 based on the smaller amount of disturbed, susceptible cover type acres from vegetative and fuels treatments, and road construction. Areas of soil disturbance in susceptible habitats are at risk for weed invasion, particularly when ground-disturbing activities occur near existing infestations. Dry forest types in the Prichard-Murray Resource Area are at risk of weed invasion and spread as displayed in Table NW-1. Different management activities vary in the level of risk for weed invasion on affected sites. There would be little direct effect to noxious weeds due to activities; most effects would be indirect or cumulative in nature. "Features Designed to Reduce Noxious Weeds" under all action alternatives (EA, Part 3.C.2.) would help reduce, but not eliminate, the risk of weed spread due to proposed activities. Pre-treatment of all roads used in the timber sale is a feature of Alternative 2 and Alternative 3.

Proposed timber harvesting, road construction/ rehabilitation, and various fuels treatments have the greatest risk of introducing and spreading weeds in the project area. Most of the activities would occur in dry to moderately dry Grand fir, Douglas-fir, and ponderosa pine cover types. The activities would increase the risk of weed invasion on harvested acres, newly constructed roads, and in burned areas, particularly in these cover types. Mitigation measures to reduce the spread of weeds, including roadside pre-treatment, grass seeding and equipment washing would reduce, but not eliminate weed spread. Post activity monitoring and weed treatment will be implemented given availability of funding.

Timber harvesting is a feature of both action alternatives. Shelterwood, seed tree regeneration harvest, and commercial thinning would be the main silvicultural treatments used. The regeneration treatments would remove most of the overstory trees and underburning would be used as site preparation for tree planting. Units where shelterwood or seed tree harvesting is implemented with skyline or tractor yarding and underburning would have the highest risk of weed invasion and spread. More soil disturbance would occur with this type of treatment when compared to intermediate harvests, such as commercial thinning. The increased amount of sunlight reaching the ground would also make regeneration units more prone to weed invasion by sun-dependent species such as spotted knapweed and Dalmatian toadflax. A combination of skyline, tractor, forwarder, and helicopter yarding would be used in Alternative 2 and 3. Commercial thinning units would retain greater canopy closure and be slightly less prone to weed invasion by shade intolerant weed species.

Road construction, reconstruction, reconditioning, decommissioning, and fire line construction would cause soil disturbance. Many roads in the project area are currently weed- infested and there is a risk of indirectly introducing noxious weeds into newly disturbed sites. Road construction could link already infested sites to further increase weed spread. This occurs by means of equipment, animals, off-road vehicles and other vehicles. Since most of the project area roads would be temporary, rehabilitation would occur, such as ripping and grass seeding, prior to road closure, therefore reducing the risk of invasion.

Fuels treatment is proposed in all activity units following harvesting. Underburning and mechanical fuels treatment, such as grapple piling, are the most common methods. Fuels Treatments such as prescribed fire would directly affect some weeds, and may indirectly affect some habitats, making them more susceptible to weed invasion.

Some of the documented effects to certain weed species from fire are as follows:

- **Spotted knapweed *(Centaurea biebersteinii*)** plants present before burning may re-sprout from root crowns, and seedlings may emerge from the seed bank or invade bare ground from an off-site seed source following fire. Differences in the observed response of spotted knapweed to fire may be regional, may differ with the density of the infestation, may be different in low fire severity versus high fire severity microsites, and in spring versus fall burns (USFS 2003; NW-17).
- **Toadflax *(Linaria spp.)*** is likely to be top-killed by fire, however its deep, extensive root system is likely to survive even severe fire and allow re-establishment of the population from vegetative buds on roots. Toadflax is able to recover after fire and may even be promoted by fire, especially if other species are reduced. The post fire environment is well suited to establishment by seed. (USFS 2003; NW-17).
- **Canada thistle *(Cirsium arvense)*** varies in its response to fire, depending on vegetation and site characteristics, as well as frequency, severity, and season of burning. This species is slightly damaged to enhanced by fire. It can survive fire and re-sprout vegetatively from its extensive perennial root system, or colonize bare ground via seedling establishment after fire. Several studies have indicated the presence of Canada thistle in burned areas where it was absent from the pre-fire community and/or adjacent unburned areas (USFS 2003; NW-17).
- **Cheatgrass *(Bromus tectorum*)** is an invasive species that has been widely documented to increase on sites following fire (USFS 2003; NW-17). The effect cheat grass invasion on dry sites following fire is to out-compete native forbs for moisture, thus becoming the dominant ground cover.

Prescribed fire would be used to prepare regeneration harvest units for planting and for fuels reduction, following slashing in commercial and non-commercially treated units. Exposure of mineral soil is likely in regeneration units, thereby creating a suitable seedbed for weed introduction. Weed populations, constituting a ready seed source, are documented to exist on roads and within units proposed for treatment. Though many of the common weeds invade after site preparation, they tend to decrease as the site becomes stocked with planted conifers and native vegetation. This is a long-term process of vegetation succession, taking up to 20-30 years or more to achieve canopy closure. In all action alternatives, prescribed fire would be used both within and outside the boundaries of harvest units. The objective of these fires would be to reduce smaller diameter fuels with a low intensity burn. There would be a risk of fires burning outside of the unit boundaries or at a higher severity than desired, thereby increasing the spread of certain weed species on susceptible acres. Burning prescriptions would strive to minimize those risks.

Chipping as a ground-based mechanical fuels treatment would disturb the soil and provide areas for weed invasion, with no further prevention measures. There is also the potential for equipment to spread weed seeds from infested sites to newly disturbed ground. Contract provisions for construction equipment washing would greatly reduce this risk (Chapter 2, Features Designed to Reduce the Spread of Noxious Weeds).

Cumulative Effects to Noxious Weeds Common to the Action Alternatives: Cumulative effects with this alternative would be low to moderate. Weed infestations are already present in the Resource Area on federal and private lands, and county road right-of-ways. The proposed action may increase the spread of some weeds despite the required mitigation measures. Weed control efforts in the area are ongoing. Federal agencies, the state of Idaho, county officials, and the public work together cooperatively to control noxious weeds within the Inland Empire Cooperative Weed Management Area.

While existing infestations of certain weed species may continue to increase on Federal lands and adjacent private lands, proposed activities under all action alternatives would minimize the risk of weed spread by application of the "Features Designed to Reduce the Spread of Noxious Weeds" described in Chapter 2. Weed treatment and prevention practices as proposed would minimize, but not eliminate, the risk of weed

spread. The Forest Service does not have control over activities occurring on private lands; weed introduction and spread is likely occurring.

Cumulative Effects to Noxious Weeds Resulting From Reasonably Foreseeable Actions: A list of reasonably foreseeable and ongoing projects in Coeur d'Alene River Ranger District is included in Chapter 2. Projects include weed treatment on USFS, BLM, and private lands, timber harvest on federal, and private lands, timber stand improvement, road maintenance, prescribed burning, recreation and road access, and slash disposal. Additional weed treatment will be considered in the Resource Area depending on available funding.

Implementation of foreseeable future and current actions on National Forest lands will, in most cases, have a low level of cumulative impacts on the risk of weed spread, since the Coeur d'Alene River Ranger District is committed to implementing treatment and prevention practices (EA, part 3.C.2., "Features Designed to Reduce the Spread of Noxious Weeds") where ground or vegetation disturbance and/or canopy removal would occur.

Cumulative Effects to Noxious Weeds as a Result of Implementing the Identified Opportunities: Watershed restoration projects such as road obliteration, removal or improvement of stream crossings and placement of in-stream structures to benefit fish habitat could increase the risk of weed spread and of new invasions through moderate levels of soil and vegetation disturbance. Weed treatment and prevention practices would reduce this risk (Chapter 2, Features Designed to Reduce the Spread of Noxious Weeds). In addition, removal of problematic road segments would reduce or eliminate chronic erosion of topsoil, which can discourage establishment of native species and encourage invasion of weed species that readily establish on disturbed soils. Removal of unneeded roads and road segments also reduces the availability of travel corridors that hasten the spread of weeds from vehicle traffic.

Weed treatment and prevention projects would be conducted in accordance with the noxious weed features included in the Coeur d'Alene River Ranger District Noxious Weeds Final EIS (USDA 2000; PF Doc. NW-2). Timber stand improvement work would have no effect on the spread of weeds.

4. Consistency with the Forest Plan and Other Applicable Regulatory Direction in Regard to Noxious Weeds

All action alternatives proposing management activities within the Prichard-Murray Resource Area, with the provisions for minimizing weed spread (EA Part 3.C.2., Features Designed to Reduce the Spread of Noxious Weeds), would meet the intent of the Forest Plan for noxious weeds. Alternative 1 (No Action) would also meet the intent of the Forest Plan. The Forest Plan (IPNF 1987; PF Doc. CR-002) lists objectives for noxious weeds:

k. Range (PF Doc. 18, p. II-7-8):

Noxious weed control will be based on an integrated pest management approach, which includes, but is not limited to, the current practices of inventory, monitoring, some hand-pulling, and some biological control.

Weed control on the Coeur d'Alene River Ranger District is conducted in accordance to guidelines established in the Noxious Weeds Final Environmental Impact Statement, 2000 (PF Doc. NW-2). The guidelines provide for a strategy of integrated weed control, including inventory, monitoring, and manual, chemical, biological, and cultural treatment methods. An "adaptive" strategy is outlined that allows for consideration of new treatment methods, if they become available, and treatment of new infestations that may be discovered. The FEIS identified a total of 76 infested sites across the District that are planned for weed treatment. Each site was analyzed for weed species present, infestation level, and the most effective method of treatment (PF Doc.NW-2). Infested roads, trails, and meadows in the Prichard-Murray Resource Area were considered for treatment. A list of priorities for weed treatment is included in Project File (PF Doc. NW-16). The extent of weed treatment is dependent of the availability of funding.

Noxious weed control will be conducted in Cooperation with counties, other agencies, and private landowners.

The Coeur d'Alene River Ranger District is an active member of the Inland Empire Cooperative Weed Management Area, a group of County, Federal, State, and other agencies and private citizens that work together on noxious weed control efforts in northern Idaho. District weed project managers coordinate and share information about planned weed treatments with the group on a regular basis. In accordance with the FEIS, the public is notified when weed treatments are planned to occur on Forest Service lands and on lands adjacent to private.

Many noxious weed species, including knapweed, St. Johns wort and common tansy, are widespread and control would require a major cooperative effort with counties and private landowners. Major programs to eradicate such species are not possible within expected budget levels. Priority will be given to small infestations of species new to an area, where moderate control actions have a good chance of preventing the establishment of new problems. (Forest Plan, p. II-7; PF Doc. CR-002).

The Noxious Weeds FEIS, 2000 (PF Doc. NW-2) listed elimination of new invaders (weed species not previously reported in the area) before they become established in the Purpose and Need for Action (FEIS, 2000 (PF Doc. 2, p. 1). Surveys conducted for the FEIS, and subsequent to it, identify sites of new invading species and make them a priority for treatment. New invaders that are found in the Resource Area would be treated, given the availability of funding.

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Specialist's Report on Aquatic Resources in the Prichard-Murray Resource Area

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March 2007

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SPECIALIST'S REPORT ON AQUATIC RESOURCES IN THE PRICHARD MURRAY RESOURCE AREA

1. Regulatory Framework for Aquatic Resources

The regulatory framework governing management of watershed and fisheries for the analysis is based on:

- *Forest Plan – Idaho Panhandle National Forest (IPNF)*
- *National Forest Management Act (NFMA)*
- *Endangered Species Act (ESA)*
- *Clean Water Act (CWA) and amendments.*
- *Idaho Department of Environmental Quality (IDEQ) implementation of the Clean Water Act*
- *Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code, 2000)*
- *Executive Order 12962 (Recreational Fishing)*
- *State of Idaho Governor's Bull Trout Plan*

The National Forest Management Act (NFMA 1976) requires that the Forest Service manage for a diversity of fish habitat to support viable fish populations (36 CFR 219.19). Regulations further state that the effects on these species and the reason for their choice as management indicator species (MIS) be documented (36 CFR 219.19(a)(1)). Direction is also included in the Idaho Panhandle National Forests Forest Plan (USDA 1987). The Inland Native Fish Strategy (INFS; USDA 1995; PF CR-003) amended some Forest Plan direction regarding stream and fish habitat protection measures (see Appendix B).

Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies, in consultation with the U.S. Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. Currently, bull trout have been documented within some of the watersheds in the Prichard-Murray Resource Area. Private land along the North Fork Coeur d'Alene River and Prichard Creek are designated as critical habitat by the U.S. Fish & Wildlife Service (Federal Register, October 6, 2004, USFWS 2004 http//Pacific.fws.gov).

Under authority of the Clean Water Act, the Environmental Protection Agency (EPA) and the states must develop plans and objectives that will eventually restore identified water bodies that are not meeting State water quality standards. Stream segments of concern are identified under the antidegradation policy of the State's water quality standards as meeting or exceeding standards. The North Fork of the Coeur d'Alene River, Prichard Creek, and the East Fork of Eagle Creek are all listed on the 2002/2003 303(d) list for water quality impairment (DEQ, 2003). The pollutants of concern are metals and sediment. There is a Total Maximum Daily Load (TMDL) for sediment in the North Fork of the Coeur d'Alene River Subbasin that was approved in November 2001 (AQ-116). The completion of the implementation plan is pending. Under this status, there should be no net increase in the pollutant of concern with management actions and an overall trend in pollution reduction over time. The TMDL for the North Fork of the Coeur d'Alene River would include the main stem river and any tributary that influences water quality to the main river such as Prichard Creek, Eagle Creek, Brown Creek, and Hopkins Creek.

The Forest Service is working with DEQ and EPA to develop an implementation plan for its portion of the TMDL in the North Fork Coeur d'Alene River in cooperation with IDEQ, other Federal, State and local Governments, and interested local parties. In the interim, any activities we undertake or permit on National Forest System lands will be designed to reduce pollutants of concern, where feasible. The timeframe for completion of the implementation plan has not yet been determined.

The Forest Service has agreements with the State of Idaho to implement Best Management Practices (BMPs) or Soil and Water Conservation Practices for all management activities. Proposed activities will be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Manual

2509.22), which outlines BMPs (BMPs; Appendix A). These practices and guidelines are designed to meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

Executive Order 12962 (June 7, 1995) states objectives "to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by: (h) evaluating the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order."

The mission of the Governor's Bull Trout Plan is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (State of Idaho 1996; PF Doc. AQ-11). The Governor's Bull trout plan incorporates the entire Coeur d'Alene River drainage and its tributaries, which in this project would include the N.F. Coeur d'Alene River and its tributaries.

2. Affected Aquatic Environment

A. Methodology Used in the Assessment and Description of the Affected Aquatic Environment

Geographic Scale of the Analyses

For this analysis, the resource area was subdivided into manageable units referred to as "subwatersheds" (Figure AQ-1). One unit termed as the Middle Segment of the North Fork of the Coeur d'Alene River is not a sub-watershed but is cataloged separately by reference to its water quality impaired segment status and delineation. The discussions focus on the three subwatersheds of the Prichard-Murray Resource Area and the two smaller Subwatersheds within those. A summary of cumulative effects will also be discussed for subwatersheds of the Middle North Fork Coeur d'Alene River. These discussions are arranged in the following order:

1) *Prichard Creek Watershed*
2) *Upper Prichard Creek Watershed*
3) *Eagle Creek Watershed*
4) *Brown Creek Watershed*
5) *Hopkins Creek Watershed*
6) *Middle Segment North Fork Coeur d'Alene River*

Each of the watersheds in the Prichard-Murray Resource Area was analyzed as its own cumulative effects area using WATSED to look at cumulative effects at a smaller scale except the Middle segment of the North Fork of the Coeur d'Alene River (see Appendix H for model limitations). The entire Upper and middle segments North Fork of the Coeur d'Alene River fall within a watershed that is approximately 600 sq miles. This is too large to apply WATSED so smaller watersheds were used at the appropriate scale to analyze and summarize cumulative effects from this proposed project. This scale used in modeling is also consistent with the analysis in the Geographic Assessment.

Aerial photographs from 2004 were used to estimate location and types of vegetative management on non-federally managed lands and Bureau of Land Management (BLM) records were used on BLM managed land so that all land management activities could be accounted for in each of the cumulative effects analysis areas.

Water quality in the North Fork Coeur d'Alene River, at the confluence with Prichard Creek, is qualitatively addressed in this Environmental Assessment based on changes in contribution of pollutants. The Geographic Assessment recommends one integrated strategy that will help respond to issues and process of the terrestrial, aquatic and recreation components of the ecosystem (Geographic Assessment, page 59; PF Doc. CR-025. This strategy identified different implementation strategies for different areas, so native aquatic resources can be conserved and protected.

The aquatic ecosystems of the Prichard-Murray Resource Area were identified as falling into one of three condition classes, as defined in the Geographic Assessment (USDA Forest Service, 1998, pages 59-61; PF Doc. CR-025):

- *Properly functioning: Within the scope of this assessment, a properly functioning watershed system is one that is exhibiting dynamic equilibrium characteristics and whose streams are operating and responding appropriately under their current environment. These systems can absorb and respond to disturbances that they have evolved under their historic range. Typically, parts of these systems, or the system as a whole, can move toward a more stable condition over time following a disturbance (or a series of disturbances) within a certain time period. As a system, these watersheds will not benefit from large-scale watershed restoration actions (although local, site-specific improvements may be productive.)*
- *Functioning at risk: A watershed system that is functioning-at-risk is one that is essentially still properly functioning. However, it may be exhibiting trends or it may contain known risks that are likely to compromise that status and the ability to fully support beneficial uses in the future. This status may be assigned where the apparent watershed status is uncertain because the complexity of the system and disturbances. These systems are the first priority for large-scale watershed system restoration and improvement programs. Such programs will often produce effective and timely responses in the near future.*
- *Not properly functioning: Watershed systems that are not properly functioning often exhibit rapid adverse trends and may not fully support beneficial uses. These systems may appear to be responding to their own last adjustment, rather than toward stabilizing the last disturbance. They are "out-of-balance" with their environment and may not be in dynamic equilibrium, in periods of at least several decades. These systems are in need of large-scale restoration. These watersheds are usually second priority due to limited availability of resources, uncertain technology, and the long time period expected for positive responses.*

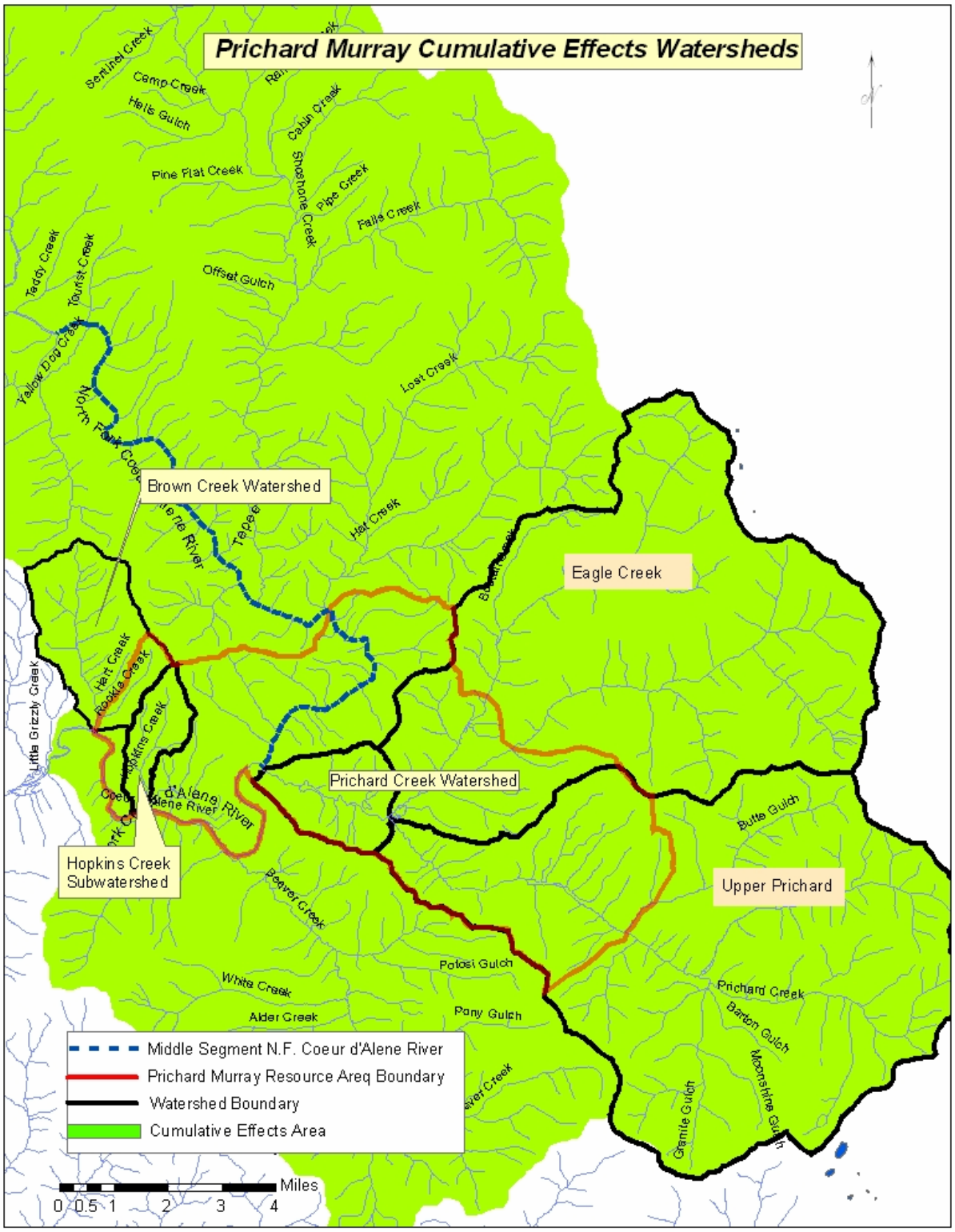
Watersheds of the Prichard-Murray Resource Area have been identified by the Geographic Assessment as being in the following condition classes:

Prichard Creek…… Not Properly Functioning
Eagle Creek…….. Functioning at Risk
Middle North Fork Coeur d'Alene River…… Not Properly Functioning
(below Yellow Dog Creek and above Prichard Creek)
Lower North Fork Coeur d'Alene River……...Not Properly Functioning
(below Prichard Creek)
Brown Creek……Properly Functioning

Literature and Office Review

The assessment of existing conditions is critical to an environmental analysis because it describes the current condition of the Prichard-Murray Resource Area and provides a basis for comparing the effects of management alternatives. Information for the watershed and fisheries analysis was compiled using data from the field observations and measurements made in 2003. Additional information was gathered from district files, historical records, aerial photographs, and published scientific literature. Also, discussions with the Idaho Department of Fish and Game (IDFG) provided electrofishing and stocking data and comprehensive knowledge of the fisheries resources in the North Fork Coeur d'Alene River Watershed. Data was obtained from the Idaho Department of Environmental Quality (DEQ) beneficial use reconnaissance program (BURP). The Roads Analysis Process (USDA 1999c; PF Doc. AQ-13) was also completed, which established recommendations for long-term road management objectives within the Prichard-Murray Resource Area.

Figure AQ-1. The Cumulative Effects Area for Aquatic Resources in the Prichard-Murray Resource Area. *Watersheds of the appropriate size and watersheds at different scales were chosen for use in WATSED cumulative effects modeling 1) Eagle Creek Watershed; 2) Upper Prichard Creek; 3) The whole Prichard Creek Watershed; 4) Brown Creek Watershed; and 5) Hopkins Creek Watershed. 6) Middle Segment of N. Fork Coeur d'Alene River.*



The WATSED Model

Anticipated sediment and water yield runoff modification for the Prichard-Murray Resource Area watersheds was estimated from the methods documented in the R1/R4 Sediment Guides (USDA 1981; PF Doc. AQ-14), (Appendix H, WATSED Model Limitations), and the WATBAL Technical User Guide (Patten 1989; PF Doc. AQ-15). The version calibrated for the Idaho Panhandle National Forests, known as WATSED, is an analysis tool that spatially and temporally organizes typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to help determine the findings of probable effects.

WATSED estimates a series of anticipated annual values over a period of years. The model predicts an estimate of most likely mean annual sediment loads (reported as tons per square mile per year, or as routed tons per year), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" (i.e., historic mean load prior to significant development activities) sediment load, which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2006, which is prior to any anticipated disturbances related to the proposed activities.

The estimates of sediment and peak flow reflect how watersheds with similar conditions and landtypes have responded over time to a similar history of disturbance. WATSED is neither intended nor designed to model event-based processes and functions, or specific in-channel responses. It does, however, incorporate the results of those processes in the calibration of its driving coefficients. WATSED does not evaluate increases in sediment and peak flows specifically resulting from "rain-on-snow" events or other stochastic events, nor does it attempt to estimate in-channel and stream-bank erosion. The Idaho Panhandle National Forests (IPNF) frequently validates the WATSED coefficients and estimates using long-term water quality monitoring networks on the IPNF (USDA 1998b, 1999, and 2000; PF Doc. CR-014-016).

The forest management activities used to calibrate the model include standard BMPs and Soil and Water Conservation Practices; therefore, standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard BMPs, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis to fully determine watershed response.

WATSED was designed to address a complex array of landtypes and disturbances within the context of a watershed, and organize the evaluation according to rule sets established by the author and cooperators. In the case of WATSED, the rule sets reflect watershed processes and functions based on research, data, and analyses collected locally and regionally. Forest Plan monitoring reports (USDA 1998b, 1999, and 2000; PF Doc. CR-014-015) describe how the calibration and validation of WATSED has been an annual process on the forest and where changes have been made. The model, however, also includes simplifying assumptions, and does not include all possible controlling factors. Therefore, the use of models only provides one set of information to the technical user, who, along with knowledge of the model and its limitations, other models, data, analysis, experience and judgment must integrate all those sources to make the appropriate findings and conclusions.

Field Review

Roads within the Prichard-Murray Resource Area were surveyed during the 2005 field season. Sites where roads cross drainages were inventoried to assess erosional hazards and risks to aquatic ecosystems, using a protocol developed locally for the Coeur d'Alene River Ranger District. This method gathered information on road-stream crossings that included fill volumes, culvert sizes, erosional features, and other variables, so that sediment risk from culvert failure could be assessed. Perennial crossings where known fish presence occurred were inventoried and evaluated for fish passage using R-1 protocols for road-stream crossings (Clarkin et al. 2003; PF Doc. AQ-56b). From this information culverts and stream crossings could be prioritized for upgrading or removal (see Sediment Risk Analysis, PF Doc. AQ-74).

Stream information was collected in streams within the project area and some of its tributaries during the 2003 and 2005 field season (Project File Doc. AQ-110). Representative segments within the lower reaches and those that are most sensitive to watershed disturbance were selected for collecting information to determine

stream channel types, cross sectional profiles, longitudinal profiles, woody debris composition, bank erosion, and stream temperature. A modified version of the R1/R4 fish and fish habitat inventory (Overton et al. 1997; PF Doc. AQ-16) was conducted along these same index reaches. These sites are mapped, documented, and marked on the ground so that repeat measurements can be accomplished to track changes in stream conditions (see monitoring, Appendix C, and Aquatics Project File records AQ - 110).

GIS Technology

Geographical Information System (GIS) technology was used to combine existing databases, proposed activities and data taken from aerial photos to create maps and summary tables of existing conditions. Landtype maps and descriptions were input into GIS layers to evaluate the existing condition and for the effects analysis.

B. How Past Actions Influenced Existing Conditions of the Affected Watershed/Subwatersheds

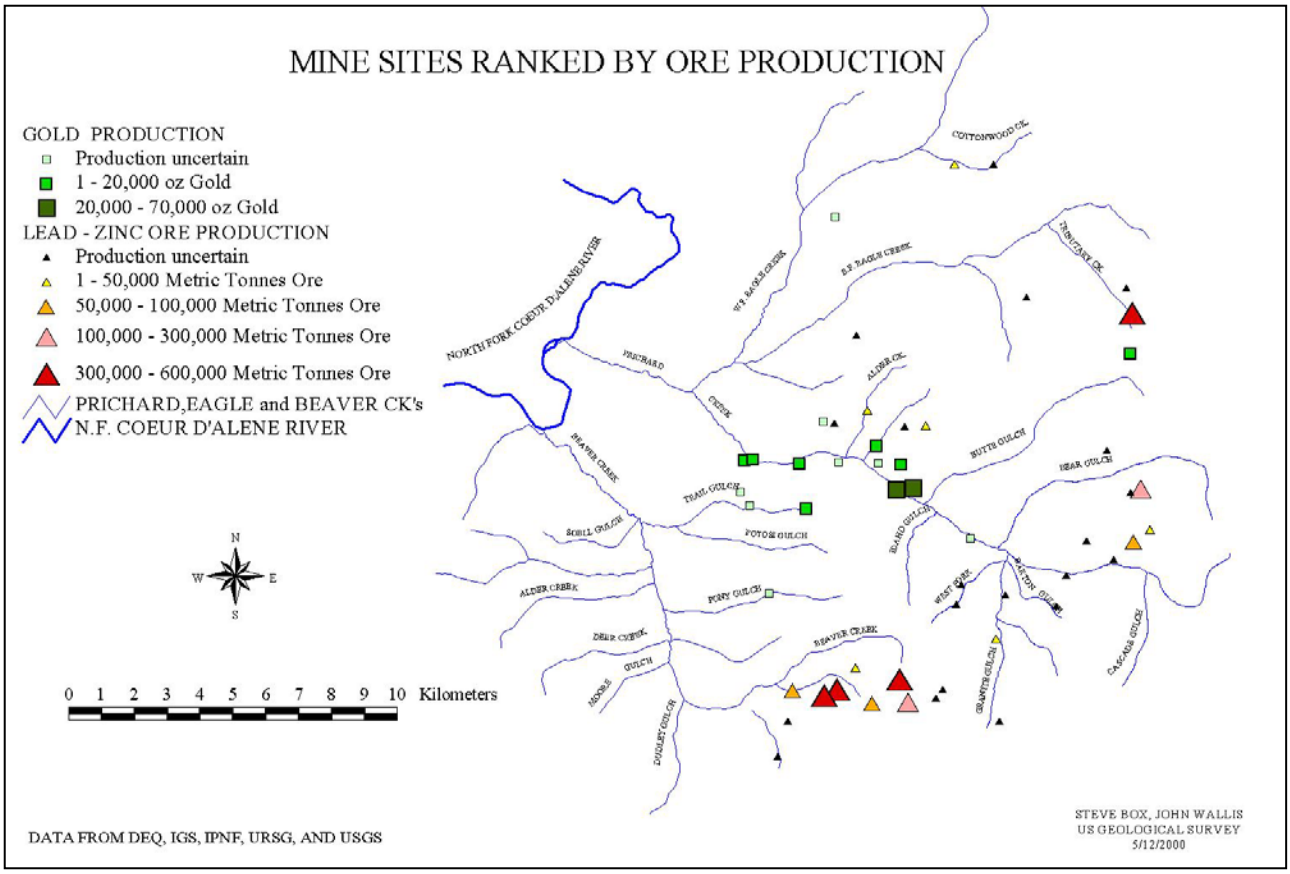
The following is a description of past actions, to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below were ones that are relevant to the watershed and fisheries cumulative effects analysis. Other activities identified in the Prichard-Murray Environmental Assessment (Appendix B) are not discussed here because there was no soil or watershed disturbance created by these activities. These include tree planting, firewood gathering and hunting.

Effects of Past Wildfires: Historically, the greatest natural agent of disturbance in the Prichard-Murray Resource Area was wildfire. Fire history of the area is explained in detail in the Fire/Fuels Specialists Report. Generally speaking for most of the Prichard-Murray Resource area, fire has been of mixed severity with less than 75% overstory replacement with each fire event (see Fires/Fuels Report, page FF-6). Throughout most of the area the average historic fire return interval was 35 to 100+ years. The very moist riparian stands likely burned less often and less severely, due to their topographic position and fuel moisture conditions during most fire seasons. This has led the condition where stream bottoms historically would have a good supply of large woody debris and excellent aquatic habitat. Salvage logging, road building and other human development in the riparian areas has occurred in the majority of the resource area and altered the historic natural condition. Past fire suppression has occurred in recent years and has contributed to the continual increase in fuel-loading on both dry and moist sites.

Effects of Roads: Road construction within the Prichard-Murray Resource Area has been extensive in Prichard and Brown Creeks compared to other areas within the North Fork of the Coeur d'Alene River Basin. Access to Montana over Thompson Pass, extensive mining and other forest management activities such as past fire and timber projects (predominately salvage logging since the turn of the century), have driven the need for the existing road networks. Many of the roads in the analysis area were built in the early 1900s for mining purposes. The Forest Service required access to parts of the watershed for vegetation management and some exploratory mining then built more roads in the 1950's to the 1980's. On average there are approximately 4.1 miles of road per square mile; of these approximately 60% are brushed in and closed. Brown Creek Watershed is partially outside of the Prichard-Murray Resource area. The whole watershed was modeled even though the only proposed activity is in Rookie Creek (approximately 15% of the watershed). Brown Creek watershed has high road densities with little road decommissioning or watershed restoration activities. Undersized culverts in old road systems and routing of sediment from roads near stream crossings are likely sources of chronic sediment in this watershed. The 990 Road in lower Brown Creek has 4 tributary crossings with undersized culverts and fill slope failures that contribute sediment to Brown Creek. (See PF Doc. Tran-1)

Effects of Mining: Mineral exploration work in the Prichard-Murray Resource Area began shortly after the gold rush to Murray in 1885. Extensive dredge mining for placer gold occurred in main Prichard Creek and its tributaries, which produced instability within the areas of placer mining. Soon after the discovery of gold significant zones of mineralization were discovered in the Silver Valley with smaller sites in the resource area. A number of these sites were large enough to establish ore milling sites (Figure AQ-2), which produced both jig and flotation tailings which have elevated levels of dissolved metals in both Eagle and Prichard Creek (Box 2004 et al , PF.DOC. AQ-150).

Figure AQ-2 Mine sites within the Prichard, Eagle and Beaver Creek Drainages.



At this time there are 180 known active claims within the Prichard-Murray Resource Area on National Forest System land. Extensive work has been conducted by the Forest Service and State of Idaho on mine cleanup within both Prichard and Eagle Creek watershed. Cleanups have occurred on the Paragon site and Monarch site in upper Prichard Creek and clean up on the Jack Waite site is just beginning.

Effects of Fish Barriers: Waterfalls, channel flow intermittency, and some debris jams are part of the reference conditions that naturally and continually fragment aquatic habitats for various periods of time. In the Prichard-Murray Resource Area, high gradient stream reaches in headwater locations are the predominant form of natural barriers. There are human-caused fish barriers in the Prichard-Murray Resource Area. These barriers are on private land. One prominent barrier to fish migration occurs in lower Prichard where sections of the stream go subsurface and block movement of fish during this low water period. It is thought that these subsurface flows were caused by excess sediment movement due to historic placer dredging. Access through this reach does occur during periods of higher flow (late winter, spring and early summer). It is believed that the culvert on Alder Gulch may not provide access for fish, but the fisheries production and available habitat in this stream is low and all associated with private land. Another barrier may exist on Hopkins Creek at Forest Highway 9; this culvert will be surveyed in summer 2008. Fisheries surveys conducted in 2005 in Hopkins Creek found Westslope cutthroat trout and sculpin present. It was not determined if the population is resident or fluvial.

Effects of Sediment Production and Delivery: Surface erosion and, to a much lesser extent, mass erosion are part of the natural reference conditions for sediment production and delivery of the streams within the Prichard-Murray Resource Area. Prior to fire suppression, wildfire frequently altered the structure and composition of forest stands within the assessment area. At times site conditions following fires would coincide with wet climatic conditions in a season, year, or period of years that would trigger landslides or surface erosion. Other than topographic characteristics such as slope shape and drainage networks, there were no features such as roads on the landscape that would increase the potential for slope failures or surface erosion by intercepting, re-routing, and concentrating water. Other than hillslope rejuvenation caused by

streams reaching a lower base elevation or channel migration, there was no major mechanism such as roads that could cause slope instabilities by undercutting or overburdening slopes.

Effects of Water Yield Increases: Rain-on-snow events occur throughout much of northern Idaho when strong warm moist weather fronts from the Pacific Coast invade during the winter months. These relatively warm and moisture-laden air masses cause mid-winter snowmelt, thaws and rainfall. Snow packs generally between 3,000 to 4,500 feet in elevation accumulate substantial snow in the winter and are often found to achieve isothermal conditions following prolonged warm, moist storm periods. In the Prichard-Murray Resource Area, approximately 65% of the drainages are within the elevation range that is most prone to rain-on-snow events (3,000 to 4,500 feet) (PF Docs. AQ-59, AQ-72, AQ-94, AQ-107). Peak flows and water yield effects from the past timber harvest activities for the watersheds in the Prichard-Murray Resource area have almost completely recovered. There currently is an increase of 2% to 4 % over baseline conditions except in Brown Creek watershed which is 6% over baseline. Vegetative growth of young trees and brush in past harvest units older than 25 years have a significant effect on water yield response. Those specific areas with harvest greater than 25 years ago are near pre activity levels of water runoff. Activities prior to about 1980 would have very little water yield effects as seen in WATSED outputs (PF Doc. AQ-76-80) or observed in the field in term of measurable effects to stream health. Roads near streams and road/stream crossings have a more lasting and chronic effect on channeling water to stream courses and altering water yield than past harvest units older than 25 years.

Effects of BLM Land Development and Timber Management: These types of activities have been principally located in within a small portion of the Prichard-Murray Resource area. Effects from these actions are similar to the effects described above in "water yield increases" and are also described in the cumulative effects section.

Effects of Private Land Development and Timber Management: These types of activities have been principally located in the lower most portions of the Lower Prichard subwatershed and the main North Fork of the Coeur d'Alene River within the Prichard-Murray Resource Area. Effects from these actions are similar to the effects described above in "water yield increases" and are also described in the cumulative effects section.

C. Characterization of the Affected Watershed and Subwatersheds

Designated Beneficial Uses in the Prichard-Murray Resource Area

The status of Beneficial Uses comes from Idaho Department of Health and Welfare, 1992 (PF Doc. AQ-17). Beneficial uses in streams of the project area include:

- *salmonid spawning and rearing habitat*
- *cold water biota*
- *primary contact recreation*
- *secondary contact recreation*
- *drinking water*

Impaired Waters

Three water bodies within the Prichard-Murray Resource Area are water quality impaired (2002 Integrated Report AQ-117).

- The North Fork of the Coeur d'Alene River between Yellowdog Creek to its mouth and Prichard Creek which has approved TMDLS for sediment, both are listed on the 303d Sect 4a list.
- Two stream segments in the project areas listed in section 4c; Impaired for Flow alteration and Habitat alteration is the North Fork of the Coeur d'Alene River below Yellowdog Creek and Prichard Creek.
- Streams listed in section 5; Impaired Waters – Rivers are Eagle Creek for Cadmium, metals, temperature and zinc, the North Fork of the Coeur d'Alene River for Total suspended sediment, and temperature; the North Fork of the Coeur d'Alene River below Prichard Creek for sediment, silt, and temperature and Prichard Creek for metals and temperature.

Prichard Creek, Eagle Creek, and sections on the North Fork of Coeur d'Alene River flow through private land or BLM-managed land. The North Fork of the Coeur d'Alene River from Yellowdog Creek to its mouth, Prichard Creek, and Eagle Creek has approved TMDL's for sediment as of February 2002. The TMDL identifies coarse sediment as the pollutant of concern and identifies failure of riparian roads and stream crossings associated with uplands roads as the primary source of sediment (AQ-116 North Fork CDA – TMDL, 2001)

Subwatersheds

The Geographic Assessment characterizes watersheds within the Prichard-Murray Resource Area *(size, topology, and past activities)*

- *Stream Flow Regime (water yield, peak flows, and rain-on-snow sensitivity)*
- *Stream Channel Morphology - narrative results from stream surveys, 2003*
- *Water Quality - number of inventoried road channel crossings*

Table AQ-1. Summary of existing conditions by subwatershed or river segment in the Prichard-Murray Resource Area.

Subwatershed Name	Acres (NFS + Private)	% NFS lands	Percent of Watershed in Rain on Snow zone	Ave. Road Density on NFS (mi/mi2)	Water Quality Impaired?
Prichard Creek Watershed	62,457	90	52%	4.04	**Yes** metals, sediment habitat alteration, flow alteration, and temperature
Upper Prichard Creek	31,732	78	49%	3.15	**Yes** sediment, metals, habitat alteration, and temperature
Eagle Creek Watershed	28,533	95	54%	4.62	**Yes** sediment, cadmium, metals temperature, and zinc
Brown Creek Watershed	3,700	100	78%	8.66	**Yes** sediment with approved TMDL
Hopkins Creek Watershed	1,167	98	65%	1.3	**No**
Middle Segment NF Coeur d'Alene River (Yellowdog Creek to Prichard Creek)	383,968	96	n/a	0.18	**Yes** sediment with approved TMDL

Prichard Creek Watershed Conditions

Overview: Prichard Creek is 62,457 acre drainage with 90 percent of its area managed as National Forest System lands, 4 percent is managed by the Bureau of Land Management (BLM), and 6 percent is privately owned. Prichard Creek flows into the North Fork Coeur d'Alene River at the upper most point of what is referred to as the lower North Fork Coeur d'Alene River. The main channel through the middle reach of Prichard Creek is highly disturbed from placer mining in the early 1900's. Natural channel characteristics are absent or greatly reduced from its pre-disturbance condition. Stream features have been reduced or eliminated such as meanders, large woody debris, pools, lateral pools, flood plane wetlands, and riparian shrubs along the stream banks. Placer mining in the middle reaches of Prichard Creek and the disturbance associated with this activity caused sections of the middle and lower reaches to flow sub-surface through the gravels below the surface.

Stream Flow Regime: Past private mining activities have altered the flow regime in much of the Prichard Creek. In general hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average peak month flows in Prichard Creek watershed have been modified to approximately 3 percent above

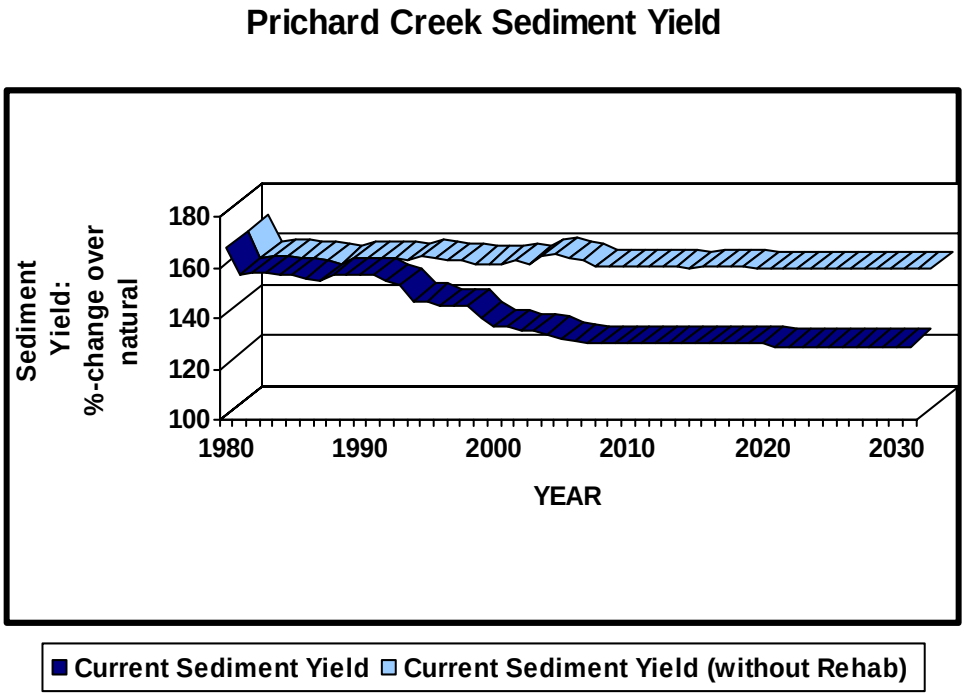
baseline conditions. This level of modification is too small to measure in the field. Harvest activities on Forest Service, BLM and private lands around 1990 opened up enough to only cause a 1 percent increase in peak flows. Stream flow conditions and hydrologic recovery are still responding to many types of activities, such as mining, timber harvest, floodplain alteration, and especially placer mining and stream channelization in the middle and lower reaches of Prichard Creek. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project reports (PF Doc. AQ-79).

Stream Channel Morphology: As described in the overview placer mining, dredging and channelization has alter the natural channel geometry in the middle and lower reaches of Prichard Creek. Evidence of old (early 1900's) riparian harvest was observed during the 2003 field surveys. Large old stumps and remnant scars of roads and skid trails remain visible along some sections of Prichard Creek and its tributaries. This activity can increased bedload supply and bed mobility but is likely over shadowed by the negative effects from placer mining activities.

Water Quality: Water quality is described in terms of sediment yield as modeled in WATSED. All the major streams in the Prichard-Murray Resource Area have experienced some increased sediment yield from past mining, timber harvest and/or prescribed fire activities. Graphs are displayed below for this watershed and each of the other modeled watershed showing past changes in sediment yield and existing conditions. The data displayed is outputs from WATSED modeling. Timing and type of timber harvest on non-Forest Service lands in the Prichard-Murray Resource Area was estimated using 2004, 1996, 1983-84 and 1973-74 aerial photographs and personal observations by Forest Service personnel (PF Doc. AQ-88). The degree of regeneration and amount of ground cover in the harvested units were estimated from observable evidence in aerial photographs. Ground scars seen in aerial photographs were used to determine harvest methods. For example, if skid trail scars were visible in the photos then tractor logged was assumed to be the method of harvest.

Road density within Prichard Creek watershed is 4.04 miles per square mile (PF Doc. AQ-62), which is largely, accounted for with upland roads in the headwaters. Inventories of roads and their conditions including culvert conditions were completed in the Prichard watershed, (PF Doc. AQ-87).

Figure AQ-3. Existing Sediment Yield in Prichard Creek. *Modeling of current sediment yield reflects watershed restoration (road decommissioning) that occurred in the drainage. If restoration activities had not occurred, the sediment yield would be significantly greater, as reflected by "current sediment yield without rehab."*



Sediment yield is measured by the percent change over natural conditions. By observing conditions in the field we found that existing bedload movement and deposition in the middle and downstream reaches of Prichard Creek are high. The model predicts that sediment yield is elevated and will remain fairly constant unless restoration occurs. Placer mining in the middle reaches of Prichard Creek have disrupted natural bedload movement and probably overshadows any effects from past timber harvest and roading. A significant amount of watershed restoration has occurred in this watershed since 1992, mostly through road decommissioning. Riparian roads have been re-contoured and upland roads have had failing culverts removed with channels stabilized. Figure AQ-3 displays the approximate percent decrease in sediment yield each year restoration occurred compared to sediment yield if no restoration had been accomplished. The percent drop is based on miles of roads decommissioned. As shown in the table below, in 1999 a large drop in sediment yield occurred as a result of the Eagle Creek Restoration Project, where approximately 6 miles of riparian road were removed in the East Fork of Eagle Creek (USFS, 1998, Decision Notice (PF Doc AQ-158), and Restoration Report; PF Doc. AQ-157). The total percent reduction over natural in the Prichard Creek watershed is 79%.

Table AQ-2. Sediment reduction from watershed restoration work in the Prichard Creek Watershed since 1992 (Project File Doc. AQ –79)

Year	Activity	% decrease in Sediment Yield
1992	Road Decommissioning	8%
1993	Road Decommissioning	9%
1994	Road Decommissioning	32%
1996	Road Decommissioning	8%
1999	6 miles of riparian road decommissioning in East Fork Eagle Creek	13%
2001	Road Decommissioning	9%
	Total Reduction	**79%**

Historical hard rock mining (Figure AQ 2) in both Prichard and Eagle Creek have had effects on metal loading in both systems, to the point they have been listed as impairing beneficial uses. The data collected by USGS discusses the metal concentrations within the system and their effects on the biological communities *(Box 2004 et al, PF Doc. AQ-150 and PF Doc. AQ-151).*

Upper Prichard Watershed Conditions

Overview: Upper Prichard Creek watershed is mostly outside the Prichard Resource Area and encompasses the headwaters to the confluence of Eagle Creek. This watershed was delineated and analyzed to account for past, current and future activities in this upper watershed and compare them to activities in the Eagle Creek watershed, where most of the Prichard-Murray vegetation treatments within the Prichard drainage are proposed. Little land management activity has occurred in Upper Prichard watershed since 1980.

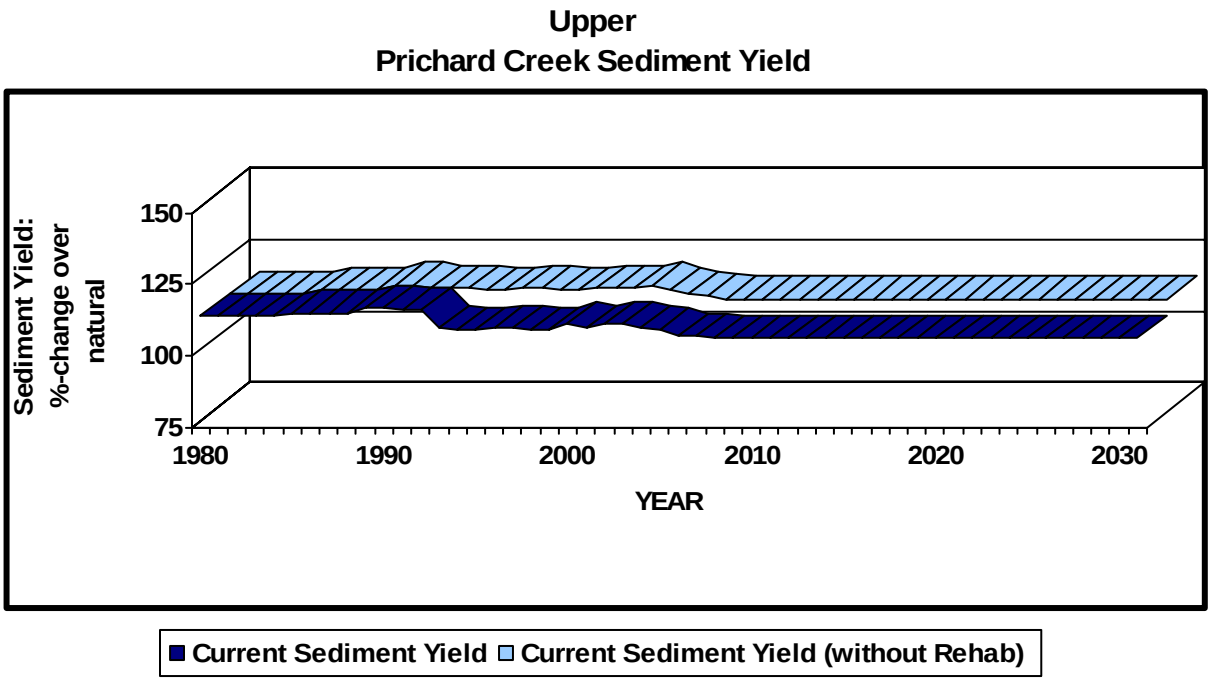
Stream Flow Regime: The channel is formed primarily by storm events that occur from rain-on-snow events and spring run-off during years when snow-pack is above normal. In general, hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average peak month flows in Upper Prichard Creek watershed are currently modified to approximately 2% above baseline conditions. This level of modification is not measurable in the field. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project file reports (PF Doc. AQ-80).

Stream Channel Morphology: The Upper Prichard watershed contains some Rosgen C channel types in the lower half, upstream of the Eagle Creek Confluence (PF Doc. AQ–33). This reach has lower energy flow regimes and is more depositional than other reaches. The lower reach is more responsive to disturbance compared to other reaches in the Prichard Creek Watershed because of it is highly disturbed and altered nature. This reach may show channel adjustments if upstream impacts were to occur. For example, if large watershed

areas of forest vegetation were removed, either by mining activities or natural wildfire, the stream reaches in Middle Prichard Creek subwatershed would show channel adjustment through aggradation, movement, and deposition of gravels and cobbles.

Water Quality: There are approximately 3.2 miles of road per square mile of land within the Upper Prichard watershed,(PF Doc. AQ–84). This is a relatively high road density and does account for the elevated sediment yield observed in the field and predicted by WATSED.

Figure AQ-4. Existing Sediment Yield in Prichard Creek. *Sediment modeling has accounted for watershed restoration (road decommissioning). If no restoration had occurred then sediment yield would be greater.*



Ground based logging in the 1980's on Forest Service, Bureau of Land Management, and private lands have most likely slowed sediment yield recovery. The existing sediment modification is 10 percent over baseline and is accounted for by some recent timber harvest on private land and the existing roads still on the landscape. The reduction in sediment in 1993 displayed in the WATSED output graph above is a result of road decommissioning that occurred after the Idaho Gulch Timber Sale. The total percent reduction over natural in the Upper Prichard Creek watershed is 6%.

Table AQ-3 Sediment reduction from watershed restoration work in the Upper Prichard Creek Watershed since 1993 (Project File Doc. AQ –80)

Year	Activity	% decrease in Sediment Yield
1993	Road Decommissioning	6%
		Total Reduction 6%

Eagle Creek Watershed Conditions

Overview: The East Fork of Eagle Creek is approximately 28,533 acres in size. This drainage has been managed heavily in the early 1900's for mining and then in the 1950's through 1980's for timber. A large abandoned contaminated mine site is present in the upper East Fork of Eagle Creek called the Jack Waite Mine. Heavy metals and arsenic leach directly from tailings, waste rock, and jig tailings along the stream. The West Fork of Eagle Creek has some history of timber harvest and roading but is much less impacted than

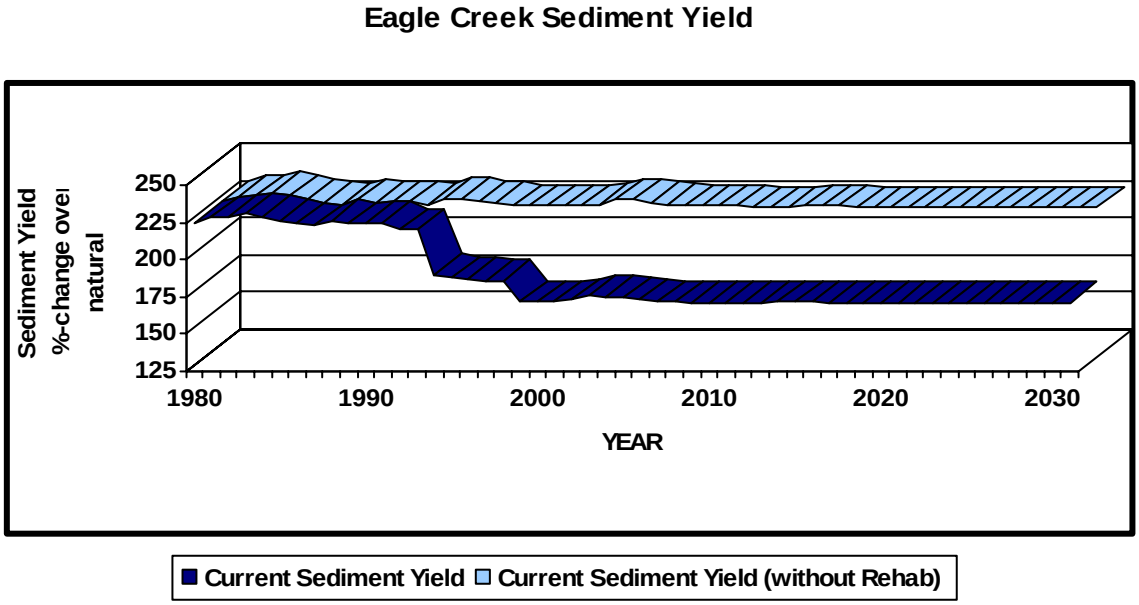
the East Fork. Placer mining and channel dredging has highly altered some middle reaches of the East Fork of Eagle Creek in early 1900's.

Stream Flow Regime: The channel is formed primarily by storm events that occur from rain-on-snow events and spring run-off during years when snow-pack is above normal. In general, hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average peak month flows in Eagle Creek watershed are currently modified to approximately 4% above baseline conditions. This level of modification is not measurable in the field. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project file reports (PF Doc. AQ-77).

Stream Channel Morphology: Bedrock, large boulders, and rock slopes that extend right down to the stream's edge is generally a predominate feature that controls channel gradient, form and function throughout this watershed. Valley bottoms are moderately narrow in the East Fork except for several short reaches that were once Rosgen C channel types before placer mining altered them, (PF Doc. AQ-33). .

Water Quality: There are approximately 3.2 miles of road per square mile of land within the Eagle Creek watershed. This level of road density is the primary cause of the elevated sediment yield observed in the field and predicted from modeling but significant reductions have been made from recent riparian restoration.

Figure AQ-5. Existing Sediment Yield in Eagle Creek. *Sediment modeling has accounted for watershed restoration (road decommissioning). If no restoration had occurred then sediment yield would be significantly greater.*



Sediment Yield is shown as percent change over natural conditions. A significant amount of watershed restoration has occurred in this watershed since 1992 mostly through road decommissioning. Large sections of the 152 road were removed and stabilized after the flood of 1996 in the East Fork of Eagle Creek. In 1999 a large drop in sediment yield as shown in Figure AQ-5 is a result of the Eagle Creek Restoration Project where approximately 6 miles of riparian road was removed in the East Fork of Eagle Creek. In-stream channel structures, stabilization work and woody debris were installed over 6 miles of stream length, (USFS, 1998, Decision Notice AQ-158) and Restoration Report; AQ-157). The total sediment yield in the Eagle Creek subwatershed as predicted from WATSED has been reduced from 225% over natural to 175%. Through field review it was observed that this restoration was effective in reducing sediment (see Figures AQ-6 through AQ-8).

Table AQ-4 Sediment reduction from watershed restoration work in the Eagle Creek Watershed since 1992 (PF Doc. AQ –77)

Year	Activity	% decrease in Sediment Yield
1992	Road Decommissioning	7%
1994	Road Decommissioning	26%
1996	Road Decommissioning	6%
1999	6 miles of riparian road decommissioning in East Fork Eagle Creek	11%
	Total Reduction	**50%**

Figure AQ-6. Site 49, in East Fork Eagle Creek, in 1997 (before restoration).

Figure AQ-7. Site 49, East Fork Eagle Creek, in 1999 (after restoration).

Figure AQ-8. Site 49, East Fork Eagle Creek, in 2004, five years after restoration.

Brown Creek Subwatershed Conditions

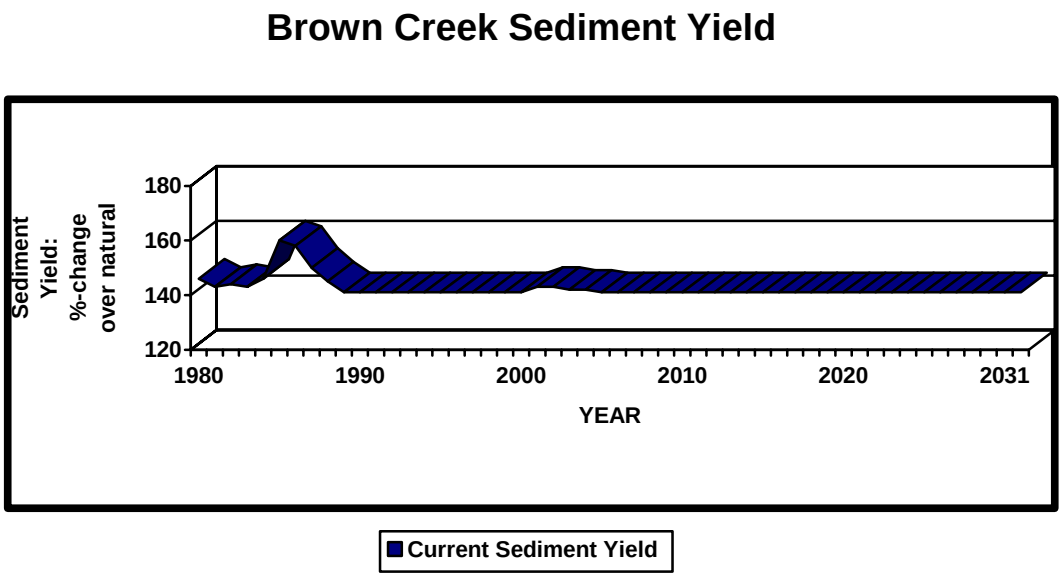
Overview: Brown Creek subwatershed is a 3,700 acre watershed that lies mostly outside the Prichard-Murray Resource Area. Only Rookie Creek, a tributary to Brown Creek, lies within the portion of the Prichard-Murray Resource area with proposed vegetative treatments. Rookie Creek is a tributary that flows into lower Brown Creek and forms a small subwatershed (less than 1 sq mile). This subwatershed has been relatively lightly managed. One road occurs only at the upper most east ridge of the subwatershed, far from any stream course. This single road accounts for the total road density 2.72 miles/sq mile in the Rookie Creek subwatershed. The rest of Brown Creek has been relatively heavily harvested and roaded in the 1970's and 1980's.

Stream Flow Regime: In general, hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from culvert outlets that are over-steeped road fills where small tributaries cross roads (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED modeling results estimated that average peak month flows are modified to approximately 6% above baseline conditions. This level of modification is not likely to be measurable in the field. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project reports (PF Doc. AQ-76).

Stream Channel Morphology: Stream reaches in the Brown Creek subwatershed are mostly stable and resilient due to the high degree of coarse rock the channels are formed in and the steep gradient nature of the Rosgen B channel types, (Rosgen, 1996, AQ-33). Repeated channel cross sections in lower Rookie Creek, where a small section of Rosgen C channel exists (more sensitive to changes) has down-cut with a major shift in particle size to smaller size indicating sediment loading. A large slope failure exists above the monitoring site.

Water Quality: There are approximately 8.7 miles per square mile of roads within Brown Creek subwatershed,(AQ-93). The riparian road density is relatively low but many road-channel crossings exist at mid to upper slope locations within the watershed. Inventories from 1991 indicated that Road 207 may partially constrict some lower and middle reaches of Brown Creek causing channel braiding (PLW fisheries and channel analysis, 1991, p 133, AQ-159). 2006 inventories have found failing culverts and mass wasting sites along the lower portions of road 990 (see PF Doc Tran-1 and aquatics Project Files AQ- 87). Rookie Creek in its lower reaches may have had extensive human occupation with traces of an old wagon trail and waste rock piles from mining exploration (PLW fisheries and channel analysis, 1991, p 138, AQ-159).

Figure AQ-9. Existing Sediment Yield in Brown Creek.



Hopkins Creek Watershed Conditions

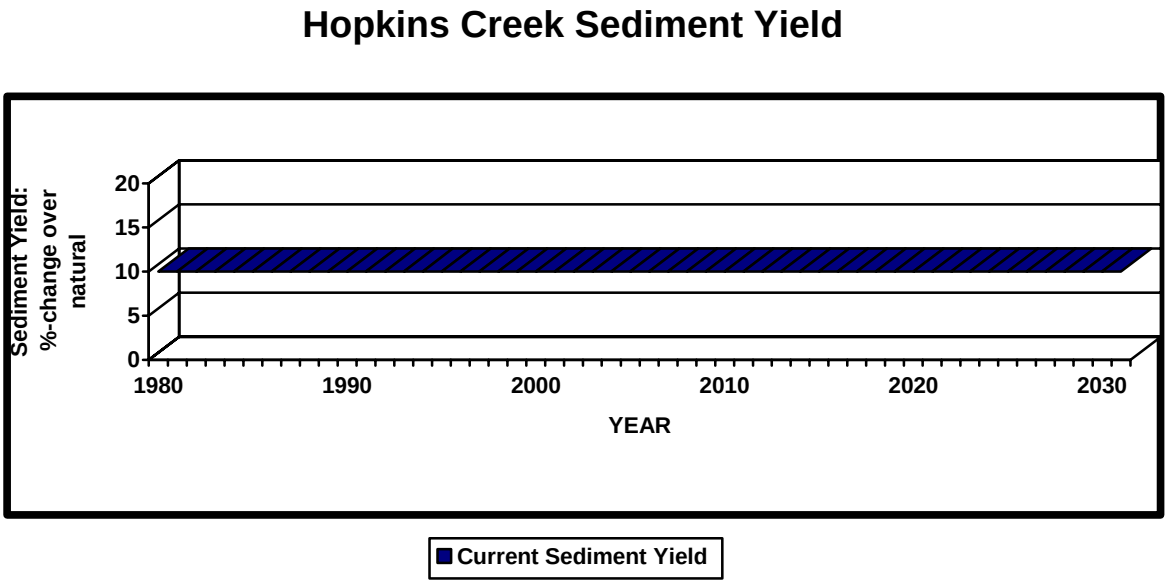
Overview*:* Hopkins Creek subwatershed is a very small (1,167 acre) watershed that lies partially within a roadless area. The watershed is relatively unmanaged and has few impacts except in its lower reach. A failing culvert and some unauthorized motorized use near the lower end of this subwatershed are causing some negative impact to the stream.

Stream Flow Regime: The channel is formed primarily by storm events such as rain-on-snow events and spring run-off during years when snow-pack is above normal. In general, hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22). WATSED model results estimate that average peak month flows in Hopkins Creek are currently modified to approximately 1% above baseline conditions. This level of modification is not measurable in the field. For a more detailed discussion of processes and the interpretation of WATSED, refer to the WATSED project file reports (PF Doc. AQ-78).

Stream Channel Morphology: This small drainage has high gradient, narrow Rosgen A and B channels types that are generally resilient to disturbance, (AQ-33).

Water Quality: Few sediment sources have been identified throughout this sub-watershed and they are primarily associated with one road/stream crossing and motorized use in the lower part of this drainage. There are approximately 1.3 miles per square mile of roads within the Hopkins Creek sub-watershed, as a result of the power line road (Rd 943) outside the roadless area along the west ridge of this small subwatershed, (AQ-106). Due to few roads and little harvest, the sediment yield is not experiencing any decline or recovery in terns of sediment; instead the trend in sediment yield is neutral.

Figure AQ-10. Existing Sediment Yield in Hopkins Creek.



Middle Segment North Fork of the Coeur d'Alene River

Overview*:* The middle segment of the North Fork of the Coeur d'Alene River was not analyzed or modeled as a watershed because it is too large (383,968 acres), and WATSED outputs would not be reliable (PF Doc. AQ-78). This river segment is an important aquatic resource that flows though the middle of the Prichard-Murray Resource area and is aligned with the river segment delineations used in the 303d listing, and the North Fork Coeur d'Alene TMDL. There are some south facing brush fields and dry site timber stands along this segment within the resource boundary. The valley bottom is very wide through this segment ranging from 300 feet to 1,500 and has significant human development along its flood plain such as Forest Highway 9, other roads, homes, and agricultural fields. A large potion of the river bottom along this segment, and within the analysis area, is privately owned.

Stream Flow Regime: The channel is formed primarily by storm events such as rain-on-snow events and spring run-off during years when snow-pack is above normal. In general, hydrologic changes are caused by many factors including canopy removal, increased drainage efficiency due to the road network, and the increased gradient from stream straightening (Thomas and Megahan 1998, PF Doc. AQ-18; Jones and Grant 1996, PF Doc. AQ-19; Brooks 1991, PF Doc. AQ-20; Harr 1986, PF Doc. AQ-21; Troendle and King 1983, PF Doc. AQ-22).

Stream Channel Morphology: This River is a low gradient gravel dominated channel with a large wide valley bottom. The channel has high levels of coarse sediment that easily moves in high water events with a tendency for channel migration. Rip Rap along some road shoulders and along private lands somewhat slows the natural rate of bank erosion and channel migration. The broad valley shape and location is controlled by bedrock. Elevated levels bed load consisting of coarse gravel, and cobbles have been deposited since the post 1910 logging. The loss of large woody debris in the river from historic log drives along with elevated bedload has reduced pool features and increase shallow, slow water glides.

Water Quality: The coarse sediment in this river has been identified in the North Fork TMDL (AQ-116) and the 303d list as the pollutant of concern. The high level coarse sediment in this channel is generally a result of past land management after the 1910 fires and especially from roads, and road/cream crossing that fail or route water and sediment into the network of tributaries that lead to the river.

Rain-on-snow Events and Watershed Responses

Northern Idaho experiences a strong maritime influence with warm moist weather fronts invading in the winter from the Pacific Coast. These relatively warm and moisture-laden air masses are frequent and have a profound effect on the climate and hydrology of the Coeur d'Alene Mountains. As a result, midwinter snowmelt, thaws, and rainfall are common in the region. The snow pack within the 3,000 to 4,500 foot-elevation range is most susceptible to rain-on-snow events. The watersheds analyzed for cumulative effects in the Prichard-Murray analysis area contain rain on snow prone areas that occupy 52% to 78% of the total watershed area (see table AQ-1) (Below 3,000 feet, the snow pack often may accumulate and abate several times during the season, and would therefore not be a substantial contributor to overall basin runoff. Many years, the snow pack above about 4,500 feet is "cold" and less susceptible to rain-on-snow events.

Rain-on-snow is a natural process under which the streams of the basin developed. Historically, streams of the basin were very stable and resilient because they developed in response to the variability of the climatic processes and the dominant geology of the basin. Changes in vegetation resulting from management or natural events can affect the frequency and magnitude of rain-on-snow events. Before human disturbance, rain-on-snow events have always occurred and probably did not have the same affect on stream channel equilibrium as it did during the 1950's through the 1980's when clear cutting was a predominant activity in this area. Clear cutting opened up stands, and effected wind and micro climate to increase the melting effects from raion-on-snow (PF Doc. AQ-59, AQ-72, AQ-94, and AQ-107). Today rain-on-snow events have a detrimental effect on aquatic health not from clear cuts on the landscape but from roads that increased water runoff and sediment. Road-stream crossing channel more water into stream networks and more sediment gets introduces into the streams from road and culvert failures during a rain-on-snow event.

D. Fisheries Existing Condition

Overview

The cumulative effects areas contain approximately 60.0-miles of a fish-bearing stream, all of which is contained within the North Fork Coeur d'Alene river watershed. Fish species that inhabit or potentially inhabit streams in the Prichard-Murray Resource Area include native populations of westslope cutthroat (*Oncorhynchus clarki lewisi*) sculpin (*Cottus spp*.; primarily torrent sculpin [*C. rhotheus*]and shorthead sculpin (c.*confuses*), mountain whitefish (*Prosopium williamsoni*), Northern pike minnow (*Ptychocheilus oregonenis*), Longnose Dace (*Rhinichthys cataractae*), Longnose sucker (*Catostomus catostomus*) and Bull trout (*Salvelinus confluentus*). Introduced fish species include populations of unspecified rainbow trout (*O. mykiss*) and eastern brook trout (*Salvelinus fontinalis*). The creation of hybrid fish between native westslope cutthroat trout and exotic rainbow trout may be present. Distribution of these fish is identified in the following table.

Table AQ-5. Stocking records (Idaho Fish & Game) snorkel and electrofishing records (Idaho Fish & Game and USDA Forest Service) for watersheds in the Prichard-Murray Resource Area analysis. *IDF&G stocking data was gathered using a search engine located on the website: http://www2.state.id.us/fishgame/. (PF Doc. AQ-23).*

Stream	Species	Info. Source	Date of Samples	Species/Year Stocked by IDF&G
North Fork Coeur d'Alene River	Westslope cutthroat trout/rainbow trout/ sculpin spp./mountain white fish/ northern pike minnow/longnose sucker and westslope cutthroat trout/rainbow trout (WCTxRBT) hybrids	IDF&G USFS	2005	Cutthroat fry (1968-72) Kamloops, rainbow, Kokanee (1968-1999) Triploid Kamloops (2000 -02)
Prichard Creek	Eastern brook trout/westslope cutthroat trout/rainbow trout/sculpin spp./and WCTxRBT hybrids	IDF&G USFS	2003, 2006	Unspecified rainbow (1968-72
Eagle Creek	Westslope cutthroat/rainbow/and WCTxRBT Hybrids,brook trout			Unspecified rainbow (1968-88 Kamloops,1975
East Fork Eagle Creek	Westslope cutthroat trout/rainbow trout/brook trout/sculpin spp.	USFS	1994	
Brown Creek	Westslope cutthroat trout/rainbow trout/brook trout/sculpin spp.	USFS	1991, 1997, 2000, 2002	
Rookie Creek	Westslope cutthroat trout/rainbow trout/and WCTxRBT hybrids	USFS	1991, 2005	
Hopkins Creek	Westslope cutthroat trout/rainbow trout/and WCTxRBT hybrids	USFS	2005	

Streams listed in the above table flow into other fish-bearing waterways, specifically the North Fork Coeur d'Alene and then the Coeur d'Alene River, respectively. Non-fish bearing perennial and intermittent streams occur within the Prichard-Murray Resource Area, but most are not named on Forest Service topographic maps.

The analysis of direct, indirect, and cumulative effects to fish is based on effects to sensitive and management indicator fish species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group. The Forest Plan (IPNF 1987) identifies westslope cutthroat trout, bull trout, and rainbow trout as potential Management Indicator Species (MIS) for fisheries (Forest Plan Appendix L, PF Doc. CR-002). Currently, westslope cutthroat and rainbow trout are known to utilize streams within the Prichard-Murray Resource Area for spawning, rearing, and over-wintering. They have nearly similar habitat needs. Consequently, westslope cutthroat and rainbow have been selected as appropriate MIS for the fisheries analysis of this project.

The life history of the bull trout is included because it is listed as threatened under the Endangered Species Act (1973). However, there is no set or sub-set of data that has identified bull trout populations in the N.F. Coeur d'Alene River. Confirmed and some unconfirmed reports of individual bull trout in the projects area have been reported, and sections of the N.F. Coeur d'Alene river and Prichard Creek that are in private ownership have been designated as critical habitat. Although viable populations are currently not present within the project area potential habitat modifications will be addressed in this document.

White sturgeon, burbot, and interior redband are found to occur only in the Kootenai River system, and possibly the Kootenai River larger (e.g., Yaak River for sturgeon and burbot) and smaller tributaries (e.g. Long Canyon - interior redband trout). Therefore, these fishes will be given no further analysis within the context of this document since they do not naturally inhabit the N.F. Coeur d'Alene River drainage or its tributaries.

Bull Trout (Threatened)

The North Fork of the Coeur d'Alene River supported a viable resident, fluvial and/or adfluvial bull trout populations in the past (Maclay 1940 PF Doc. AQ-152), however these populations were eradicated due to over fishing and decline in habitat conditions associated with stream cleaning, and sediment/bedload movement from past mining, timber harvest and road building. In addition, the adfluvial bull trout populations from Lake Coeur d'Alene were eliminated with the decline in water quality associated with hard rock mining in the South Fork Coeur d'Alene drainage. The current presence of bull trout in the North Fork is restricted to the occasional sighting of single, transient individuals by local fisherman or professional biologists.

Historically bull trout were documented in the West Fork of Eagle and the North Fork Coeur d'Alene river (Maclay 1940 PF Doc. AQ-152). Electrofishing surveys and habitat surveys conducted in 2002 in both the West Fork and East Fork of Eagle Creek documented no bull trout (Table AQ 6) (USGS, unpublished report PF Doc. AQ-151). Westslope cutthroat trout, brook trout and sculpin were present within the watershed. Three electro-shocking fish surveys have been completed in Eagle Creek and the West Fork of Eagle (DEQ, BURP data, 1996, 1998 PF Doc. AQ-109). Each survey area covered approximately 500 feet of the stream. Fish populations in the area consist predominately of Westslope cutthroat trout (*Onchorhynchus clarki lewisi*). Westslope cutthroat trout are known to be utilizing streams within the analysis area for migration, spawning, rearing, and possibly over-wintering. Data collected in 2000 and 2001 (U.S.G.S unpublished) in both the East and West fork found no Bull trout, but again Westslope cutthroat trout, Brook trout and Sculpin were found. Bull trout (*Salvenlinus confluentus*) have been found in the Coeur d'Alene River and Lake (IDF&G, 1985 PF Doc. AQ-153) but recent surveys (Dunnigan, 1997 PF Doc. AQ-154 and Abbott, 2000 PF Doc. AQ-155, U.S.F.S., 2005 PF Doc. AQ-110 and IFG, 2005 PF Doc. AQ-111) show no indication of their presence in tributary streams through out the Coeur d' Alene basin. Individual fish, however, have been reported within the mainstem Coeur d' Alene River, Prichard Creek and the Little North Fork Coeur d'Alene River (1990-2000), however those reports have not been verified by a fisheries biologist. Day time snorkeling surveys (conducted by USFS, USFWS and IFG) after the reported sitings in 1998 at the mouth of Eagle Creek found no Bull trout. Scott Deeds (USFWS) reported a single fish (in the upper reach of the West Fork Eagle) that could have been of the "*salvelinus*" genus, but could not confirm it. Snorkeling surveys in the East Fork of Eagle in 1990 did report the presence of a bull trout, however, follow-up surveys did not verify that any bull trout were present, only brook trout were identified, (USGS, unpublished, DEQ, BURP data 1996, 1998). Data from the USGS study also indicated that fish not acclimated to water quality in Eagle will generally not survive. The last confirmed sighting of a bull trout was approximately ¼ mile below the project area in the North Fork Coeur d'Alene river in 1985 (Lider personal observation, 1985).

Table AQ-6. Bull trout distribution within streams in the project area.

Stream Name	HUC Number	Bull Trout Presence
Prichard Creek	170103010502	surveyed/unlikely
East Fork Eagle Creak and Eagle Creek	170103010502	surveyed/unlikely
Brown Creek	1701030106	surveyed/unlikely
Rookie Creek	1701030106	surveyed/unlikely
Middle and Lower Reaches of the North Fork Coeur d'Alene River	1701030106	surveyed/likely individuals

Westslope Cutthroat Trout (Sensitive)

Westslope cutthroat trout are listed as "sensitive" by Region 1 of the USDA Forest Service and are listed as a "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service (USFWS) list westslope cutthroat trout as a "species of concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA; USDI 2002; PF Doc. AQ-26). The USFWS lists westslope cutthroat trout as to occur, potentially occur, and/or its habitat exists within the portion of the Idaho Panhandle National Forests where activities could be implemented in the Prichard-Murray Resource Area. But first, a brief history is necessary to ascertain the background of status reviews on westslope cutthroat:

> *On two separate occasions (1997 and 1998) petitioners petitioned to list westslope cutthroat trout as threatened. On June 10, 1998, the USFWS published a Federal Register notice announcing a 90-day finding that an amended petition to list the westslope cutthroat trout as threatened under the Endangered Species Act, where substantial information was provided to indicate that such a listing may be warranted. After review, the USFWS concluded in April 2000 that listing westslope cutthroat trout as a threatened or endangered species under the act was not warranted at that time.*
>
> *However, in 2001 the court ordered USFWS to review the status of westslope cutthroat trout based on three key points. In response, on September 3, 2002 in the Federal Register (vol. 67, #170: 50 CFR Part 17), the USFWS set forward a notice of intent to prepare a status review for the westslope cutthroat trout. In summary, the USFWS announced the initiation of a new status review for the westslope cutthroat trout in the U.S. pursuant to a recent court order and the Endangered Species Act of 1973, as amended.*
>
> *After a thorough review of all the available scientific information (Shepard et al 2003* PF Doc. AQ-156*), the USFWS reaffirmed their previous decision that the westslope cutthroat trout did not warrant listing as a threatened species because abundant, stable, and reproducing populations remain well distributed throughout its historic range.*

Westslope cutthroat trout have been identified in nearly all streams in the Prichard-Murray Resource Area. Unknown variations of cutthroat trout and other salmonids have been previously stocked in the North Fork Coeur d'Alene River basin from 1968-1999 by Idaho Department of Fish and Game (Table AQ-6). However, the populations that resided there prior to the introductions were likely native westslope cutthroat trout.

There are three possible life-history forms that westslope cutthroat trout could exhibit within the N.F. Coeur d'Alene River system. These are adfluvial, fluvial, and resident forms (see Appendix – Glossary). The two most likely life forms within the Prichard-Murray Resource Area are resident and fluvial fish. The resident forms are most likely present in the smaller head water streams or in streams that have barriers that do not allow access from the North Fork Coeur d'Alene river. Fluvial fish are present within the main river and the larger streams are used as spawning and rearing areas for this life form. Most of the streams also support both life history forms. Westslope cutthroat trout are spring spawners (April – June). There is a possibility that they can utilize more habitat than fall spawning salmonids, principally due to higher water conditions creating more habitat and greater access.

The preferred habitat of westslope cutthroat trout is cold, clear streams with rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Reel et al. 1989; PF Doc. AQ-27). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70 percent of the time (Mesa 1991; PF Doc. AQ-28). Other key features of westslope cutthroat habitat are large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early rearing.

A population status review of westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined over their historic distribution with viable populations existing in only 36 percent of the original Idaho range. The primary cause of the decline was found to be habitat degradation (Rieman and Apperson 1989; PF Doc. AQ-29). The most recent status review in 2002 for westslope cutthroat trout (WCT) in the United States indicated they currently occupy 59% of historical habitat (Shepard et al 2003 PF Doc. AQ-

156). They found that within Idaho WCT currently occupy 95% of historical habitat. Of the total miles of occupied habitat 29% support populations that are believed to be at or near the habitat's potential capacity and 28% support populations below capacity. Many of these populations have genetic introgression with rainbow trout. This status review indicated that currently 10% of the occupied habitats are not introgressed (Shepard et al 2003). Currently within the scientific community there are ongoing discussions as to the levels of introgression and how this relates to the status of westslope cutthroat trout and management of the species and habitats.

Reference Condition for Fisheries

The reference condition for fish habitat is based on reference reaches in the North Fork Coeur d' Alene River watershed, habitat surveys in the North Fork Coeur d' Alene river to headwater tributaries (see "Watershed Reference Condition"), historic information, electrofishing data, knowledge of basic ecological processes, and professional judgment. Physical attributes of fish habitat are mainly defined by stream channel condition.

Salmonids generally require cool, clear water, clean gravel substrates; well-vegetated banks for shading and bank stability; abundant instream cover such as boulders, logs, and undercut banks; and unobstructed migratory corridors (Bjornn and Rieser 1991; PF Doc. AQ-31).

The historic distribution of westslope cutthroat in the tributaries within the Prichard-Murray Resource Area is speculated, but no known 'natural' mainstem barriers would have limited access (except headwater stream gradient). If adfluvial stocks of westslope cutthroat trout were present they would utilize main channel and headwater habitat with fluvial and resident forms, however this form is absent due to many conditional factors in the system (i.e. years of mining, man-caused barriers, etc). Several data sources have identified westslope cutthroat trout within the Prichard-Murray project area watersheds (USFS – electrofishing project files). These include Forest Service and IDFG records that indicate westslope cutthroat trout have been identified within the system and that other species of salmonids have also been identified (Table -AQ-6). Historical plantings of unspecified fingerling rainbow trout are known (Table -AQ-6); eastern brook trout are not known to be stocked (post-1970), but occur in lower Brown, Eagle, E.F. Eagle and Prichard Creek watersheds and are likely a result of past legal and/or illegal stocking.

Existing Condition for Fisheries

Stream Channel Characteristics

Stream habitats are influenced by woody debris constrictions and local confinement, which typically produce scour pools and riffles. Stream bank conditions and degradation rates are quite variable in Prichard-Murray project area. For a complete review of each watersheds condition see "Conditions of each respective Subwatershed in Watershed Section".

Stream temperature data from 1999 - 2005 (PF Doc. AQ-32) have shown that temperature requirements for spawning and egg incubation are not being met in some streams. Cold-water aquatic life (i.e. salmonids) are being met in all tributaries, but in some years the N.F. Coeur d'Alene may exceed the criteria.

Habitat

Fisheries habitat data was collected in the Prichard-Murray area watersheds and its tributaries in 2003 and 2005 (PF Doc. AQ-110). In addition, water temperature and large woody debris was collected at the same points as Fish habitat. All data and summaries are located in the project file; the following is a summary of this data collection effort:

The mainstem of the North Fork Coeur d'Alene river is approximately 15 miles in length as it flows through the project area into downstream reaches of the N.F. Coeur d'Alene River. Prichard-Murray Resource Area encompasses an area of approximately 15.6 mi^2, with a road densities ranging from 8 mi/mi^2 in Brown Creek to 1.3 mi/mi^2 in Hopkins Creek. The Prichard-Murray Resource Area has experienced past mining and timber harvest activities including direct impacts to stream channels and riparian areas. Several small intermittent and perennial non-fish bearing tributaries feed the North Fork Coeur d'Alene river and the tributaries within the project area (ie Creaky creek, Trouble creek and Short creek).

Stream channel habitat and morphology were evaluated using modified R1/R4 (Overton et al. 1997; PF Doc. AQ-16) stream survey methodologies; Rosgen (1996) channel analysis (PF Doc. AQ-33); Stream Channel Reference Sites (Harrelson et al. 1994; PF Doc. AQ-56c) guide and large woody debris (LWD) collections. A modified R1/R4 stream survey (Overton et al. 1997; PF Doc. AQ-16), protocol was used to sub-sample an identified monitoring reach and collect important variables (e.g. LWD information; pool, riffle, and run habitat information; pool volume, etc.) In 2003 general habitat information was collected in the North Fork Coeur d'Alene river to evaluate westslope cutthroat trout movement and habitat use (PF Doc AQ 110).

U.S. Forest Service and Idaho Department of Fish and Game stream survey crews snorkeled transects within the North Fork Coeur d'Alene River in 2006 and electrofished Hopkins and Rookie Creek in 2005 to determine fish density and presence and absence data. Electrofishing surveys were conducted in the West Fork Eagle and East Fork Eagle above the project area by DEQ and USGS. In the electrofishing surveys, westslope cutthroat trout (includes wct*rbt hybrids) were found in all reaches surveyed and had a mean density of 16.3 fish/100m^2 (range 2 to 35 fish/100m^2). Eastern brook trout were found in Prichard and Eagle Creek with a density of 0.22 fish/100m^2, and sculpin *sp*. (either slimy or shorthead) were found in Rookie, Hopkins Creek, North Fork Coeur D'Alene river and Prichard Creek above Paragon Gulch. Sculpin had a mean density of 71.5 fish/100m^2 (range 0 to 251 fish/100m^2) in Rookie and Hopkins Creek (PF Doc. AQ-110).

The life histories of westslope cutthroat trout in the Prichard-Murray project area are both resident and fluvial fish. Historical introductions or stocking of rainbow trout in streams in the project area (Table -AQ-6) may have altered fish populations and/or spawning and rearing habitat for westslope cutthroat trout.

Monitoring Reach Summary

The middle reach of the N.F. Coeur d'Alene river was surveyed throughout the project area to establish long term monitoring sites, where Rosgen (1996) stream channel types were identified (PF Doc. AQ-33). Overall, N.F. Coeur d'Alene River had a moderate pool to riffle ratio (approximately 1:3) and most pools surveyed were created by meanders. Cover was dominated by large substrate, associated with road rip rap on Forest Highway and the county road LWD pieces within the project area were not inventoried, but accumulation of LWD occurred at all sites where the flood plain width increased and meandering increased.

The IDF&G and U.S.F.S monitoring site survey data and Cutthroat trout study data in the N.F. Coeur d'Alene river indicated the following: 1) fish density was relatively high and included non-native eastern brook trout in lowest reaches; 2) channel stability was good; 3) pool-to-riffle ratio was moderate; and 4) LWD class was large in length and diameter, with aggregates associated with the wide flood plains and multiple channels (PF Doc. AQ-110).

Primary Tributaries in the Prichard-Murray Resource Area

Key points for selected subwatersheds

Prichard, Eagle and the East Fork of Eagle all have a history of mining, which have affected native fishes in two ways 1). Hard rock mining has elevated metals within the water column and bed sediments that have affected the fisheries and 2) placer mining has created disturbance to the channel which has affected fish habitat. All these streams are 303 (d) listed for metals; in addition the N.F. Coeur d'Alene river below Prichard is listed. These watersheds along with Brown Creek have had extensive timber harvest in the past which has negatively affected fish habitat and population due to excessive sediment loads. All these streams currently have approved TMDL's for sediment. Streams such as Rookie and Hopkins have had limited activity, although Hopkins Creek appears to have fish migration barriers across the road/stream prism (Forest Highway 9). This barrier is either year-round or seasonal in nature to migrating resident salmonids and likely poses a higher level or migration risk to other non-salmonid and aquatic species. No other drainages with fisheries potential in the project area have known culvert crossing barriers. Past restoration in Brown Creek has corrected barriers in Rookie and upper Brown Creek. Restoration in Prichard and Eagle Creeks has removed or replaced fish migration barriers with crossings which allow year around access by aquatic species. Significant restoration work to reduce sediment risk, heavy metals and to improve fish habitat have occurred in Prichard and Eagle Creeks and their tributaries

Key points for selected Prichard-Murray subwatersheds

Where applicable habitat surveys were conducted (see fisheries project files PF Doc. AQ-110 and 114) that indicated these stream had moderate pool to riffle ratios (less than 1:4); greater than 55% of LWD in a size class greater than three feet in length and 10 inches in diameter (small diameter wood); and water temperatures that are lower than the main stem mean temperatures during peak summer maximum temperatures.

3. Environmental Consequences to Aquatic Resources

The following discussion discloses the direct, indirect, and cumulative effects of the proposed and reasonably foreseeable activities on the aquatic resources. The discussion of effects is based on the key issues and issue indicators identified in Methodology for Aquatics. The reasonably foreseeable activities are also listed in Aquatics Appendix B of this document and those relevant to the aquatics analysis are discussed later in this section.

A. Methodology Used in the Assessment and Description of Environmental Consequences to Aquatic Resources

The proposed activities and their potential effects to water quality or changes to stream channels, and fish habitat, are the main concerns related to watershed and fisheries resources. Hill-slope conditions are reflected in stream channels, which in turn are the formative features of aquatic habitat. The analysis of direct and indirect effects is based on how the various components of the project (*e.g.*, location, size of cutting units, methods of logging systems, road construction and road work, and reasonably foreseeable actions) are expected to affect each subwatershed within the Prichard-Murray Resource Area.

For this environmental analysis, the WATSED model was used to compare the cumulative effects of the No-Action Alternative (Alternative 1) to effects of the action alternative (2) and the modified action Alternative, (Alternative 3).

Methodology Used in Estimating Effects to Water Yield and Peak Flow (Flow Regime)

Peak flows represent the change in runoff and is expressed as the percent change from the estimated "natural" peak month discharge. The WATSED model was used for this analysis to estimate the effects of the proposed timber harvest, construction, reconstruction and decommissioning of temporary and classified roads, and site preparation treatments. Reasonably foreseeable actions are included in this analysis. Changes in peak flows are compared to the existing peak flows discussed in the affected environment section. The timeframes for the estimated direct and indirect effects, for all alternatives is 2007 (estimated start of activity), through 2031.

Guidelines for Changes to Water Yield and Peak Flow

Zero	If the increase over the existing level is zero, there is no potential for an increase in water yield and peak flow or delay of watershed recovery.
0 to 5%	No potential exists for measurable increases in water yield and peak flow or delay of watershed recovery. For example, if you dumped a cup of water into a stream, you know the flow has increased; yet it would not be measurable with modern flow gauging equipment.
5 to 10%	There would be a slight potential of a measurable increase in water yield and peak flow or delay of watershed recovery.
10% or more	A potential exists for measurable increases and recovery delay.

Methodology Used in Estimating Effects to Channel Morphology

Morphology is the shape of the stream channel – such as bank height, bank slope, channel width, and pool size. The stability of a stream channel and morphology is dependent on variations of the stream channel type. Stream channels that are primarily alluvial systems (sediment deposited and formed) are the most susceptible to stream bank erosion, changes in sediment supplies, and large woody debris removal (Chamberlin et al.

1991, PF Doc. AQ-34; Rosgen 1996, PF Doc. AQ-33). Stream channels are more stable with respect to fluctuations in flow and sediment yields when the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom (Chamberlin et al 1991, PF Doc. AQ-34; Rosgen 1996, PF Doc. AQ-33). This analysis compares effects of proposed activities under Alternative 2 and 3, in regard to changes in channel morphology (such as bank erosion, downcutting, and deposition of bedload sediment). The analysis stems from interpretation of WATSED's sediment and water flow changes and where (or if) any changes may be occurring in the more sensitive reaches of the streams. The analysis is based on judgment supported by WATSED modeling by subwatershed.

Methodology Used in Estimating Effects to Water Quality

Water quality is analyzed from two different aspects: 1) changes in sediment yield from proposed vegetation activities, burning, road construction and road reconstruction; and 2) in respect to aquatic restoration activities such as road decommissioning and treatment of road crossings.

Methodology Used to Estimate Effects to Sediment Yield: Percent increase in sediment yield is estimated as the annual sediment above existing levels loading into each of the subwatersheds. This percent is compared to the current sediment load discussed in the existing conditions section. Sediment yield percent is calculated for each alternative using the WATSED model. The proposed timber harvest units, construction, reconstruction, and decommissioning of temporary and classified roads, and site preparation treatments are included in the analysis. Some of the reasonably foreseeable actions discussed below are also calculated in the analysis. The estimated short-term or direct and indirect effects analysis timeframe for sediment yields is through 2009, the latest year that sediment yield would recover to baseline.

Guidelines for changes to Sediment Yield

Zero	If the increase over the existing level is zero, there is no potential for an increase in sediment or delay of watershed recovery.
0 to 10%	No potential exists for measurable increases in sediment or delay of watershed recovery. For example, if you dumped a cup of dirt into a stream, you know the sediment has increased; yet it would not be measurable at a gauging station or with modern sediment sampling equipment.
10 to 20%	There would be a slight potential of a measurable increase in sediment or delay of watershed recovery.
20% or more	A potential exists for measurable increases and recovery delay.

Methodology Used to Estimate Effects to Sediment Risk Associated With Drainage Structures: This is the anticipated change in sediment risk associated with stream crossings that were inventoried within the scope of the project. The associated risk is presented in terms of tons of sediment as discussed in the affected environment section. This figure was calculated based on measurements or estimates of road through-fill located at stream crossings. This issue indicator is important in assessing watershed improvement work associated with the action alternatives.

Methodology Used to Estimate Effects on Rain-on-Snow

There is a potential for localized effects at the subwatershed scale. It is difficult to predict large-scale, catastrophic effects at the larger watershed scale and the effects to the North Fork of the Coeur d'Alene River downstream of Prichard-Murray Resource Area. The analysis is based on change of canopy openings, the size of those openings, and conclusions drawn from studies specific to the Pacific and Inland Northwest including Rothacher (1973; PF Doc. AQ-35), Harr and McCorison (1979; PF Doc. AQ-36), Harr (1981; PF Doc. AQ-37), Christner and Harr (1982; PF Doc. AQ-38), Harr (1986; PF Doc. AQ-21), Berris and Harr (1987; PF Doc. AQ-39), King (1993; PF Doc. AQ-40), and Coffin and Harr (1991; PF Doc. AQ-41).

The issue is whether the management activities proposed with this project will affect the hydrologic response to rain-on-snow events at a scale beyond that disclosed in this analysis. The rationale used for this analysis was based on these two questions:

1) *Is the* **scale** *of the management activities with this project sufficient to affect the hydrologic response of large watersheds to rain-on-snow events (ie; will openings created from the proposed vegetation treatments effect flows in the lower Coeur d'Alene River?*
2) *Is the* **magnitude** *of the management activities proposed with this project sufficient to affect the hydrologic response of large watersheds to rain-on-snow events?*

B. Direct and Indirect Effects to Aquatic Resources

Direct and Indirect Effects to Aquatic Resources - No-Action Alternative (Alternative 1)

Since no management activities would be implemented with this alternative, there would be no direct effects associated with this project. Sediment yield values and trends as discussed in the existing conditions would not change from existing predicted trends. Water yield and peak flow values would continue to decrease very slowly by an average of approximately 1% for the next 25 years in each of the subwatersheds as vegetation recovers from past harvest. This 1 percent water yields and peak flow over the next 25 years would be too small to measure in the streams because of the detection limits of water flow recording instruments. The interpretation from looking at existing model outputs and observing the conditions of the past harvest units in the project area is that canopy closures and vegetation density have almost completely recovered. There has been vegetative recovery sufficient enough to avoid adverse effects from rain on snow events and/or unpredictable flood events. Sediment yield would continue to recover by 1 to 2 percent over the next 25 years according to WATSED outputs. In terms of observing true change in the streams, the recovery or change would be too small to measure. The baseline conditions as shown in figures AQ-3, AQ-4 and AQ-7 have been reduced as a result of recent watershed restoration in Prichard Creek and Eagle Creek subwatersheds. The sediment reduction from restoration has been substantial enough to be measurable, and contributes far greater to sediment yield recovery compared to the minor recovery under the No-Action Alternative as modeled in WATSED.

Direct effects: *those immediately detected in time or space as a result of activities. Example: an immediate delivery of sediment to a Creek.*

Indirect effects: *those that are detected at a later time or place and occurring separate from actual activities. Example: an increase in water yield as a result of removing canopy closure.*

Disclosure of the direct and indirect effects analyses are combined in this report.

Cumulative effects: *based on the existing condition, the direct and indirect effects of proposed activities and any ongoing or reasonably foreseeable actions. The reference condition of the cumulative effects analysis is presented in the Existing Condition section of this report. Reasonably foreseeable activities in the Prichard-Murray Resource Area include ongoing road maintenance and noxious weed treatments on National Forest System lands, fuel break creation, watershed restoration such as road decommissioning, road building, mining and timber harvest on private lands.*

Alternative 1 includes the reasonably foreseeable implementation of the Joe Cat Timber Sale, a proposed treatment of approximately 285 acres of dead and dying lodgepole pine in upper Prichard Watershed. The application of INFISH no harvest buffers, other foreseeable activities, and the small scale of the project in relation to the whole Prichard subwatershed, there would be no generation of measurable sediment or water increases.

The only potential change to peak flow and water yield would be if a large-scale, high intensity wildfire were to occur within the watershed. Measurable changes to peak flows and water yield would occur, with the degree of change dependent on how far the fire spread.

Direct and Indirect Effects to Aquatic Resources under the Action Alternatives (Alternatives 2 and 3)

Description of effects for both action alternatives (Alternative 2 and 3) are discussed together because the difference between them is very small. In all subwatersheds accept for Prichard Creek there is no difference at all WATSED outputs and interpretation of effects for both Alternatives 2 and 3.

Direct and Indirect Effects to Water Yield and Peak Flow (Flow Regime) Under the Action Alternatives

The Prichard-Murray subwatersheds would have peak flow and water yield increases ranging from 0 to 4% over existing, which constitutes a zero to slight potential of measurable increases in water yield and peak flow or delay of watershed recovery (see Table AQ-8). There would be very little difference in peak flow changes between the no action alternative and Alternatives 2 and 3. Alternative 2 could potentially result in a slight increase in peak flows within the first order, headwater drainages. This constitutes a potential for a slight increase in peak flow but would be localized only in the headwaters and would not be great enough to cause measurable channel degradation or measurable increase fine sediment or coarse bedload particles in the larger more downstream portions of project area streams. This is especially true in the middle reaches of Prichard Creek where past placer mining has highly altered the aquatic habitat and natural channel geometry.

The burning activities proposed in Alternative 2 and 3 would be low intensity under-story and brush field burns when soils are cool and damp with no expected impacts to soil productivity. The prescribed burning would cause very little over-story mortality. With overstory mortality ranging from 1% to 2 %, there would not be enough heat to damage soils or kill trees that provide canopy and there would be no change in water yield or peak flows.

Table AQ-7. Comparison of Changes to Peak Flow and Water Yield in the Prichard-Murray Resource Area, by alternative.

Indicator	Alternative 1 (No Action) Includes activities on private and Joe Cat; FS-timber sale	Alternative 2	Alternative 3
WATER YIELD Effects of commercial harvest and resulting canopy openings on % increase in water yield. **(percent increase over existing)**	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 0% Brown Creek 0% Hopkins Creek 0% Range = 0 to 0% Mean = 0.0%	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 0% Brown Creek 1% Hopkins Creek 0% Range = 0 to 1% Mean = 0.2%	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 0% Brown Creek 1% Hopkins Creek 0% Range = 0 to 1% Mean = 0.2%
PEAK FLOW Effects of commercial harvest and resulting canopy openings on % increases in peak flows. **(percent increase over existing**)	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 0% Brown Creek 0% Hopkins Creek 0% Range = 0 to 0% Mean = 0.0%	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 1% Brown Creek 1% Hopkins Creek 0% Range = 0 to 1% Mean = 0.2%	Prichard Creek 0% Upper Prichard Cr 0% Eagle Creek 0% Brown Creek 1% Hopkins Creek 0% Range = 0 to 1% Mean = .0.2%

Fisheries - Direct and Indirect Effects of Water Yield and Peak Flow Increases (Alternatives 2 and 3)

The mean water yield and peak flow increase under Alternative 3 would be 0.2% (range 0.0 – 1%) above the existing conditions with the proposed fire/fuels, vegetation treatments, and road prescriptions. Within the drainages in the Prichard-Murray Resource Area, Alternative 2 would increase both water yield and peak flows by an estimated mean of 0.2% above current levels (range 0% to 1 %). Within the subwatersheds in the Prichard-Murray Resource Area the effects in water yield and peak flows would be localized at mid-elevations and headwaters. Increases in water yield under the action alternative would not be measurable (see guidelines above) in the mainstem of Prichard-Murray Resource Area streams and would not change existing fisheries habitat conditions in any of the fish-bearing stream segments. Since any change in water yield associated with this project probably would not be differentiated from normal climatic fluctuations in the Prichard-Murray Resource Area watersheds any additional bedload scour during high flows would not be expected. Salmonid redds, aquatic life, and their associated habitat existing in the cumulative effects area would not be directly or indirectly affected by the expected increases in water yield and peak flow changes. The proposals in Rookie

Creek may have some effects on channel stability and fish habitat due to the areas of mass wasting upstream of the monitoring site and the potential for increased water yield. Rookie Creek is too small to be modeled with WATSED (1 sq mile, see WATSED Limitations, AQ-Appendix D) and have reliable predictions for water yield and peak flows. Approximately 21% of the watershed will be treated, and a calculated 10% equivalent clear cut acres (ECA) (see Rookie Projects File AQ-159).

Direct and Indirect Effects to Channel Morphology under the Action Alternatives

Changes in the magnitude, intensity or duration of peak flows, water yield, and sediment yield have the potential to change stream channel characteristics. The action alternatives would modify the magnitude, intensity and duration of peak flows and sediment yields, but this increase based on WATSED would not be measurable. The most sensitive stream segments, prone to channel morphology changes from management activities are located in Lower Prichard Creek and the North Fork Coeur d'Alene River below Brown Creek. These larger C type channel reaches have dominant stream bed material composed of cobbles, (particle sizes ranging from 31 mm to 256 mm [approximately1 to 10 inches]), and are scoured, transported and deposited with high stream flows.

A maximum increase in water yield of 1.0 %, peak flow of 1.0 %, (Table AQ-7) and sediment yield of 3.0 %, (Table AQ-8) over the existing baseline would not result in any measurable changes to channel morphology or stream flow in any of the reaches of Prichard- Murray Resource area streams. There would be no risk of measurable changes in the North Fork Coeur d'Alene River downstream of the proposed activity because the entire area proposed for treatment is only 0.6% (Alt 2) and 0.5% (Alt 3) of the acres of the Upper North Fork Coeur d'Alene Basin, above Brown Creek (Figure AQ-1).

Changes in the magnitude, intensity or duration of peak flows and sediment yields have the potential to change stream channel characteristics. Stream channels that are primarily alluvial systems (sediment deposited and formed) are the most susceptible to stream bank erosion, changes in sediment supplies, and large woody debris removal (Chamberlin et al. 1991; PF Doc. AQ-34; Rosgen 1996; PF Doc. AQ-33). Stream channels where the substrate is composed of bedrock and boulders that have a good portion of large woody debris jams and are more confined within the valley bottom are more stable with respect to fluctuations in flow and sediment yields (Chamberlin et al 1991; PF Doc. AQ-34; Rosgen 1996; PF Doc. AQ-33).

The action alternatives could potentially modify the magnitude, intensity and duration of peak flows and sediment yields but the risk of measurable effects and detection of stream channel changes is very low to non-existent. The estimated changes in peak flows, sediment yields and the potential increases in flows from rain-on-snow events would not affect stream channel morphology from the action alternative, and therefore would not change fish habitat. The dominant stream bank material ranges from small to large cobbles within the sensitive reaches of project area streams. This material is easily scoured, transported, and deposited with high flows. The other channel types upstream of sensitive reaches of project area streams are well confined and entrenched, which allow sediment and debris to be easily transported, without effecting channel morphology.

Fisheries - Direct and Indirect Effects of Channel Morphology under the Action Alternatives

Based on the estimated changes in peak flows, water yield, and sediment yields and the potential increases in flows from a rain-on-snow event as described above, would not affect the stream channel morphology in each of the subwatersheds from the action alternatives, and therefore would not have a measurable direct or indirect affect to fish, fish habitat, aquatic biota or their habitat.

Direct and Indirect Effects to Water Quality (Sediment Yield) Under the Action Alternatives

Description of effects for both action alternatives (Alt 2 and 3) are discussed together because the difference between them is very small. In all subwatersheds accept for Prichard Creek there is no difference between Alternative 2 and 3.

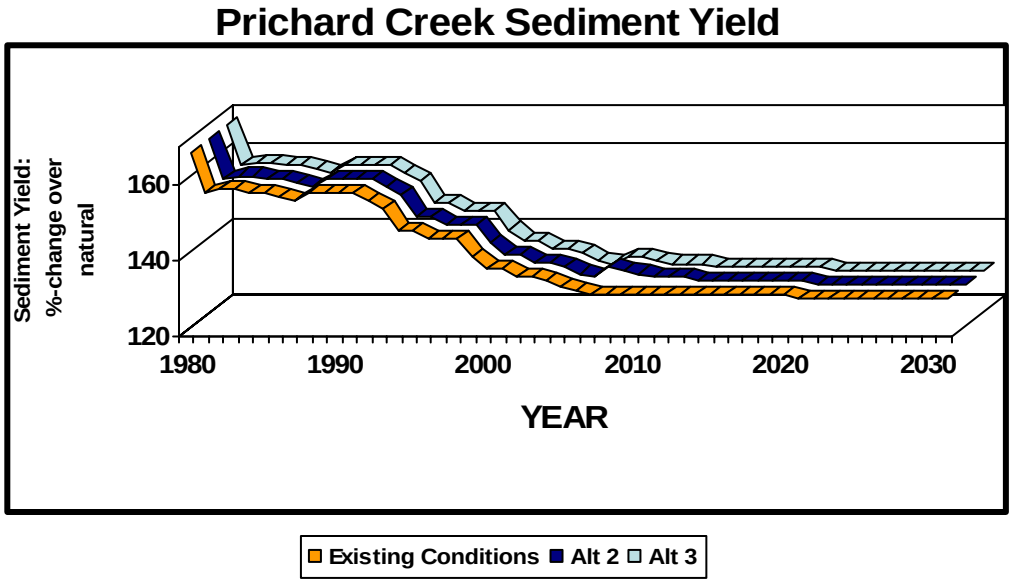
Sediment yield is variable by subwatershed as modeled with WATSED. Figures -AQ-11 through -AQ-15 display the differences in sediment yield increases resulting only from vegetative treatments and associated road construction/reconstruction. Following is a comparison of effects of the same activities both with and without aquatic restoration. All results assume that treatments would be implemented in 2007.

Table AQ-8. Comparison of Sediment Yield changes by alternative for the Prichard-Murray Resource Area by Alternative.

Indicator	Alternative 1 (No Action) Includes activities on private and Joe Cat; FS-timber sale	Alternative 2	Alternative 3
SEDIMENT YIELD Effects of commercial harvest and resulting % increase in sediment yield. **(percent increase over existing)**	Prichard Creek 1% Upper Prichard Cr 2% Eagle Creek -1% Brown Creek 0% Hopkins Creek 0% Range = 0 to 2% Mean = .4%	Prichard Creek 3% Upper Prichard Cr 3% Eagle Creek -1% Brown Creek 1% Hopkins Creek 2% Range = 0 to 3% Mean = 1.6%	Prichard Creek 2% Upper Prichard Cr 3% Eagle Creek -1% Brown Creek 1% Hopkins Creek 2% Range = 0 to 3% Mean = 1.4%

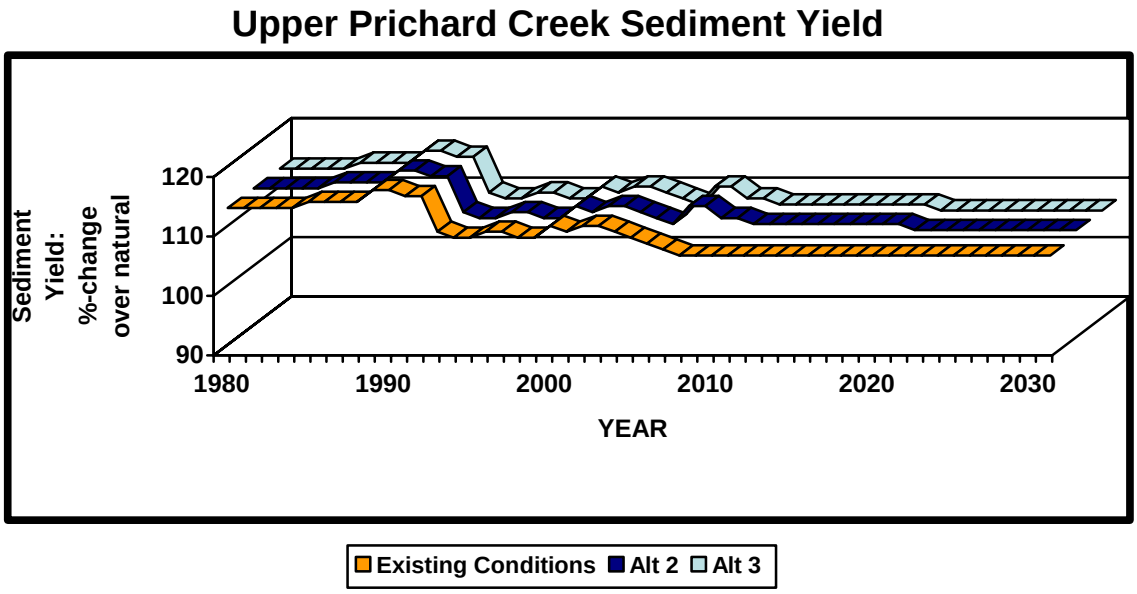
Alternative 2 shows a maximum predicted sediment yield increase of 3 % above baseline in Prichard Creek and Upper Prichard Creek. Alternative 3 would have almost the same sediment yield prediction as Alternative 2 except fro Prichard Creek sub-watershed would increase by 2% instead of 3%. The increase in sediment as modeled would not show any measurable effects of sediment in these subwatersheds. Application of BMPs (Aquatics Appendix A) and no harvest, or new road building activities within INFISH (1995; PF-CR-003) buffer areas are expected to prevent sediment levels from increasing. No direct or indirect effects to beneficial uses would occur because sediment yield increases would be too small to measure.

Figure AQ-11 Sediment Yield in Prichard Creek under Alternatives 2 and 3.



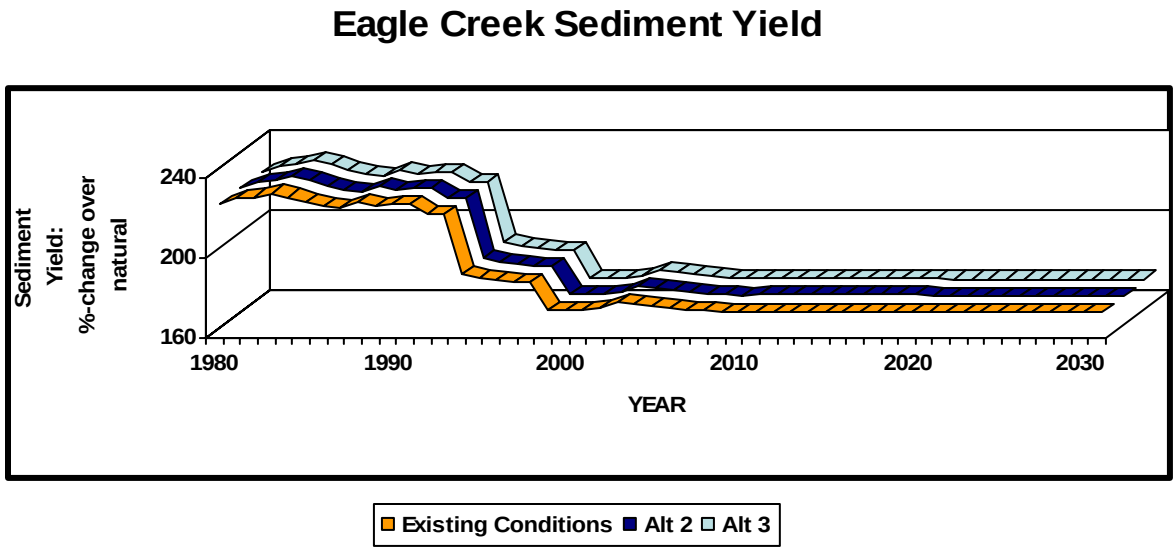
Alternative 2 would have a slight more increase in sediment yield compared to alternative 3 as model output showed from WATSED. The difference is too small to see in Figure AQ-11 and would not be detectable if attempts were made to measure sediment change in Prichard Creek. The small difference between the alternatives can be attributed from some dropped harvest units with alternative 3.

Figure AQ-12. Sediment Yield in Upper Prichard Creek under Alternative 2 and 3.



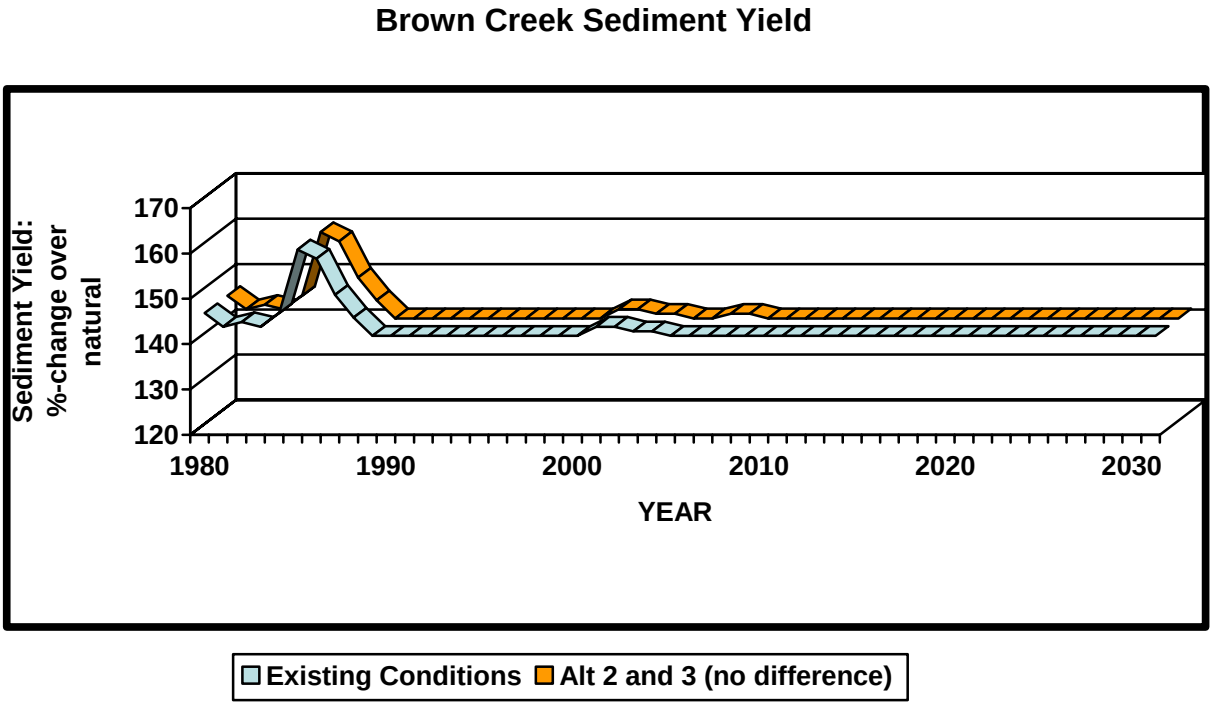
Alternatives 2 and 3 would have the same effects in this subwatershed because there are no differences in treatments in the two action alternatives. A 3 percent increase in sediment would have a slight potential for increased sediment yield but it would not be measurable and there would be no direct effect in this subwatershed. With the additive effects from Joe Cat project, planned for implementation approximately one year after Prichard Murray, there could be a delay in recovery with implementing either Alternative 2 or 3. This indirect effect of delaying recovery is observed from WATSED model outputs but would not be detectable in the streams because the location of tractor units 5 and 6 are greater than 300 feet from riparian areas and occur over a small area compared the subwatershed scale. There would be no detectable increases in sediment with the action alternatives in Upper Prichard subwatershed.

Figure AQ-13. Sediment Yield in Eagle Creek under Alternatives 2 and 3.



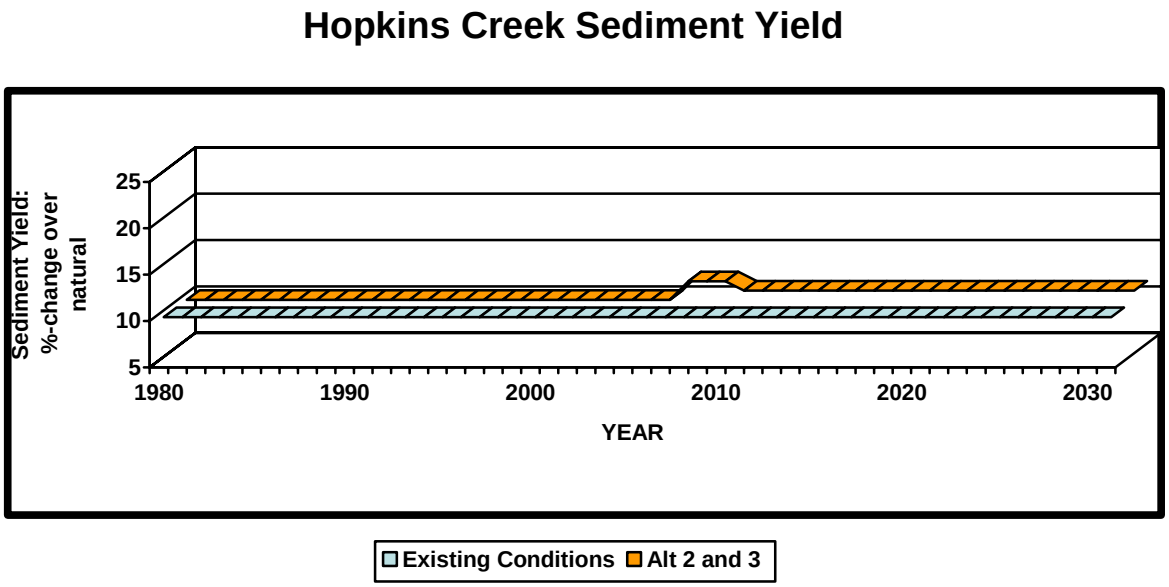
Eagle Creek subwatershed showed sediment yield change as a negative 1% from baseline for both alternatives 2 and 3, (PF Doc. AQ-77). This negative change represents a continued strong recovery in sediment yield despite a small portion of the subwatershed with proposed treatment units. Application of BMP's (Aquatics Appendix A) and no harvest, or new road building activities within INFS (1995; PF-CR-003) riparian areas, there is no expected effects to the improvement trend of this watershed and no negative direct or indirect effects to beneficial uses. There would not be any detectable changes in water quality or stream morphology. The restoration in this watershed has directly and visibly reduced sediment in this subwatershed (Figures AQ-3, 4, and 5).

Figure AQ-14. Sediment Yield in Brown Creek under Alternatives 2 and 3.



Alternatives 2 and 3 would have the same effects in the Brown Creek subwatershed because there are no differences in treatments in the two action alternatives. A one percent increase in sediment would not have a potential for increased sediment yield and would not be measurable. Rookie Creek is a 1 square mile subwatershed within the Brown Creek subwatershed and was too small to be modeled, (AQ-Appendix D) and have reliable predictions for water yield and peak flows. Approximately 21% of the watershed will be treated, and a calculated 10% equivalent clear cut acres (ECA) (see Rookie Projects File AQ-159). No increase in sediment would be expected in lower Rookie Creek as a result of harvest units located far from stream courses and no harvest within INFS riparian habitat conservation areas. There is a slight potential that in-stream sediment from channel erosion in the lowest reach of Rookie Creek could occur due to areas of mass wasting upstream of the monitoring site and the potential for increased water yield. Mitigation is designed with the action alternatives that would restore approximately 2 miles of the 990 road in Brown Creek and stabilize 4 channel / road crossings. This action is expected to reduce sediment in Brown Creek at its confluence with the North Fork of the Coeur d'Alene River, and result in no effects to beneficial uses.

Figure AQ-15 Sediment Yield in Hopkins Creek under Alternative 2 and 3.



Alternatives 2 and 3 would have the same effects in this subwatershed because there are no differences between treatments in the two action alternatives. A 2 % increase in sediment would not have a potential for increased sediment yield and would not be measurable. There would be no direct effect in this subwatershed from implementing either alternative 2 or 3. Past harvest and roading has not occurred much in this small subwatershed compared to other parts of the project area as shown from WATSED modeling of existing conditions, (PF Doc. AQ-78). The stream and watershed conditions in Hopkins Creek are stable and resilient (other than an isolated culvert failure near private land in its lower reach) and this stream can be considered as having reference conditions for a stream like this. These conditions decrease the likelihood of measurable effects from a 2% increase in sediment yield from proposed action alternatives.

Middle Segment North Fork of the Coeur d'Alene River

The predominant proposed activity that falls outside of modeled subwatersheds is prescribed fire. This activity is proposed along the hill slopes of the middle segment of the North Fork Coeur d'Alene River. The effects to soils and the risk of increased runoff and erosion is low based on the conditions necessary to implement prescribed fire as proposed (see Fuels Specialists Report). Fire ignition and construction of hand lines would not occur within INFS buffers. This measure is expected to reduce risk of impacting aquatic resources by keeping ground cover in riparian zones in tact so it can filter sediment should erosion and runoff result from prescribed fire. If prescribed fire creeps downhill into the INFSH buffers it would not be suppressed, with the intent that a low intensity and low severity fire would have no effects to the riparian area. Riparian shrubs and water dependent vegetation such as willow and alder is know to re-sprout and become more vigorous after low severity, low intensity fire (Dwire et al. 2006, AQ-115). Incidental fire within the INFS buffer is expected to be of low intensity and low severity and not injure mature trees or consume large woody debris. The desired cool and moist conditions necessary to implement prescribed fire would be sufficient to keep the risk of negative impacts to riparian vegetation and aquatic health low.

Other activities proposed along this segment of the North Fork of the Coeur d'Alene River include fuel breaks near homes and one thinning unit (unit 9) proposed in both action alternatives. The fuel break activities do not include any ground disturbance and there would be no increases increased risk of erosion or sediment delivery. The proposed thinning harvest (Unit 9) would be located south east of the river, upslope of Forest Highway 9. This highway is a two-lane paved road located on the edge of the North Fork Coeur d'Alene River flood plain, approximately 300 feet from the river. This road is built up approximately 5 to 6 feet above the natural flood plain. This highway acts as a dike and cuts off any surface flow that moves from the hill slopes to the river.

There are no drainages or culverts near the proposed thinning unit that connects surface water to the river (R. Davies, personal observation, 2006). If erosion were to occur, water and sediment, would not be able to move from the treated unit to the river because the road acts as a dike, blocking water and sediment.

Effects Analysis Conclusions

In summary, there would be only a slight difference in sediment yield increases between Alternatives 2 and 3. The risk of measurable sediment under either action alternative would be very low for all subwatersheds within the analysis area and for the lower North Fork of the Coeur d'Alene River below Brown Creek. If sediment increases were to occur, it would be localized in treatment units proposed for tractor skidding. This level of treatment at the subwatershed scale, application of BMP's, and location of treatments far enough away from streams would prevent sediment from being routed down slope to stream channels or into the North Fork of the Coeur d'Alene River. Sediment yield increases under alternative 2 or 3 would not be great enough to cause measurable effects to water quality or impair beneficial uses. The identified road improvement and culvert removals/upgrades identified in the Brown Creek subwatershed (Road 990) would reduce sediment and improve water quality in this drainage. The Rookie Creek drainage could potentially see some channel changes in its lower most reach because 21% of the Rookie subwatershed will be treated, and a calculated 10% equivalent clear cut acres (ECA) (p AQ-28). Sediment yield reduction from the 990 Road restoration work is expected to reduce sediment and provide sufficient mitigation in the Brown Creek subwatershed so that no negative impacts would be detectable at the mouth of Browns Creek. In the short term, temporary road reconstruction and watershed restoration activities may generate some measurable sediment dependent of flow levels and precipitation during this activity. In the long term the proposed activities would have no measurable effects to water yield, sediment yield, and overall aquatic health.

Fisheries: Direct and Indirect Effects of Sediment Yield - Action Alternatives

Increases in sediment delivery can affect fish habitat by filling in the interstitial spaces in spawning gravels. This results in decreased water flow through the gravels necessary for oxygen delivery and waste removal for incubating eggs. Filling of interstitial spaces can also displace macroinvertebrates, thereby reducing an important food source for fish and other aquatic life. High amounts of sediment can fill in pools and reduce rearing habitat for juvenile fish. Since all ground disturbing activities (e.g. roading, skyline and helicopter logging; etc) would occur outside of RHCAs, the risk of any sediment generated by logging activities actually reaching a live channel is very low (Belt et al. 1992; PF Doc. AQ-42). By using timing restrictions (see Fisheries BA/BE), onsite direction, and BMPs, sediment delivery to occupied fish habitat associated with culvert removals and upgrades would be minimized and risk of failure removed/reduced.

Sediment yield into stream courses, during road reconstruction and temporary road construction, would likely be immeasurable (see WATSED Guidelines for changes to Sediment Yield). The risk of measurable effects to fish habitat from sediment being transported into depositional zones of Prichard, Eagle, Brown, or the North Fork Coeur d'Alene River based on the watershed analysis, and application of BMPs (Aquatic Appendix A and INFS (1995; PF Doc. CR-003) and INFISH standards and guidelines would also be immeasurable. The higher-gradient channel types present in the headwaters of project drainages would likely route any sediment to the nearest low gradient stream reaches where it would be stored, given the amount of large woody debris component found in the project watersheds (USFS-Stream Surveys 2002; PF Doc. AQ-43). The predicted increase in sediment delivery would likely be transported or stored within the system. During high flows, silts would likely stay suspended, be carried through the system and be re-deposited in large woody debris sites or off-channel microsites (i.e. depositional zones) influenced by high flows. Salmonid redds, aquatic life, and their associated habitat existing in the cumulative effects area would not be directly or indirectly affected by the expected increases in water yield and peak flow changes.

Watershed Restoration Mitigation

Direct and Indirect Effects of Aquatic Restoration (Road Decommissioning, Crossing Removals and Upgrades:

Mitigation was identified and designed to assure that potential impacts would not occur in Brown Creek within the resource area and also where it enters the North Fork of the Coeur d'Alene River. Rookie Creek is the only part of the Brown Creek sub-watershed with proposed harvest units from the action alternatives. Rookie Creek is too small to be modeled with WATSED (1 sq mile, see WATSED Limitations, AQ-Appendix D) and have reliable predictions for water yield and peak flows. There is a slight risk of detectable change to the channel morphology in the lower reach of Rookie Creek from the proposed treatment activities (see Aquatics Appendix C- Corporate Monitoring). The mitigation entails treatment of approximately 2 miles of the 990 road, removing 4 failing road/stream crossings, stabilizing fill slopes, and restoring flood plains of the these small tributaries where the cross Road 990. During these restoration activities there would be a slight risk of erosion and sediment delivered downstream if a large precipitation event were to occur and through the first year after the activity while vegetation is being established. Seeding and mulching the stream crossings will help speed recovery but there still will be a risk of short term sediment delivery to Brown Creek for one year following the activity. The long-term benefit from implementing these mitigation activities would be a reduction in chronic sediment sources and the benefits would out-weigh the short-term risks. Planting, seeding, and mulching are effective BMPs when applied to these restoration sites, and are designed to reduce potential for short-term negative effects (Appendix A). The long-term reduction of erosion and sediment delivery to Brown Creek would benefit water quality and aquatic habitat. Predicted water yield and peak flow increases from the action alternatives is low and might be detectable in the lowest reach of Rookie Creek there would be overall long term sediment reduction at the scale of Brown Creek subwatershed. Rookie Creek flows into Brown Creek before entering the North Fork of the Coeur d'Alene River and effects from rehabilitation in the lower portion of the 990 road would have a long term effect of reducing sediment into the North Fork of the Coeur d'Alene River. The result of this sediment reduction would meet the intent of the North Fork CDA River TMDL by reducing sediment sources to the watershed.

Cumulative Effects of Ongoing and Reasonably Foreseeable Activities on Existing Aquatic Resources

The following is a description of Ongoing and Reasonably Foreseeable Activities, to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below were ones that are relevant to the watershed and fisheries cumulative effects analysis. Other activities listed in Appendix B are not discussed here because there is no soil or watershed disturbance created by these activities. These include tree planting, firewood gathering, and hunting.

Cumulative Effects of Fire suppression activities: Over the last century, stands within the Prichard-Murray Resource Area have been allowed to progress towards climax vegetative condition. The current trend is toward more shade tolerant species that are not as long-lived and are more susceptible to insects and disease (Specialist Report on Forest Vegetation). Since changes in water yield are associated with vegetation conditions, the existing and future trends would have an effect on water yield. The ongoing and foreseeable fire suppression techniques, if areas in Prichard-Murray Analysis area watersheds are not allowed to be treated (i.e. brush field burning) will continue fuel load, the result, should a ignition occur, would likely be a severe and intense stand replacing fire. Should a large scale fire of high intensity Aquatic Resources would be measurably impacted by increases in sediment, flow and possible flooding.

Cumulative Effects of Restricted or Unauthorized Motor Vehicle Use on Roads/Trails: The lack of road and trail maintenance can cause an increase in erosion and sediment delivery. Since 1999 the Forest Service has worked on portions of Trail 151 in the project area with the goal of improving safety and lessoning the environmental impact of motorized vehicles. The objective of the work was to widen portions of the trail to accommodate all users and eliminate the off trail impacts of people trying to detour around narrow spots on the

trail. Development and improvement of the motorized trails and closure of other non-system trails will reduce erosion and sediment delivery (Specialists report on Recreation).

Cumulative Effects of Road Maintenance Activities: These activities occur annually to some degree within the watershed, and include (but are not limited to) blading, brushing, and culvert cleaning. Maintenance activities typically improve drainage and decrease erosion from water channeling down the road surface. Culvert cleaning and associated maintenance lowers the associated risk of failure. The long term sediment reduction is achieved from road maintenance by reduced rutting and road surface erosion on this heavily travel road during the summer and fall months.

Cumulative Effects of Activities on Private Lands within the Prichard-Murray Resource Area: Private land consists of approximately 14% of the watershed analysis areas. The private lands primarily in the watershed areas consist of homes and developed acreage. Some of the private roads accessing these homes and within riparian development have delivered sediment to streams in the resource area from road fill failures, road surface runoff, and immediate riparian activities. Sediment delivery levels from these private roads are based on the level of road maintenance activities. Land management on private land principally includes development through home construction and logging practices. A review of permit requests to the Idaho Department of Lands indicates that approximately 262 acres (approximately 4.2 % of the cumulative effects project area) have been or are planned for harvest on private lands based on requests processed from 2001-03. The effects from private land activities is mostly derived from roads constructed for timber harvest and/or access. These roads will continue to route water and sediment and create a risk of chronic sediment sources to streams where they are located near private roads.

Cumulative Effects of Noxious Weeds Monitoring and Treatment: This activity would follow guidelines established in the Coeur d'Alene Noxious Weeds FEIS (USDA 2000; PF Doc. AQ-44). Effects to aquatic resources were analyzed in that document and its adaptive strategy. No additional effects to watershed or fisheries are expected to occur.

Cumulative Effects of Timber Stand Improvement: This activity would occur outside Riparian Habitat Conservation Areas (RHCAs) except potentially where it would improve riparian habitat from a non-commercial thinning associated activity. No ground disturbance would occur and timing restrictions would be enacted as prescribed through either contract clauses based on BMPs, INFS standards and guidelines, and the Fisheries BA/BE.

Cumulative Effects of Fire Suppression Activities: Successful fire suppression activities within the Prichard-Murray Resource Area will continue to allow stands to progress towards climax vegetation conditions where stands are not treated. As this occurs, water yield values will stay stagnant in the Prichard-Murray watersheds and decrease by approximately 0.5 % per year in the other areas. Fire suppression activities would not affect water yield or sediment yield and there would be no change in quantity of large woody debris in the stream systems of the Resource Area. The streams in the Prichard-Murray Resource Area will continue storing sediment in the channel areas of deposition until an episodic event increases peak flows high enough to flush and pick up stream bottom sediments (Benda and Dunne 1997; PF Doc. AQ-45).

Cumulative Effects of Ongoing & Reasonably Foreseeable Activities and Proposed Activities under the Action Alternatives on Aquatic Resources

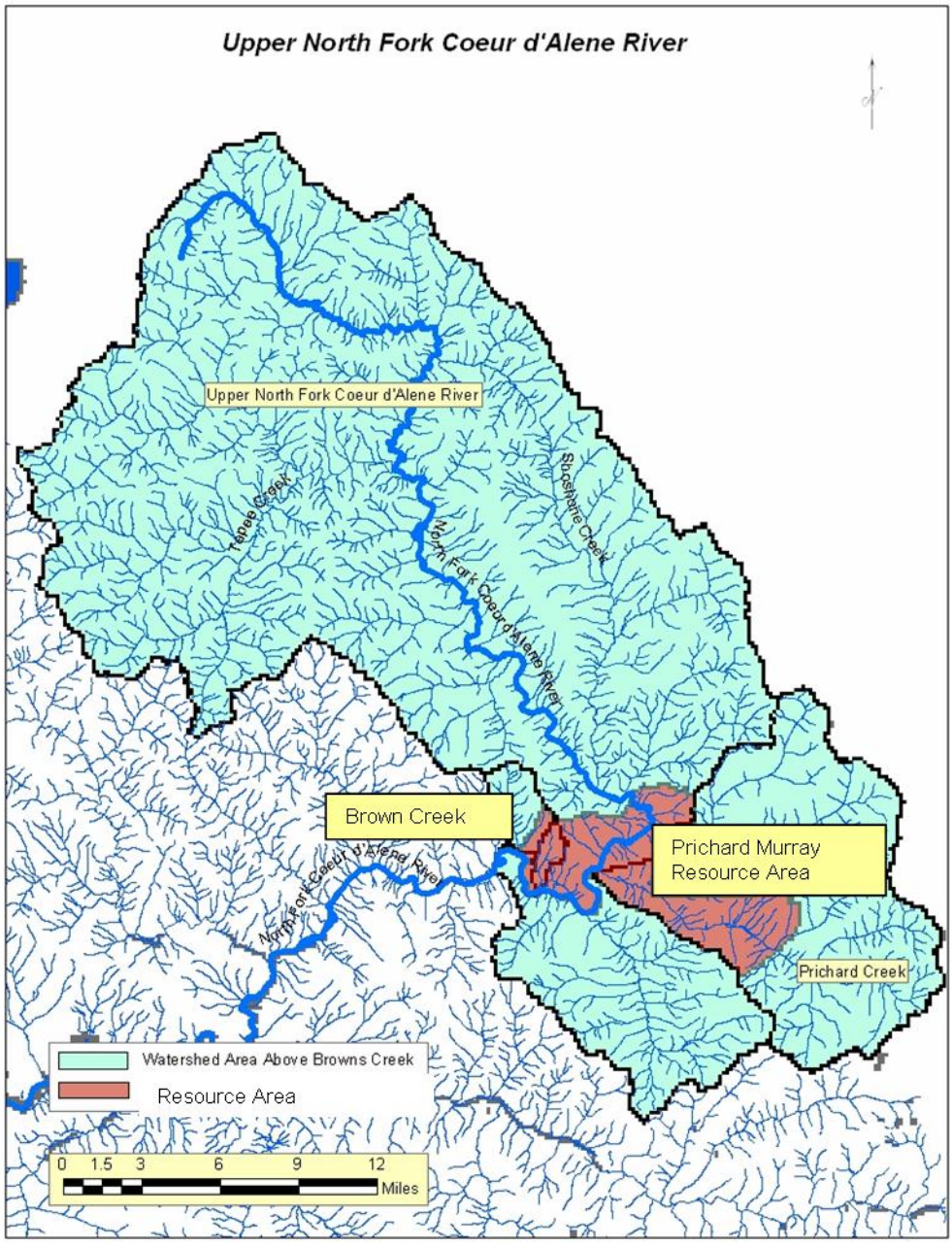
Cumulative Effects in regards to changes in Sediment Yield:

Studies have revealed that disturbance patterns created by timber harvesting, when used to achieve some of the benefits of natural disturbances, cause less disturbance to aquatic resources if concentrated in a smaller drainage rather than dispersed throughout the whole drainage, assuming riparian areas are protected, and harvest rotations occur over longer intervals (Reeves et al 1995; PF Doc. AQ-46). Alternative 2 and 3 would have very little difference if implemented with the only difference being a few harvest units not being treated. Vegetative conditions would move towards natural disturbance intervals and more natural conditions in the watershed.

Within the Prichard-Murray Resource Area, the ongoing activities and reasonably foreseeable projects would not have any measurable effect to sediment yield. Decommissioning of road 990 and stabilization of 4 stream crossings in Brown Creek subwatershed would result in sediment reduction and improvement of aquatic health. This mitigation activity is expected to offset any effects in channel adjustments resulting from harvest activities in Rookie Creek, a tributary to Brown Creek. The estimated sediment increases from the proposed activities with Alternatives 2 and 3 in the Prichard-Murray Resource Area would result a low risk of sediment delivery. This project would not further degrade impaired conditions within Prichard-Murray Resource Area or downstream in the North Fork of the Coeur d'Alene River. Overall the reduction in sediment with in the analysis area since 1992 has been well documented and observed as being effective from past restoration, as seen in Eagle Creek.

The most downstream point of the North Fork Coeur d'Alene River where all the streams from the resource area come together is at the confluence of Brown Creek and the North Fork of the Coeur d'Alene River. This segment of the North Fork Coeur d'Alene River is listed for sediment. Since none of the watersheds modeled and analyzed will generate measurable sediment from the proposed activities, it is logical to assume that sediment would not be measurable at the larger scale in the North Fork at Brown Creek. The reason for this is because the cumulative effects watersheds (Brown, Hopkins, and Prichard are only 12% of the whole watershed, (Browns Creek to the headwaters). In addition, the Prichard-Murray Resource area is only 10% of the whole watershed (See Figure AQ-16).

Figure AQ-16. The Prichard-Murray Resource Area and the watersheds used to analyze cumulative effects shown in proportion to the Upper North Fork of the Coeur d'Alene River.



Upper NF Coeur d'Alene Watershed	383,968 acres (100%)
Sum of Cumulative Effects Subwatersheds	67,324 acres (18%)
Prichard Creek Watershed	62,457 acres (16%)
Brown Creek Watershed	3,700 acres (1%)
Hopkins Creek Watershed	1,167 acres (0.3%)
Total treatment area Alternative 2	2,493 acres (0.6%)

Cumulative Effects in regards to changes in Water Yield and Peak Flows: With the action alternative, the direct and indirect effects of increased peak flows combined with the effects from past, present and reasonably foreseeable activities would not result in any cumulative effects to subwatershed in the Prichard-Murray Resource Area. Estimated water yield increases are within the historic range of variability for magnitude, intensity and duration when compared with estimates for past natural events. The effects of Alternative 2 are more consistent with what likely occurred with natural events (Table AQ-8) where water yield increases are a low risk of being great enough to be measurable. The proposed activities would not increase peak flows in any Watershed by more than 1% above existing conditions. Based on the historic fires in the Resource area it can be assumed that the magnitude, intensity and duration of the peak flows were very similar if not greater that what is predicted with the action alternative. The proposed treatment reduces canopy over only 4% of the total area within the Prichard-Murray Resource Area and the reasonably foreseeable activities would not significantly increase peak flows, the increases in flows for the proposed activities would be within the historic range of variability.

Cumulative Effects in regards to Rain-On-Snow Events: In the event of a rain-on-snow event, peak flow increases would not cause any cumulative effects to the subwatersheds of the resource area. These events are natural processes that occur episodically in time and space. Vegetation prescriptions would trend vegetation towards natural conditions and patterns, which would be observed from past natural disturbance events. As discussed in the Affected Environment section, the greatest impacts observed from rain-on-snow events occur when culverts become plugged from resulting floods and debris flows. The activities proposed with all the action alternatives are not expected to open canopy enough opening over large enough areas to have any affect on runoff and flooding from rain-on-snow events. Required mitigation would upsize some culverts and reduce the risk of culvert failure in the event of a rain on snow

Cumulative Effects in regards to changes in Stream Channel Morphology: Estimated peak flow increases would also not effect channel degradation or stream bank erosion. Since the estimated increases in water yield and peak flows are less than 1% for the Whole Prichard-Murray analysis area, they are judged to be within the historic range of variation and not be a factor in any cumulative effects to changes in stream channel morphology. The existing condition in most of the headwater streams of the analysis (Rosgen B channels), (PF Doc. AQ-33), area are such that they are well armored with mixed substrate and large woody debris, have good to excellent stream vegetation, and are stable and resilient. Lower reaches sensitive to disturbance such as lower Hopkins Creek, Brown Creek middle Prichard Creek show signs of past impacts from riparian roads, human development and placer mining. The estimated short-term increases in sediment yield associated with this project, for example the culvert removal is expected to be routed through the stream channel and would not be of a magnitude that would cause changes to stream channel morphology (e.g. migration, braiding, and widening of channels). Overall, stream channel morphology in the Prichard-Murray project area would be maintained and likely improved in Brown Creek since known sediment delivery sources are being rehabilitated through mitigation.

Cumulative Effects in regards to changes Fisheries Habitat: In consideration of the influences from direct and indirect effects associated with the proposed project, the cumulative effects are not expected to change the existing condition trend for fisheries resources. In general, there would be "long-term benefits" to fisheries if the proposed fuels reduction work is implemented under the action alternative. The non-commercial (i.e. brush field burn) treatments were deemed necessary in order to reduce fuel hazards and loading adjacent to surrounding communities that are threatened if a wildland urban interface fire became ignited. This form of activity would meet the intent of silvicultural practices that would not retard RMOs (INFS: TM-1) and avoid adverse cumulative effects to inland native fish (see specialists report on Fire/Fuels) by preventing long-term RMO damage or reduction from severe fire.

The Prichard-Murray Resource Area roadwork, in conjunction with reasonably foreseeable actions, would result in a net increase in sediment, peak flow, and water yields in the short term, and an overall reduction in sediment risk in the long term with the stand treatments and implementation of restoration activities. Based on the direct and indirect effects discussed above, the cumulative effects risk of any sediment delivery actually reaching a live channel is relatively low. The predicted increase in water yield (mean = 0.2%; range 0-1%, see Table AQ-8) would be localized and would likely not be measurable in fish-bearing channels. The potential

short-term increase in sediment may affect individual westslope cutthroat trout, but would **not** lead toward a trend in federal listing. In the long term, the reduction in sediment yield is expected to benefit survival of individuals (e.g. viability and emergence) and habitat.

The cumulative effects from road decommissioning show that planting, seeding, and mulching are effective BMP's when applied to these restoration sites, to reduce potential for short-term effects. The long-term gain from restoration activities would be reduction of roads near riparian areas that would reduce water and sediment yields and reduce erosion and sediment delivery, resulting in a benefit in water quality in the Prichard-Murray Resource Area. As a consequence these road-decommissioning opportunities benefit fisheries in that the risk of sediment delivery would be immediately reduced when, near riparian road erosional sources are restored and high-risk-to-fail culvert crossings are removed.

Primary and secondary contact recreation (also see summary of Executive Order 12962 – Recreational Fishing under section 3.12d); the action alternative is consistent with this executive order regarding aquatic systems and recreational fisheries. Short-term effects of this project may affect westslope cutthroat trout individuals, but would **not** lead toward a trend in federal listing. Long-term effects (i.e., net reduction in sediment) are expected to benefit westslope cutthroat trout survival and habitat. Short-term effects of this project would not affect Bull trout or critical habitat (NE).

4. Consistency with Regulatory Framework for Aquatic Resources

A. Consistency with the Forest Plan

All alternatives would meet the requirements of the Forest Plan for water resources and fisheries. Specific requirements and how this project meets them are listed in Aquatics Appendix A – BMPs (watershed) and Aquatics Appendix B INFS (fisheries). Alternative 1 would not change riparian habitat conditions, except for a steady increase in the risk of a stand replacement fire over time and the potential for road drainage failures from high-risk culverts. The action alternatives also met the requirements for fisheries resources in the Forest Plan, as amended by the Inland Native Fish Strategy (see Appendix B). The following are the water and fish standards to the Forest Plan and responses on each (USDA 1987, pp II 29-31; PF Doc. AQ-24).

Consistency With Forest Plan Water Standards

Water Standard 1: Management activities on Forest Lands will not significantly impair the long-term productivity of the water resource and ensure that state water quality standards will be met or exceeded.

Idaho State BMPs (BMPs) are designed to protect the long-term productivity of the water resource and ensure state water quality standards will be met. The Prichard-Murray Resource Area will meet standard BMPs. Site-specific BMPs were also included with this project as mitigation measures to improve water quality.

Water Standard 2: Maintain concentrations of total sediment or chemical constituents within state standards.

The net increase and delivery of sediment would be a maximum of 3% above existing conditions in the Prichard Creek watershed with an average of (1.3 %) for all the subwatersheds as modeled by WATSED, (PF Doc. AQ-79 and 80). This increase in sediment will not further degrade water quality in streams of the resource area or downstream in the North Fork of the Coeur d'Alene River. The proposed activities in conjunction with past and foreseeable actions would not impair beneficial uses. Implementation of the aquatic restoration as mitigation would reduce sediment in Brown Creek and meet the intent of the North Fork Coeur d'Alene TMDL. The action alternatives would meet State standards for chemical constituents given that "Required Design Criteria for All Action Alternatives," State and site-specific BMPs, and INFISH standards would be applied if any of the action alternative are selected.

Water Standard 3: Implement project level standards and guidelines for water quality contained in the BMPs (IPNF Forest Plan - Appendix S), including those defined by State regulation and agreement between the State and Forest Service such as: Idaho Forest Practices Rules, Rules and Regulations and Minimum Standards for Stream Channel Alterations, and BMPs for Road Activities.

Specific road maintenance and repair is needed for Alternative 1 to be consistent with Idaho Forest Practices Rules. The action alternatives are consistent with this criterion. In addition to standard State BMPs, other soil and water conservation practices that are approved BMPs are built into the timber sale contract. Site-specific BMPs are specified and are listed in the BMP portion of this appendix. Soil and water conservation principles were used during alternative design to determine the location and types of treatments including which areas should be avoided or restored. The specified and designed measures surpass those required by the State Forest Practices Act and are consistent with Forest Service standards.

Water Standard 4: Cooperate with the states to determine necessary instream flows for various uses. Instream flows should be maintained by acquiring water rights or reservations.

Instream flows are not an issue with any portion of the proposed project. Therefore, this Standard is not applicable to any alternative.

Water Standard 5: Manage public water system plans for multiple uses by balancing present and future resources with public water supply needs. Project plans for activities in public water systems will be reviewed by the water users and the State.

Streams not defined as public water systems, but used by individuals for such purposes, will be managed to standards established by the state's forest practices rules and/or the National Forests' BMPs or to the INFS standards and guidelines whichever is applicable. Streams within the Prichard-Murray Resource Area are not defined as a "Municipal Watershed" but the streams of this watershed are the public water supply for the town of Murray, Idaho.

Water Standard 6: Activities within non-fishery drainages, including first and second order streams, will be planned and executed to maintain existing biota. Maintenance of existing biota will be defined as maintaining the physical integrity of these streams. BMPs (Forest Plan Appendix S), Appendix 0, and riparian guidelines will be used to accomplish this objective.

The existing biota will be maintained in first and second order streams through standard and site specific BMPs and the application of INFS standards and guidelines. Site Specific BMPs and applicable INFS standards and guidelines are listed and described in the BMP portion Aquatic Appendix A.

Water Standard 7: It is the intent of this plan that models be used as a tool to approximate the effects of National Forest activities on water quality values. The models will be used in conjunction with field data, monitoring results, continuing research and professional judgment, to further refine estimated effects and to make recommendations.

All alternatives meet this standard. The WATSED model was used to predict water and sediment yield changes. A Risk Analysis models for culvert failure was used with inventoried data collected in 2005 and used for analyzing road drainage crossings and erosional hazards and risks to aquatic ecosystems, (Flanagan et al 1998; PF Doc. AQ-52). This method gathered information on road-stream crossings that included fill volumes, culvert sizes, erosional features, and other variables, and then ranked each crossing for treatment (project file).

Consistency With Forest Plan Fish Standards

Fish Standard 1: Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the

life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.

Fish Standard 2: Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and resident populations of special concern *["high value streams"],* will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard.

On June 2, 2005, the Forest Supervisor for the Idaho Panhandle National Forests signed a Decision Notice and Finding of No Significant Impact that amended the Forest Plan to modify or remove objectives, standards, and monitoring requirements pertaining to fry emergence success (USDA Forest Service 2005; PF Doc. AQ-56d). The amendment was implemented because the fry emergence objectives, standards and monitoring requirements that were in the IPNF Forest Plan did not contribute as well as INFISH objectives, standards, guidelines, and monitoring direction towards meeting the goals of providing sufficient habitat in support of maintaining diverse and viable populations of fish species across the forest. In addition, because of the limited application of the fry emergence models and their unreliability, and the inability to determine fry emergence success in the field due to high variability affected by multiple natural and human-caused factors, the Forest Service was not able to state with any degree of certainty whether measures of fry emergence success were accurate or precise.

Fish Standard 3: The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective.

Forest Plan standard 3 is not applicable to this analysis because no streams in the Prichard-Murray Resource Area are listed as "low access fishing streams." However, streams within the Resource Area are recognized as to providing beneficial uses.

Fish Standard 4: Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.

Within the Prichard-Murray Resource Area, potential fish barriers were identified through surveys. Potential fish barriers were located on Forest Highway 9 and planned activities do not include the removal or modification of these known barriers. These sites are under contract to inventory to determine their status concerning fish passage. No new stream migration barriers will be created with this project. This objective does apply to the Prichard-Murray Resource Area.

Fish Standard 5: Utilize data from stream, river, and lake inventories to prepare fishery prescriptions that coordinate fishery resource needs with other resource activities. Pursue fish habitat improvement projects to improve habitat carrying capacities on selected streams.

As stated in the aquatics specialist report, information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game, and the U.S. Fish and Wildlife Service.

Fish Standard 6: Coordinate management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O.

Water resource concerns are protected in Management Area 16 through INFS standards and guidelines (See Aquatics Appendix G – INFS Standards and Guidelines).

B. Consistency With the National Forests Management Act – Species Viability

Fish species that may be affected by the project (westslope cutthroat trout and rainbow trout) are also distributed across the Forest. For example, westslope cutthroat and rainbow trout are found in 13 of 13 (100 %) of 4th code HUC watersheds (i.e., large watersheds, such as Coeur d'Alene River) on the IPNF. There is possible connectivity between the Coeur d'Alene River basin and one of the twelve other 4th code HUC watersheds on the Forest (i.e. St. Joe River).

- *Further westslope cutthroat are well distributed and found in 100% of the 6th code HUCs in the Coeur d'Alene River basin. Though introduced, rainbow are not as well distributed;*
- *At the smaller watershed scale, westslope cutthroat and rainbow are known to inhabit tributary stream in the analysis area (7th Code HUC watershed). Based on the distribution of species across the Forest, the lack of connectivity between large watersheds, and the limited cumulative effects area the Prichard-Murray Resource Area will not affect viability of any threatened, endangered, sensitive, or MIS fish species on the IPNF;*
- *Therefore, the project will not affect viability, not only because of species distribution, but also because the project is supposed to lead to an improvement in habitat conditions.*

C. Consistency With the Endangered Species Act

All alternatives meet requirements of the Endangered Species Act. Critical habitat has been proposed for bull trout in the Coeur d'Alene River basin, and is included the Prichard-Murray project area and its tributaries. The project will have no effect on critical habitat or threatened bull trout (NE).

D. Consistency With the Clean Water Act (Including State of Idaho Implementation)

All alternatives would be consistent with the requirements of the Clean Water Act, 33 U.S.C. §1251. Sediment and metals, the pollutants of concern, would not increase in the water quality limited North Fork Coeur d'Alene River segment from Yellowdog Creek to its mouth. Risks to beneficial uses in all streams of the Prichard-Murray Resource Area would not be changed by this project. In compliance with the current TMDL for the North Fork of the Coeur d'Alene River, there would be no net increase in sediment or metals into the North Fork of the Coeur d'Alene River or streams of the project area through the proposed management activities.

E. Consistency With the Safe Drinking Water Act and Amendments of 1996 Act (Including State of Idaho Implementation).

All alternatives would be consistent with the requirements of the Safe Drinking Water Act and Amendments of 1996. BMP's were developed from protection measures recommended from this assessment along with site specific BPM's outlined in Aquatics Appendix A.

F. Consistency with the Idaho Forest Practices Act

No municipal watersheds are within the effects area of the Prichard-Murray Analysis area. The Town of Murray does draw it's domestic water from sources within the Prichard Creek watershed. Proposed activities are away from water sources used for domestic purposes. BMPs (Aquatics Appendix A) or Soil and Water Conservation Practices (PF Doc. AQ-53) would be applied under all alternatives, and all activities are in compliance with the guidelines in the Soil and Water Conservation Handbook.

G. Consistency with Executive Order 12962 – Recreational Fishing

All alternatives are consistent with this executive order regarding aquatic systems and recreational fisheries. Short-term effects of this project may affect westslope cutthroat trout individuals, but would not lead toward a trend in federal listing. Long-term effects (i.e., net reduction in sediment) are expected to benefit westslope cutthroat trout survival and habitat.

H. Consistency with the State of Idaho Governor's Bull Trout Plan

The mission of the Governors Bull Trout Plan (1996; PF Doc. AQ-11) is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho." Bull trout in the N.F. Coeur d'Alene River system are not known to currently persist based on all the information available at the time of this developed document. In the Plan the Coeur d'Alene River basin is defined as a drainage area that is a key watershed for a bull trout metapopulation, however no map is provided to explain watershed boundary and scope.

5. References Cited in the Aquatics Analysis

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AQUATICS APPENDIX A
BEST MANAGEMENT PRACTICES

The wildlife analysis is commensurate with the importance of the impact (40 CEQ 1502.15), the risk associated with the project, the species affected, and the level of knowledge already on hand (USDA Forest Service, 1992; PF Doc. WL-R65. Some wildlife species or their habitat are present in the analysis area, but would not be measurably affected because they would not be impacted by the proposed activities, the impacts would not be sufficient to influence their use or occurrence, or their needs can be adequately addressed through design of the project. No further discussion or analysis is necessary for those species and/or suitable habitat that are not found within the resource area or for those which would not be measurably affected. These species and the rationale for dismissing them from further consideration are described below and in the Project Files (PF Doc. WL-48).

INTRODUCTION

The Forest Service is required by law to comply with water quality standards developed under authority of the Clean Water Act. The Environmental Protection Agency and the State of Idaho are responsible for enforcement of these standards. The Idaho Panhandle National Forest Plan states (Chapter II, p. 27) that the Forest will "maintain high quality water to protect fisheries habitat, water based recreation, public water supplies and be within state water quality standards". The use of BMP's is also required in the Memorandum of Understanding between the Forest Service and the State of Idaho as part of our responsibility as the Designated Water Quality Management Agency on National Forest System lands. The State's water quality standards regulate nonpoint source pollution from timber management and road construction activities through application of Best Management Practices (BMPs). The BMPs were developed under authority of the Clean Water Act to ensure that Idaho's waters do not contain pollutants in concentrations, which adversely affect water quality or impair a designated use. State recognized BMPs that will be used during project design and implementation are contained in these documents:

a. Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and

b. Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).

Many of the rules and regulations for stream channel alterations are contained, in slightly different forms, in two Memorandum of Understandings (MOU) between the USFS and the State of Idaho. These MOUs are incorporated into the Forest Manual and R-1 Supplement 31, contains provisions which are not currently state recognized BMPs.

The practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet state and Forest water quality objectives. The purpose of this appendix is to: 1) establish the connection between the Soil and Water Conservation Practice (SWCP) employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAPA 16.01.2300.05) and 2) identify how the SWCP Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code. The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also covered.

The objective of this appendix is to provide conservation practices for use on National Forest Lands to minimize the effects of management activities on soil and water resources. The conservation practices were compiled from Forest Service manuals, handbooks, and contract and permit provisions, to directly or indirectly

improve water quality, reduce losses in soil productivity and erosion, and abate or mitigate management effects, while meeting other resource goals and objectives. They are of three basic forms: administrative, preventive and corrective. These practices are neither detailed prescriptions nor solutions for specific problems. They are purposely broad. These practices are action initiating process mechanisms, which call for the development of requirements and considerations to be addressed prior to and during the formulation of alternatives for land management actions. They serve as checkpoints, which are considered in formulating a plan, a program and/or a project.

Although some environmental impacts may be characteristic of a management activity, the actual effects on soil and water resources will vary considerably. The extent of these management effects on soil and water resources is a function of:

1. The physical, meteorological and hydrologic environment where the activity takes place (topography, physiography, precipitation, channel density, geology, soil type, vegetative cover, etc.);

2. The type of activity imposed on a given environment (recreation, mineral exploration, timber management, etc.) and its extent and magnitude;

3. The method of application and the duration of the activity (grazing system used, types of silvicultural practice used, constant vs. seasonal use, recurrent application or onetime application, etc.);

4. The season of the year that the activity occurs or is applied.

These factors vary within the National Forests in the Northern Region and from site to site. It follows then that the extent and kind of impacts are variable, as are the abatement and mitigation measures. No solution prescription, method, or technique is best for all circumstances. Thus the management practices presented in the following include such phrases as "according to the design", "as prescribed," "suitable for," "within acceptable limits," and similar qualifiers. The actual prescriptions, specifications, and designs are the result of evaluation and development by professional personnel through interdisciplinary involvement in the NEPA process. This results in specific conservation practices that are tailored to meet site specific resource requirements and needs.

BMP IMPLEMENTATION PROCESS

In cooperation with the States, the USDA Forest Service's primary strategy for the control of nonpoint sources is based on the implementation of BMP's determined necessary for the protection of the identified beneficial uses. The Forest Service Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams;

2. BMP Application;

3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses;

4. Evaluation of BMP monitoring results;

5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects. The Practices described herein are tiered to the practices in the R1/R4 FSH 2509.22. They were developed as

part of the NEPA process, with interdisciplinary involvement, and meet State and Forest water quality objectives. The purpose of this appendix document is to: 1) establish the connection between the SWCP employed by the Forest Service and BMP's identified in Idaho Water Quality Standards (IDAHO APT 16.01.2300.05) and 2) identify how the SWCP, Standard Specifications for the Construction of Roads, and the Timber Sale Contract provisions meet or exceed the Rules and Regulations Pertaining to the Idaho Forest Practices Act, Title 38, Chapter 13, Idaho Code (BMP's). The relevant portions of the Rules and Regulations developed under the Idaho Stream Protection Act are also included.

FORMAT OF THE BMPS

Each Soil and Water Conservation Practice (SWCP) is described as follows:

Title: Includes the sequential number of the SWCP and a brief title.

OBJECTIVE: Describes the SWCP objective(s) and the desired results for protecting water quality.

EFFECTIVENESS: Provides a qualitative assessment of expected effectiveness that the implemented BMP will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on: 1) literature and research (must be applicable to area 2) administrative studies (local or within similar ecosystem); and 3) professional experience (judgment of an expert by education and/or experience). The expected effectiveness of the SWCP is rated either High, Moderate or Low.

High: Practice is highly effective (>90%) and one or more of the following types of documentation are available:

a) Literature/Research - must be applicable to area;
b) Administrative studies - local or within similar ecosystem;
c) Experience - judgment of an expert by education and/or experience;
d) Fact - obvious by reasoned (logical response).

Moderate: Documentation shows that the practice is effective less than 90% of the time, but at least 75% of the time.

Or

Logic indicates that this practice is highly effective, but there is little or no documentation to back it up.

Or

Implementation and effectiveness of this practice will be monitored and the practice will be modified if necessary to achieve the objective of the BMP.

Low: Effectiveness unknown or unverified, and there is little to no documentation

Or

Applied logic is uncertain in this case, or the practice is estimated to be less than 75% effective.

Or

This practice is speculative and needs both effectiveness and validation monitoring.

The effectiveness estimates given here are general, given the range of conditions throughout the Forest. More specific estimates are made at the project level when the BMPs are actually prescribed.

COMPLIANCE: Provides a qualitative assessment of how the implementation of the specific measures will meet the Forest Practice Act Roles and Regulations pertaining to water quality.

IMPLEMENTATION: This section identifies: (1) the site-specific water quality protection measures to be implemented and (2) how the practices are expected to be applied and incorporated into the Timber Sale Contract.

ITEMS COMMON TO ALL SOIL & WATER CONSERVATION PRACTICES

Responsibility For Implementation: The District Ranger (through the Presale Forester) is responsible for insuring the factors identified in the following SWCP's are incorporated into: Timber Sale Contracts through the inclusion of proper B and/or C provisions; or Public Works Contracts through the inclusion of specific contract clauses.

The Contracting Officer, through his/her official representative (Sale Administrator and/or Engineering Representatives for timber sale contracts; and Contracting Officers Representative for public works contracts) is responsible for insuring that the provisions are properly administered on the ground.

Monitoring: Implementation and effectiveness of water quality mitigation measures are also monitored annually. This includes routine monitoring by timber sale administrators, road construction inspectors, and resource specialists which is documented in diaries and project files. Basically, water quality monitoring is a review of BMP implementation and a visual evaluation BMP effectiveness. Any necessary corrective action is taken immediately. Such action may include modification of the BMP, modification of the project, termination of the project, or modification of the state water quality standards.

Table 1.1: Key to abbreviations.	
TSC = Timber Sale Contract	**SAM** = Sale Area Map
TSA = Timber Sale Administrator	**COR** = Contracting Officer Representative
PWC = Public Works Contract	**IFPA** = Idaho Forest Practices Act
SCA = Stream Channel Alteration Act	**SWCP**= Soil and Water Conservation Practices
BMP = Best Management Practices	**SMZ** = Streamside Management Zone
SPS = Special Project Specifications	**EPA** = Environmental Protection Zone
CFR = Code of Federal Regulations	

KEY SOIL & WATER CONSERVATION PRACTICES

Class * Soil and Water Conservation Practice (FSH 2509.22)

11 WATERSHED MANAGEMENT

W 11.05 - Wetlands Analysis and Evaluation
W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.11 Petroleum Storage & Delivery Facilities & Mgt

13 VEGETATION MANIPULATION

G 13.02 Slope Limitations for Tractor Operation
G 13.03 Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E 13.04 Revegetation of Surface Disturbed Areas
E 13.05 Soil Protection During and After Slash Windrowing

E 13.06 Soil Moisture Limitations for Tractor Operation

14 TIMBER

A 14.02 Timber Harvest Unit Design
A 14.03 Use of Sale Area Maps for Designating Soil and Water Protection Needs
A 14.04 Limiting the Operating Period of Timber Sale Activities
E 14.05 Protection of Unstable Areas
A 14.06 Riparian Area Designation
G 14.07 Determining Tractor Loggable Ground
E 14.08 Tractor Skidding Design
E 14.09 Suspended Log Yarding in Timber Harvesting
A 14.10 Log Landing Location and Design
E 14.11 Log Landing Erosion Prevention and Control
E 14.12 Erosion Prevention and Control Measures During Timber Sale Operations
E 14.13 Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
E 14.14 Revegetation of Areas Disturbed by Harvest Activities
E 14.15 Erosion Control on Skid Trails
E 14.16 Meadow Protection During Timber Harvesting
S 14.17 Streamcourse Protection (Implementation and Enforcement
E 14.18 Erosion Control Structure Maintenance
A 14.19 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E 14.20 Slash Treatment in Sensitive Areas
A 14.22 Modification of the Timber Sale Contract

15 ROADS AND TRAILS

A 15.02 General Guidelines for Road Location/Design
E 15.03 Road and Trail Erosion Control Plan
E 15.04 Timing of Construction Activities
E 15.05 Slope Stabilization and Prevention of Mass Failures
E 15.06 Mitigation of Surface Erosion and Stabilization of Slopes
E 15.07 Control of Permanent Road Drainage
E 15.08 Pioneer Road Construction
E 15.09 Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E 15.10 Control of Road Construction Excavation & Sidecast Material
S 15.11 Servicing and Refueling of Equipment
S 15.12 Control of Construction In Riparian Areas
S 15.13 Controlling In-Channel Excavation
S 15.14 Diversion of Flows Around construction Sites
S 15.15 Stream crossings on Temporary Roads
S 15.16 Bridge & Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)
E. 15.17 Regulation of Borrow Pits, Gravel Sources, and Quarries
E 15.18 Disposal of Right-of-Way and Roadside Debris
S 15.19 Streambank Protection
E 15.21 Maintenance of Roads
E 15.22 Road Surface Treatment to Prevent Loss of Materials
E 15.23 Traffic Control During Wet Periods
G 15.24 Snow Removal Controls
E 15.25 Obliteration of Temporary Roads
E 15.27 Trail Maintenance and Rehabilitation

18 FUELS MANAGEMENT

E 18.02 Formulation of Fire Prescriptions

E 18.03 Protection of Soil and Water from Prescribed Burning Effects

Table 1.2: Classes of SWCP (BMP)	
A = Administrative	**G** = Ground Disturbance Reduction
E = Erosion Reduction	**W** = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction	

SITE-SPECIFIC BEST MANAGEMENT PRACTICES

PRACTICE 11.05 - Wetlands Analysis and Evaluation;

OBJECTIVE: To delineate wetlands within sale areas in order do o facilities or degradation of soil and water resources.

EFFECTIVENESS: High

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency Planning
PRACTICE 11.11 - Petroleum Storage and Delivery Facilities & Management
PRACTICE 15.11 - Servicing and Refueling of Equipment

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, bitumen's, raw sewage, wash water, and other harmful materials by prior planning and development of Spill Prevention Control and Countermeasure Plans.

EFFECTIVENESS: Although SPCC Plans cannot eliminate the risk of materials being spilled and escaping into waters, they can if followed be effective at reducing adverse effects to tolerable levels. Depending on the location and quantity of a spill, a properly implemented Plan can provide for up to 100 percent containment of a spill.

COMPLIANCE: FPA Rule 2.j.i,ii - Meets

IMPLEMENTATION: TSC provisions holds the purchaser responsible for taking appropriate preventive measures to insure that any spill of oil or oil products does not enter any stream or other waters of the United States. If the total oil or oil products storage exceeds 1320 gallons or if any single container exceeds a capacity of 660 gallons, the purchaser will prepare a Spill Prevention Control and Countermeasures Plan. The plan shall meet EPA requirements including certification by a registered professional engineer. If necessary, specific requirements for transporting oil to be used in conjunction with the contract will be specified in TSC provisions.

The Contracting Officer Representative will designate the location, size and allowable uses of service and refueling areas. The criteria below will be followed at a minimum:

1. Petroleum product storage containers with capacities of more than 200 gallons, stationary or mobile, will be located no closer than 100 feet from stream, water course, or area of open water. Dikes, berms, or embankments will be constructed to contain the volume of petroleum products stored within the tanks. Diked areas will be sufficiently impervious and of adequate capacity to contain spilled petroleum products. [FPA RULE 2(j)]

2. Transferring petroleum products: During fueling operations or petroleum product transfer to other containers, there shall be a person attending such operations at all times [FPA Rule 2(j)(i)].

3. Equipment used for transportation or storage of petroleum products shall be maintained in a leak proof condition. If the Forest Service Representative determines there is evidence of petroleum product leakage or spillage he/she shall have the authority to suspend the further use of such equipment until the deficiency has been corrected. [FPA Rule 2(j)(ii)]

4. For longer-term storage, a sump pond lined with plastic will be constructed equal to the volume of fuel stored on the site.

In the event any leakage or spillage enters any stream, water course or area of open water, the operator will immediately notify the COR who will be required to follow the actions to be taken in case of hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan.

PRACTICE 11.09 - Management by Closure to Use
PRACTICE 15.23 - Traffic Control During Wet Periods

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability by excluding activities that could result in damages to facilities or degradation of soil and water resources.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rule 4.d.v(c) - Meets

IMPLEMENTATION: Specific guidelines for closure of roads during the period of the contract and at the end of the purchasers operations will be spelled out in the TSC provision (Closure to Use by Others):

Roads that must be used during wet periods should have a stable surface and sufficient drainage to allow such use with a minimum of resource impact. Rocking, paving and armoring are measures that may be necessary to protect the road surface and reduce erosion potential. Roads not constructed for all weather use should be closed during the wet season. Where winter field operations are planned, roads may need to be upgraded and maintenance intensified to handle the traffic without creating excessive erosion and damage to the road surfaces.

PRACTICE 13.02 - Slope Limitations for Tractor Operation
PRACTICE 14.07 - Determining Tractor Loggable Ground

OBJECTIVE: To reduce gully & sheet erosion and associated sediment production by restricting tractor operation to slopes where corrective measures for proper drainage are easily installed and effective.

EFFECTIVENESS: In general, the less the slope percentage, the less are the chances of rilling, gullying, and soil displacement as a consequence of tracked or wheeled skidding.

COMPLIANCE: FPA Rules 3.c.i. & c.ii - **VARIES FROM FPA RULE - FPA Rules 3.c.i**

IMPLEMENTATION:

Example 1:

1) Tractor or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils. On slopes exceeding 35 percent gradient, tractor or wheel skidding shall be conducted during the winter with a minimum of 18 inches of snow cover or with a softtrack skidding machine. On slopes exceeding 45 percent gradient and which are immediately adjacent to a class I or II stream, tractor or wheel skidding shall not be conducted unless the operation can be done without

causing accelerated erosion. Where slopes in the area to be logged exceed 45 percent gradient, skidding shall be done in the winter with a minimum of 18 inches of snow cover and a softtrack skidding machine shall be used. [FPA Rule 3.c.i.]

a. This provision does not apply to any units .

2) Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rule 3.c.ii and TSC Provisions].

Example 2:

1) Tracked or wheel skidding shall not be conducted on geologically unstable, saturated, or easily compacted soils or on slopes exceeding 30 percent. Constructed skid trails on geologically unstable, saturated, or highly erodible or easily compacted soils on slopes over 20 percent will be prohibited [FPA Rules 3.c.i and ii and TSC Provisions].

a. This provisiondoes not appys to any units:

Mandatory: When tractor skid trails are required on geologically unstable, saturated, or highly erodible or easily compacted soils, the maximum grade of the trail shall be limited to 30 percent. The Forest Service shall document any differences from the FPA Rule requirements in a variance and so note the variance in the Decision Document.

PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, & Wet Meadows

OBJECTIVE: To maintain wetland functions and avoid adverse soil and water resource impacts associated with the destruction or modification of wetlands, bogs and wet meadows.

EFFECTIVENESS: Much of this mitigation consists of avoiding the impact [40 CFR 1508.20(a)]. The Forest Service has near-complete control over construction operations. Effectiveness is expected to be high.

COMPLIANCE: FPA Rule 3.h.iii - Meets

IMPLEMENTATION: At a minimum, the following specific protective requirements for wetlands identified on the Sale Area Map (SAM) will be incorporated into CT6.61# (Wetlands Protection):

1. Soil and vegetation along lakes, bogs, swamps, wet meadows, springs, seeps, or other sources where the presence of water is indicated will be protected from disturbance which would cause adverse effects on water quality, quantity, and wildlife and aquatic habitat (FPA Rule 3.h.iii].
2. An equipment exclusion zone shall extend a minimum of 65 feet from the wetlands, bogs, and wet meadows or as directed by INFS (1995) Standards and Guidelines under category 4 definitions.

PRACTICE 13.04 - Revegetation of Surface Disturbed Areas

PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

EFFECTIVENESS: Revegetation can be moderately effective at reducing surface erosion after one growing season following disturbance and highly effective in later years. Effectiveness has been shown to vary from 10 percent on 3/4:1 slopes to 36 percent on 1:1 slopes to 97 percent on 1:1 slopes in later years (King, John G. and

E. Burroughs. Reduction of Soil Erosion on Forest Roads. Intermountain Research Station General Technical Report, 1988).

COMPLIANCE: FPA Rules 3.d.iii & e.i, ii - Meets

IMPLEMENTATION: All temporary roads, landings, and skid trails in the sale area will be seeded within one year after harvesting is completed. Seed mixes and fertilizer specifications will be incorporated into Timber Sale Contract provision CT6.601# (Erosion Control Seeding). Timber Sale Contract provision CT6.623# (Temporary Road, Skid Trail/Skid Road and Landing) will identify that scarification/ripping of compacted landings and closed roads will be a minimum of 4 inches, not to exceed 2 feet.

a. All temporary roads, landings, and skid trails will also be fertilized to give the new plants extra support in becoming established.

b. The standard Idaho Panhandle National Forests moist site erosion control seed mix will be used.

PRACTICE 13.05 - Soil Protection During and After Slash Windrowing

OBJECTIVE: To reduce erosion and sedimentation from road surfaces and fill slopes, slash is windrowed below the fill slope.

EFFECTIVENESS: Slash filter windrows are logging slash placed at the base of fill slopes and below culverts where fish passage is not required has been shown to reduce sediment leaving fill slopes by 75 to 85 percent (Cook and King, "Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes," Research Paper INT-335, Intermountain Research Station, 1983; Burroughs, *et al.*, "Relative Effectiveness of Fillslope Treatment in Reducing Surface Erosion, Horse Creek Road, Nez Perce National Forest" Intermountain Research Station, 1985.) Slash filter windrows are effective immediately and during the first few years thereafter; they may later be near capacity and in some cases would have begun to decompose. By that time, though, revegetation would have become more effective.

COMPLIANCE: No directly related FPA Rule.

IMPLEMENTATION: Slash windrows will be installed 100 feet on both sides of all new stream crossings where sediment delivery from the fill slope can be expected. Slash filter windrows will also be used on fill slopes where there is a possibility of erosion or sedimentation into a nearby stream or channel (STD FS Spec 201).

PRACTICE 13.06 - Soil Moisture Limitations for Tractor Operation

OBJECTIVE: To minimize soil compaction, puddling, rutting, and gulling with resultant sediment production and loss of soil productivity by ensuring that activities are done when ground conditions are such that erosion and sedimentation can be controlled.

EFFECTIVENESS: Responsible implementation and enforcement are required for high effectiveness.

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION:

1. Tractor operations will be limited to periods when the soil moisture content is 18% or less, the ground

is frozen, or there is at least 18 inches of snow depth. Tractor operations will only be allowed outside of these specifications through the use of designated skid trails. These requirements will be incorporated into TSC provisions.

PRACTICE 14.02 - Timber Harvest Unit Design;
PRACTICE 14.08 - Tractor Skidding Design;
PRACTICE 14.10 - Log Landing Location and Design

OBJECTIVE: To insure that timber harvest unit design will maintain water quality and soil productivity by locating/designing landings and skidding patterns to best fit the terrain and avoid soil erosion.

EFFECTIVENESS: Restricting tractor skidding to designated skid trails can reduce the areal extent of soil disturbance from the typical 18-36 percent to 10 percent or less. Properly located landings and skid trails produce similar results. Effectiveness is expected to be moderate.

COMPLIANCE: FPA Rules 3.c.iii; 3.d.i & ii - Meets

IMPLEMENTATION: TSC provision B6.422 (Landings and Skid Trails) requires that the location of all skid trails and landings must be agreed upon before construction. Specific criteria that will be addressed during sale-layout and pre-work with the operator will include:

General: All new or reconstructed landings, skid trails, and fire trails shall be located on stable areas outside riparian areas. Side casting will be held to a minimum [FPA Rule 3.d.i].

Skid Trails:

a. Skid trails shall be kept to the minimum feasible width and number [FPA Rules 3.c.iii];

b. Located skid trails to avoid concentrating runoff and provide breaks in grade and waterbars;

c. Use existing skid trails wherever possible as long as the existing trails meet INFISH requirements.

Landings:

1. Landing sizes will be the minimum necessary for safe, economical operation [FPA Rule 3.d.ii];
2. Landings and log decks will not be located within Riparian Areas;

Landings, log decks, and/or burn piles will be located a minimum of 100 feet from streams, far enough away that direct (unfiltered) entry of sediment, bark, or ash and burning products, will not occur.

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

COMPLIANCE: No related FPA rule.

IMPLEMENTATION: The following features will be designated on the SAM:

1. The stream courses (Category 1, 2, and 4) listed below will be designated as Stream Course Protection areas to be protected under the TSC. During layout of the units these areas will be excluded where possible. Where these areas cannot be easily excluded from the unit, these areas will be excluded by designating the timber as leave trees. INFS (1995) standards and and guidelines using buffer categories will be applied to the following areas:
    a) Prichard Creek, Eagle Creek, Hopkins Creek and the North Fork of the Coeur d'Alene River - The entire mainstem length of these streams and there tributaries are delineated on project GIS maps for all alternatives;

    b) Any unnamed channels that are shown on the sensitive landtype map;

2. Wetlands (meadows, lakes, potholes, etc.) to be protected per the timber sale contract clauses are those designated on the Fish and Wildlife Service 1:24000 scale wetland maps;

3. Ephemeral channels will be protected through unit layout, marking plans, and/or designation on sale area maps;

The Purchaser and the Sale Administrator prior to harvesting will review these features on the ground.

MONITORING: A Watershed Specialist (Forest or District) will insure that the above features have been designated on the Sale Area Map during contract development.

PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities;
PRACTICE 15.04 - Timing of Construction Activities

OBJECTIVE: To minimize soil erosion, sedimentation and soil productivity loss by insuring activities, including erosion control work, road maintenance, etc., are done: (1) within the time period specified in the TSC; or (2) when ground conditions are such that erosion and sedimentation can be prevented.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA 4.c.ix - Meets

IMPLEMENTATION: Within the sale area, the following specifications relating to operating periods have been identified and recommended by the IDT:

1. Earthwork shall be postponed during wet periods if, as a result, erodible material would enter streams (FPA 4(c)(ix));

TSC provisions allows operations to occur outside Normal Operating Season subject to requirements in stated in the TSC.

G. The following requirements apply to operations outside the Normal Operating Season (see H-1, 2 for specific winter operations):

    1. Drain dips will be built into skidtrails and temporary roads at the time of construction, where feasible. Where draindips are not feasible, or are not functioning, trails and temporary roads will be waterbarred and maintained as necessary and/or prior to any prolonged shutdown;

2. Pioneering on specified road construction will be limited to 1,000 feet after October 31;

3. Temporary Roads will be seeded immediately following construction;

4. All surface erosion and stabilization activities will be placed prior to November 1 of each year.

H. The following requirements apply to winter operations:

1. Skid trails will be constructed with waterbars and/or draindips, and allowed to freeze prior to skidding operations;

2. Prior to spring shutdown, slash and/or cull logs will be placed into skidtrails to approximate waterbars;

3. Breaks will be provided in the snow berm during snowplowing activities;

Winter operations will also require the following language in the referenced TSC provisions:

a. All streams and channels within harvest units will be flagged or otherwise identified;
b. During all snowplowing activities, breaks will be maintained in the snow berm along the outside of roads, particularly in the areas where needed for road drainage.

Operations will be discontinued if conditions change and activities are no longer operating on frozen or snow covered ground, the intent of winter logging.

PRACTICE 14.05 - Protection of Unstable Areas
PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures

OBJECTIVE: To identify and protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

EFFECTIVENESS: Avoidance is the most effective measure on high-risk landforms. Risk assessment based on experience is essential. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.d.iii - Meets

IMPLEMENTATION: Unstable areas will be avoided by project design within the sale area. The following are guidelines that will be followed:

1. Avoid road locations or timber harvesting on or adjacent to active landslides, slump blocks and other mass wasting processes;

2. To prevent landslides, fill material used in landing construction shall be free of loose stumps and excessive accumulations of slash. On slopes where sidecasting is necessary, landings shall be stabilized by use of seeding, compaction, riprapping, benching, mulching, or other suitable means [FPA Rule 3.d.iii];

3. If road construction is necessitated in an area of moderate instability, the embankment should be layer placed or as recommended by a geotechnical engineer;

Identify any opportunities to stabilize existing unstable areas or minimize the adverse impacts associated with the unstable areas.

PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting

OBJECTIVE: To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

EFFECTIVENESS: The more suspended log yarding can be used, the less soil disturbance will result. Effectiveness is expected to be moderate

COMPLIANCE: FPA Rule 3.g.ii - Meets

IMPLEMENTATION: The TSC provisions, requires that areas requiring special yarding, as identified in TSC provisions (Skidding and Yarding), be identified on the SAM. Cable yarding (partial or full suspension) will be used on all areas identified for such logging on the SAM. Uphill cable yarding is preferred. Where downhill yarding is used, reasonable care shall be taken to lift the leading end of the log to minimize downhill movement of slash and soils [FPA Rule 3.c.iv].

The following requirement will be included in TSC (Conduct of Logging):

Units 1, 2, 3, 4, 5, 7blm, 8, 9, 10, 11, 12, 13, 15, 16, 17, 21, 22, 23, 24, 26, and 27 (all skyline units) will be uphill yarded with at least one end of the logs suspended.

PRACTICE 14.11 - Log Landing Erosion Prevention and Control;

PRACTICE 14.12 - Erosion Prevention & Control During Timber Sale Operations;

PRACTICE 14.15 - Erosion Control on Skid Trails.

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rules 3.e.i, ii; 3.d.iii - Meets

IMPLEMENTATION: The following criteria will be used in controlling erosion and restoring landings and skid trails to minimize erosion:

General:

4. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable locations outside of Riparian Habitat Conservation Areas.
5. Skid trails and landings, seeding will be done with a seed/fertilizer mix specified in the contract.

Landings:

1. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams. Landings will not be located in ephemeral draws or swales that were created by or are prone to landslides.
2. Landings shall be reshaped as needed to facilitate drainage prior to fall and spring runoff. Landings shall be stabilized by establishing ground cover or by some other means within one year after harvesting is completed [FPA Rule 3.e.ii].

3. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.

4. After landings have served the Purchaser's purpose, the Purchaser shall ditch or slope them to permit the water to drain or spread [Provision BT6.63 (Landings)].

Skid Trails:

1. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross-draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff [FPA Rule 3.e.i].

2. The sale administrator and/or watershed specialist will designate the spacing of water bars on skid trails. [Reference FSH 7709.56].

3. Unit design and location will facilitate logging with a minimum amount of excavated skid trails. Where excavated trails are constructed they will be kept to a minimum and must be decommissioned by the purchaser following completion of the logging activities. The decommissioning will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.

4. Skid trails and fire trails shall be stabilized whenever they are subject to erosion, by waterbarring, cross draining, outsloping, scarifying, seeding, or other suitable means. This work shall be kept current to prevent erosion prior to fall and spring runoff.

5. Spacing of water bars on skid trails will be based on guides for controlling sediment from secondary logging roads (no date). If necessary, additional water bars will be prescribed by the sale administrator and/or watershed specialist.

6. All skid trail and landing locations will be approved by the Forest Service prior to harvesting and will be rehabilitated as necessary to assure that normal drainage patterns are maintained, and that exposed soil surfaces are seeded or covered with slash. This will minimize the potential for sediment production and delivery.

7. Skid trail distance will average 100 feet or greater on ground skidded units, except where the trails converge to landings and as terrain dictates otherwise. This measure will help assure that no more than 15 percent of the activity area will be detrimentally disturbed per Region 1 soil standards;

8. Mechanical fellers will only be allowed off skidtrails if they travel on 18 inches of snow, frozen ground, or a slash mat (to avoid soil compaction levels that exceed Region 1 standards).

Corridors:

1. Corridors that have become entrenched below the litter layer into the top soil and could channel water will be water-barred and/or covered with debris.

PRACTICE 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities
PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVE: To establish a vegetative cover on disturbed sites in order to reduce erosion and sedimentation on disturbed areas where **normal revegetation** **methods where other contract provisions will not apply**.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rules 3.e.i and 3.d.iii - Meets

IMPLEMENTATION: Revegetation by seeding and fertilization to control erosion is planned for all temporary roads, skid trails, and landings. If erosion problems still occur on these areas, or other problem areas are discovered or are brought to the attention of the Sale Administrator, KV Plans will be revised to reseed and/or fertilize, or provide for other control measures. If KV Funds are not available, Appropriated Funds will be used.

PRACTICE 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVE: To avoid damage to the ground cover, soil and water in meadows.

EFFECTIVENESS: High. INFS standards and guidelines un applied category deliniations protect meadows from such described activity as well as botany buffers.

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. In all cases, soil and vegetation will be protected from disturbance which would cause adverse affects on water quality, quantity and aquatic habitat. The TSC Provision (Meadow Protection) is a standard provision in all contracts.

Unless otherwise agreed, trees felled into meadows shall be removed by end lining, and resulting logging slash shall also be removed. Damage to meadows, stream courses, and riparian areas caused by unauthorized Purchaser's operations shall be repaired by the Purchaser in a timely manner to restore and prevent further damage.

PRACTICE 14.17 - Stream Channel Protection (Implementation and Enforcement).
PRACTICE 15.19 - Streambank Protection

OBJECTIVE: To protect stream beds and streamside vegetation, during and after forest practice operations and road construction, by (1) maintaining unobstructed passage of stormflows; and (2) reducing sediment and other pollutants from entering streams.

EFFECTIVENESS: Much of this mitigation consists of avoiding the impact, minimizing the impact, or rectifying the impact [40 CFR 1508.20 (a-c)]. The Forest Service has near-complete control over construction operations. Effectiveness is expected to be high.

COMPLIANCE: FPA Rules 3.f.i, ii; 3.g.i,ii – Meets SCA Rules

IMPLEMENTATION: To reduce sediment and channel bank degradation at sites disturbed by construction of stream crossing or roadway fill, it may be necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require rip-rapping for energy dissipation (FSH 7709.56B, and Std. FS Spec. 619).

The intent of the regulations and clauses is to protect the integrity of stream channels, and minimize adverse

impacts to the channel and downstream resources and beneficial uses. To list all of the regulations that would be implemented to protect and restrict channel alterations, would require a small book. The following items however, highlight some of the principal provisions incorporated into the TSC that will govern channel protection in the sale area.

1. Care shall be taken to cause only the minimum necessary disturbance to the natural appearance of the area. Streambank vegetation shall be protected except where its removal is absolutely necessary for completion of the work [SCPA Rule 9,1(c) and TSC Provisions];

    a. All streambanks will be avoided by design.

2. If the channel is damaged during construction, it will be restored as nearly as possible to its original configuration without causing additional damage to the channel;

3. Purchaser shall repair all damage to a stream course if the Purchaser is negligent in their operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified Sale Administrator and Purchaser's representative;

4. All project debris shall be removed from stream course, in an agreed manner that will cause the least disturbance. (TSC, Stream course Protection). Specifically:

    a. Whenever possible trees shall be felled, bucked, and limbed in such a manner that the tree or any part thereof will fall away from any Class I streams. Slash that enters Class I streams as a result of harvesting operations shall be continuously removed, as will other debris that enters Class I streams whenever there is a potential for stream blockage or if the stream has the ability for transporting such debris. Material removed shall be placed five feet slope distance above the ordinary high water mark [FPA Rule 3.f.i];

    b. Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long;

        ii. Slash and other debris that enters Class II streams whenever there is a potential for stream blockage or if the stream has the ability for transporting the debris shall be removed immediately following skidding and placed above the ordinary high water mark [FPA Rule 3(f)(ii)].

Material to be removed will be all logging debris that is less than six inches in diameter and less than six feet long.

PRACTICE 14.18 - Erosion Control Structure Maintenance

OBJECTIVE: To insure that constructed erosion control structures are stabilized and working effectively.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: TSC provisions requires that during the period of the contract, the Purchaser shall provide maintenance of soil erosion control structures constructed by the Purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, any erosion control work needed is accomplished through performance bond earmarked for that use. TSC provisions requires the

Purchaser to maintain erosion control structures concurrently with his operations under the sale and in any case not later than 15 days after completion of skidding each unit or subdivision.

PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

OBJECTIVE: To assure the adequacy of required timber sale erosion control work.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION AND RESPONSIBILITY: Timber Sale Contract provisions requires that upon the purchaser's written request and assurance that work has been completed, the Forest Service shall perform an inspection. Areas that the purchaser might request acceptance for are specific requirements such as logging, slash disposal, erosion control, or snag felling. In evaluating acceptance the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. Certified Timber Sale Administrators will not accept as complete erosion control measures that fail to meet these criteria.

PRACTICE 14.22 - Modification of the Timber Sale Contract

OBJECTIVE: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

EFFECTIVENESS: High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: Over time, the Forest Service adopts new policies and direction that amend how we address timber harvest operations. An example is the recent change in direction to leave some large organic debris in stream channels instead of removing it all. In cases such as this, modifications to the TSC would occur under the appropriate provisions.

If evidence indicates that unacceptable impacts would occur to soil and water resources if the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional Forester advice and approval to proceed with a resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract as allowed by TSC Provisions. If the decision is for a resource environmental modification, once the action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations of implementation.

PRACTICE 15.02 - General Guidelines for the Location and Design of Roads and Trails

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

EFFECTIVENESS:

1. Route location ground-truths the results of transportation planning and provides site-specific information on possible problem areas (Gray and Megahan, 1981; Cline et. al., 1981; Megahan and Kidd, 1972; King and Gonsior, 1980);

2. Designed and controlled cut slopes, fill slopes, road width, and road grades effectively reduce sediment production by fitting the roads to the land (Bethalmy and Kidd, 1966; Burroughs, Watts, King, and Hanson, 1985; King, 1979; Megahan, 1978).

COMPLIANCE: FPA Rules 4.b.i,ii,iii & 4.c.i – Meets SCA Rules 9,7 - Meets

IMPLEMENTATION: The following listed items are incorporated in general road location and design guidelines for minimizing impacts on water quality:

Design:

1. Roads shall be planned no wider than necessary to safely accommodate the anticipated use and equipment needs . Cut and fill volumes shall be minimized by designing the road to fit natural terrain features as closely as possible. As much of the excavated material as possible shall be used in fill sections. Minimum cuts and fills shall be planned, particularly near stream channels [FPA Rule 4.b.ii]

Location:

1. Utilize natural benches, follow contours, avoid long, steep road grades. Balance cut/fill where possible to avoid waste areas;

2. Embankments and waste shall be designed so that excavated material may be disposed of on geologically stable sites [FPA Rule 4.b.iii];

3. Avoid slumps and slide-prone areas, and steep sidehills;

4. Road construction shall be minimized within stream protection zones. Areas of vegetation shall be left or re-established between roads and streams [FPA Rule 4.b.i and Standard Road Specifications-Special Project Specification 204.01];

5. Where possible, locate turnouts and turn-arounds at least 200 feet from water bodies or riparian zones. Where placement within 200 feet is necessary due to safety considerations, emphasize erosion control measures to protect water quality; i.e additional windrowing, seeding, etc.

Stream crossing sites:

1. Minimize the number of stream crossings, and choose stable sites. Major culverts will be sized, based on hydrologic analysis, to function effectively at 50-year peak flows, without water backing up. These culverts will be tested to withstand 100-year peak flows without failing. All other live streams will be sized, based on hydrologic analysis, for 20 year peak flows with maximum headwater depth ratios of 1.2, and withstand 50 year peak flows without failing;

Road drainage: SEE SWCP 15.07

1. Locate and design roads and trails to drain naturally by appropriate use of out-sloping, rolling dips, and grade changes, where possible. Cross drains will be installed in ditched areas to 1) carry intercepted flow across constructed areas; 2) to relieve the length of undrained ditch; and 3) to reduce disruption of normal drainage patterns. Road and trail drainage should be channeled to effective buffer areas, either natural or manmade, to maximize sediment deposition prior to entry into live water;

2. Ditch lines and road grades will be designed to minimize unfiltered flow into streams. A rolling dip,

relief culvert or similar structure will be installed as close as practical to crossings to minimize direct sediment and/or water input directly into streams. Route the drainage through SMZ, buffer strips, or other sediment settling structures where possible;

3. Roads shall be planned to drain naturally by out-sloping or in-sloping with cross drainage and by grade changes where possible. Dips, water bars and/or cross drainage will be planned when necessary [FPA Rule 4(b)(iv)];

Relief culverts and roadside ditches shall be planned whenever reliance upon natural drainage would not protect the running surface, excavation, or embankment. Culvert installations shall be designed to prevent erosion of the fill. Drainage structures shall be planned to achieve minimum direct discharge of sediment into streams [FPA Rule 4.b.v].

PRACTICE 15.03 - Road and Trail Erosion Control Plan

OBJECTIVE: To minimize the effects of erosion and the degradation of water quality through erosion control work and road design.

EFFECTIVENESS: Moderate

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Prior to the start of construction, the Contractor shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. Erosion control work to be done by the Contractor will be defined in Standard Specification 204 and/or in the Drawings. The schedule shall consider erosion control work necessary for all phases of the project. The Engineer will certify that the Contractors Erosion Control Plan meets the specifications of Std. FS Spec. Section 204.

PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes:

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rule 4.c.iii & d.ii - Meets

IMPLEMENTATION: Areas requiring mitigation of surface erosion will occur during the life of the timber sale contract. When these are found, the following provisions will be implemented.

a. All disturbed areas associated with road construction and reconstruction will be seeded. The first seeding will be applied as soon as practical after cuts and fills are brought to grade within seeding seasons as established in specification 625. A second seeding in the fall or spring season following road construction will be required where original seeding did not adequately revegetate exposed soil area;

b. Where surface erosion is occurring because of inadequate vegetative cover, additional seeding and re-fertilization will occur using recommended seed and fertilizer mixes. A T108 specification covers re-seeding of cut slopes if bared by the purchaser's maintenance operation. If the purchaser has done his required seeding, or bare spots are not caused by the purchaser, revise the KV Plan to cover costs;

c. Where ditches are carrying erosion products into stream channels, straw bale and erosion cloth ditch blocks will be installed to "short-circuit" the delivery. Seeding of the eroding surfaces, and seeding of the stored sediment in the ditch will also be accomplished. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road;

d. Where either straw bale/erosion cloth structures are not felt to be effective, underdrains or other measures will be installed to drain the ditches onto suitable ground, or at least reduce erosion impacts to the stream. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road;

e. Slumping of cutslopes will require a combination of both mechanical and vegetative controls. If/when this problem is found, a solution will be determined in consultation with Engineers and resource specialists and appropriate actions taken to remedy the situation or minimize adverse impacts.;

Additional underdrains and/or french drains will be constructed where intercepted moisture is encountered on incised stream approaches. Erosion control blankets and straw bales will be used to dissipate ditch scour and stabilize fill slopes.

PRACTICE 15.07 - Control of Permanent Road Drainage

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

EFFECTIVENESS: Moderate. Designed and controlled ditches, cross drain spacing, and culvert discharge prevent water from running long distances over exposed ground.

COMPLIANCE: FPA Rules 4.c.viii; 4.d.iii(a) & (b) - Meets

IMPLEMENTATION: The following items will be included in the timber sale contract provisions or road contract special project specifications.

1. Drainage ways shall be cleared of all debris generated during construction and/or maintenance that potentially interfere with drainage or water quality [IFPA Rule 4(c)(ii), Timber Sale Contract Clause C5.4, and Standard Road Specifications-Special Project Specification 204.04].

2. During and following operations on out-sloped roads, out-slope drainage shall be retained and berms shall be removed on the outside edge except those intentionally constructed for protection of road grade fills [IFPA Rule 4(c)(vi) and Timber Sale Contract Clause C5.4].

3. Cross drains and relief culverts shall be constructed to minimize erosion of embankments. The time between road construction and installation of erosion control devices shall be minimized. Drainage structures or cross drains shall be installed on uncompleted roads which are subject to erosion prior to fall or spring runoff. Relief culverts shall be installed with a minimum grade of 1 percent [IFPA Rule 4(c)(viii) and Standard Road Specifications-Special Project Specification 204.1].

4. Cross drains and relief culverts will be installed so as to minimize concentrations of intercepted water (see also Practice 15.02 f.(3)).

5. For New Construction and Reconstruction - The following criteria will be incorporated into the road:

    a. Design:

i. The temporary road will be constructed as an outsloped road that follows the natural terrain. Following use: the purchaser will obliterate this road by restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding if needed. The purpose of this requirement is to minimize potential for increasing sediment production and delivery.

ii. The reconstruction will include increasing pipe sizes or changing design on many of the existing stream crossings to provide fish passage (if needed) and pass 100 year flood discharges and prevent diversion of streamflow by the road.

iii. Unstable cut and fill slopes will be stabilized.

iv. Additional relief culverts will be installed to very frequently cross drain the road. Distances between relief pipes will generally not exceed 200 to 250 feet.

v. The grade of outsloped and insloped roads will be varied with graded rolling dips, drivable dips, or drivable waterbars to frequently cross drain surface water and to safely return water to stream channels in the event the culvert plugs.

vi. During and following operations on out sloped roads, retain out slope drainage and remove berms on the outside except those intentionally constructed for protection of road grade fills.

vii. Construct cross drains and relief culverts to minimize erosion of embankments. Minimize the time between construction and installation of erosion control devices. Use riprap, vegetative matter, downspouts and similar devices to minimize erosion of the fill.

viii. Prior to fall or spring runoff, install drainage structures or cross drain uncompleted roads that are subject to erosion;

ix. Install relief culverts at a minimum grade of 1 percent greater than road gradient;

x. Energy dissipaters or downspouts will be placed below problem culvert outlets (Reconstruction item).

xi. Roads restricted after use will also have erosion control measures in place prior to final pull-out. Roads to be closed by any closure device other than a gate will be decommissioned.

PRACTICE 15.08 - Pioneer Road Construction

OBJECTIVE: To minimize sediment production and mass wasting associated with pioneer road construction.

EFFECTIVENESS: Moderate

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: The following contract specifications will be required:

1. Construction of pioneer roads shall be confined to the designed location of the road prism unless otherwise approved by the Contracting Officer (Std. FS Spec. 203.11).
2. Pioneering shall be conducted so as to prevent undercutting of the designated final cut slope, and to prevent avoidable deposition of materials outside the designated roadway limits (Std. FS Spec. 203).

3. Permanent culverts will be installed at wet crossings during the pioneer phase unless positive control of sediment can be accomplished during installation, use, and removal of the temporary structure.

PRACTICE 15.09 - Timely Erosion Control Measures on Incomplete Road and Stream crossing Projects

OBJECTIVE: To minimize erosion of, and sedimentation from, disturbed ground on incomplete projects.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rules 4.c.ii,iii,iv; & 4.d.iii - Meets

IMPLEMENTATION: The following measures will be implemented during projects:

1. Temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion will be installed as necessary. The removal of temporary culverts, culvert plugs, diversion dams, or elevated stream crossing causeways will be completed as soon as practical;
2. The removal of debris, obstructions, and spoil material from channels and floodplains;
3. Seeding with an erosion control seed mix approved for use on the Idaho Panhandle National Forests to minimize erosion.
4. Install drainage structures or cross drain uncompleted roads that are subject to erosion prior to fall or spring runoff. (Std Spec 204)

Erosion control measures must be kept current with ground disturbance, to the extent that the affected area can be rapidly "closed," if weather conditions deteriorate. Areas must not be abandoned for the winter with remedial measures incomplete.

PRACTICE 15.10 - Control of Road Construction Excavation and Sidecast Material

PRACTICE 15.18 - Disposal of Right-of-Way and Roadside Debris

See also Practice 13.05

OBJECTIVE: To insure that unconsolidated excavated and sidecast material, construction slash, and roadside debris, generated during road construction, is kept out of streams and to prevent slash and debris from subsequently obstructing channels.

EFFECTIVENESS: High

COMPLIANCE: FPA Rule 4.c.iii,iv; & 4.d.i,ii,iii

The slash windrow and other erosion control devices will not be placed in existing stream channels or obstruct culvert outfalls. Large limbs and cull logs may be bucked into manageable lengths and piled alongside the road for fuelwood.

IMPLEMENTATION: In the construction of road fills near streams, compact the material to reduce the entry of water, minimize the amount of snow, ice, or frozen soil buried in the embankment. No significant amount of woody material shall be incorporated into fills. Slash and debris may be windrowed along the toe of the fill, but in such a manner as to avoid entry into a stream and culvert blockage.

Where slash windrows are not desirable or practical, other methods of erosion control such as erosion mats, mulch, and straw bale or fabric sediment fences will be used. Where exposed material (excavation,

embankment, borrow pits, waste piles, etc.) is potentially erodible, and where sediments would enter streams, the material will be stabilized prior to fall or spring runoff by seeding, compacting, rip-rapping, benching, mulching or other suitable means.

The following standard specs will be included in all road contracts that include clearing and excavation.

1. Standard Specification 201 (Slash Treatment)
2. Standard Specification 203 (Excavation and Embankments)

PRACTICE 15.13 - Controlling In-Channel Excavation

OBJECTIVE: To minimize downstream sedimentation by insuring that all in-channel excavations are carefully planned.

EFFECTICENESS: High

COMPLIANCE: SCA Rule 9,1(a) - Meets

IMPLEMENTATION: Location and method of stream crossings will be designed and agreed to prior to construction. The following items highlight some of the principal provisions incorporated into the TSC that will govern channel protection:

1. Construction equipment may cross, operate in, or operate near stream courses only where so agreed to and designated by the Forest Service prior to construction. Crossing of perennial stream channels will be done in compliance with the specifications in the Stream Channel Alteration Act Rules and Regulations and included in the project specifications.
2. No construction equipment shall be operated below the existing water surface except that fording the stream at one location only will be permitted, and work below the water level that is necessary for culvert bedding or footing installations will be permitted to the extent that it does not create unnecessary turbidity or stream channel disturbance [SCA Rule 9,1 (a) and Standard Road Specifications-Special Project Specification 204.04].
3. Wheeled or track laying equipment shall not be permitted to operate within 5 feet slope distance of the apparent high water mark of Class II streams and 75 feet of Class I streams. (C6.6 Erosion Prevention and Control).
4. Construction of any hydraulic structures in stream channels will be in compliance with the Rules and Regulations pertaining to the Stream Channel Protection Act, Title 42, Chapter 38, Idaho Code).

PRACTICE 15.14 - Diversion of Flows Around Construction Sites

(See also Practice 15.13)

OBJECTIVE: To restore the natural course of any stream as soon as practical if the stream is diverted as a result of timber management activities.

EFFECTIVENESS: High

COMPLIANCE: Meets SCA Rule

IMPLEMENTATION: Flow in stream courses may only be diverted if the Forest Service deems it necessary for the contractor to do the job. Such a diverted flow shall be restored to the natural stream course as soon as practicable and, in any event, within the period stated in Stream Channel Alteration Act Rules and Regulations. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment. (Std. FS Spec. 206, 206A).

1. On perennial Class I and II streams dewatering shall be accomplished prior to excavation for culvert installation;

2. Filter cloth, erosion control blankets, plastic, straw bales, and rip-rap can be used to keep live water from contacting new fill during culvert installations;

When dewatering of stream crossings is required, a non-erodeable conduit, flex pipe or geotextile fabric will be used. Diversion dams above the crossing shall be hand constructed. Sediment traps shall be constructed below the stream crossing.

PRACTICE 15.15 - Stream Crossings on Temporary Roads

(See also Practice 15.13)

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

EFFECTIVENESS: Moderate

COMPLIANCE: SCA Rules - Meets

IMPLEMENTATION: Culverts, temporary bridges, low-water crossings, or log-fords will be required on all temporary roads and crossings. Streams that will have flowing water during the life of the temporary crossing will normally use culverts or a bridge. The number of temporary crossings will kept to the minimum needed for access.

a. Temporary crossings on temporary roads will be removed when no longer needed, and any fills will be removed and the channel restored to pre-project condition (TSC);

b. Material from temporary road and skid trail stream crossings will be removed and streambanks restored to an acceptable condition. (Temporary Roads);

Temporary crossings on temporary roads will only be allowed where anticipated or calculated flow is 40 CFS or less (approx. 48" CMP). Flow situations greater than this will normally not allow temporary crossings. Larger temporary crossing structures may be allowed following IDT review.

PRACTICE 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)

(See also Practice 15.13)

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

EFFECTIVENESS: High

COMPLIANCE: SCA Rule - Meets

IMPLEMENTATION: The following preventive measures will be included in contract specifications for such installations:

1. Diverting stream flow through or around project sites if needed during construction in order to minimize erosion and downstream sedimentation. Active streams will be de-watered or diverted during culvert installations;

2. Erodible material shall not be deposited into live streams;

3. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material;

4. During excavation in or near the stream course, it may be necessary to use suitable cofferdams, caissons, cribs or sheet piling. This will usually be the case where groundwater is contributing a significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be made immediately outside of them;

5. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds or into locations where water will not re-enter water;

All fill material shall be placed and compacted in horizontal lifts. Areas to be filled shall be cleared of all vegetation, debris, and other materials that would be objectionable in the fill [SCPA Rule 9,1(d) and Standard Road Specifications-Special Project Specification 203.15].

PRACTICE 15.17 - Regulation of Borrow Pits, Gravel Sources and Quarries

OBJECTIVE: To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbances in those gravel sources suitable for development in floodplains.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Minimize opportunities for erosion from Borrow pits and gravel sources from entering streams.

1. Complete any crushing and/or screening of excavated bedload away from any active stream channels and minimize future opportunities for waste materials to enter area streams, even under flood conditions;

2. Identify opportunities to minimize erosion from existing borrow pits within the drainage;

If development of new rock sources are needed within the watershed, complete a pit development plan or rock source development plan which outlines all mitigation measures needed to control future erosion at the rock source.

PRACTICE 15.21 - Maintenance of Roads

OBJECTIVE: To conduct regular preventive maintenance operations to avoid deterioration of the roadway surface and minimize disturbance and damage to water quality, and fish habitat.

EFFECTIVENESS: Moderate

COMPLIANCE: FPA Rule 4.d.i, ii, iii, iv, v - Meets

IMPLEMENTATION: For roads in active timber sale areas standard TSC provisions (Road Maintenance) requires the purchaser to perform or pay for road maintenance work commensurate with the purchasers use. Purchaser's maintenance responsibility shall cover the before, during, and after operation period during any year when operations and road use are performed under the terms of the timber sale contract (Road Maintenance). Purchaser shall perform road maintenance work, commensurate with purchaser's use, on roads controlled by Forest Service and used by purchaser in connection with this sale except for those roads and/or maintenance activities which are identified for required deposits in the TSC. All maintenance work shall be done concurrently, as necessary, in accordance with T-specifications set forth herein or attached hereto, except for agreed adjustments.

1. Sidecast all debris or slide material associated with road maintenance in a manner to prevent their entry into streams [IFPA Rule 4(d)(i), Timber Sale Contract Clauses, and Standard Road Specification-Special Project Specification T108].

2. Repair and stabilize slumps, slides, and other erosion features causing stream sedimentation [IFPA Rule 4(d)(ii), Timber Sale Contract Clauses, and Special Project Specification T108].

3. Active Roads. An active road is a forest road being used for hauling forest products, rock and other road-building materials. The following maintenance shall be conducted on such roads.

    (a) Culverts and ditches shall be kept functional.

    (b) During and upon completion of seasonal operations, the road surface shall be crowned, out-sloped, in-sloped or water barred, and berms removed from the outside edge except those intentionally constructed for protection of fills.

    (c) The road surface shall be maintained as necessary to minimize erosion of the subgrade and to provide proper drainage.

    (d) If road oil or other surface stabilizing materials are used, apply them in such a manner as to prevent their entry into streams [IFPA Rule 4(d)(iii)] and Timber Sale Contract Clauses C5.441 and C6.341].

EFFECTIVENESS: These measures should effectively minimize erosion from roads.

4. Inactive roads. An inactive road is a forest road no longer used for commercial hauling but maintained for access (e.g., for fire control, forest management activities, recreational use, and occasional or incidental use for minor forest products harvesting). The following maintenance shall be conducted on inactive roads.

    (a) Following termination of active use, ditches and culverts shall be cleared and the road surface shall be crowned, out-sloped or in-sloped, water barred or otherwise left in a condition to minimize erosion. Drainage structures will be maintained thereafter as needed.

    (b) The roads may be permanently or seasonally blocked to vehicular traffic [FPA Rule 4.d.iv].

    (c) Roads will be seeded and fertilized.

(d) The roads may be permanently or seasonally blocked to vehicular traffic.

5. Abandoned Roads. An abandoned road is not intended to be used again. No subsequent maintenance of an abandoned road is required after the following procedures are completed:

   (a) The road is left in a condition suitable to control erosion by out-sloping, water barring, seeding, or other suitable methods.

   (b) Ditches are cleaned.

   (c) The road is blocked to vehicular traffic.

   (d) The department may require the removal of bridges and culverts except where the owner elects to maintain the drainage structures as needed.

For roads not in an active timber sale area, road maintenance must still occur at sufficient frequency to protect the investment in the road as well prevent deterioration of the drainage structure function. This will be accomplished by scheduling periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and cleaning debris from ditches and culvert inlets to provide full function during peak runoff events (FSH 7709.15).

PRACTICE 15.22 - Road Surface Treatment to Prevent Loss of Materials

OBJECTIVE: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

EFFECTIVENESS: Stabilization of road surface and ditch lines over 6 percent with competent rock (rock that does not rapidly disintegrate) is often over 90 percent effective (Burroughs, et.al., 1983a, 1983b, 1984, 1985; King and Burroughs, 1988). High

COMPLIANCE: No directly related FPA Rule

IMPLEMENTATION: On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: watering, applying magnesium chloride, sealing, aggregate surfacing, chip-sealing, or paving.

PRACTICE 15.24 - Snow Removal Controls

Objective: To minimize the impact of snow melt on road surfaces and embankments and to reduce the probability of sediment production resulting from snow removal operations.

Effectiveness: Moderate

Compliance: No directly related FPA Rule

Implementation: For Forest roads that will be used throughout the winter, the following measures will be employed:

1. The Purchaser is responsible for snow removal in a manner that will protect roads and adjacent resources.

2. Rocking or other special surfacing and/or drainage measures may be necessary before the operator is allowed to use the roads.

3. During snow removal operations, banks shall not be undercut nor shall gravel or other selected surfacing material be bladed off the roadway surface. Ditches and culverts shall be kept functional during and following roadway use. If the road surface is damaged, the Purchaser shall replace lost surface material with similar quality material and repair structures damaged in blading operations.

4. Snow berms shall not be left on the road surface or shall be placed to avoid channelization or concentration of melt water on the road or erosive slopes. Berms left on the shoulder of the road shall be removed and/or drainage holes opened at the end of winter operations and before the spring breakup. Drainage holes shall be spaced as required to obtain satisfactory surface drainage without discharge on erodible fills. On insloped roads, drainage holes shall also be provided on the ditch side, but care taken to insure that culverts and culvert inlets are not damaged.

PRACTICE 15.25 - Decommissioning of Temporary Roads

OBJECTIVE: To reduce sediment generated from temporary roads by decommissioning them at the completion of their intended use.

EFFECTIVENESS: High

COMPLIANCE: FPA Rule 4.d.v. - Meets

IMPLEMENTATION: Effective decommissioning is generally achieved through a combination of the following measures: (TSC)

1. Road effectively drained and blocked;

2. Temporary culverts and bridges removed and any modified channel slopes stabilized and revegetated;

3. Road returned to resource production through revegetation (native species, or trees);

Sideslopes reshaped and stabilized.

PRACTICE 18.02 - Formulation of Fire Prescriptions

OBJECTIVE: To provide for soil and water resource protection while achieving the management objective through the use of prescribed fire.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: The prescription elements are defined by the interdisciplinary team during the environmental analysis. Field investigations are conducted to identify site-specific conditions, which may affect the prescription. Both the optimum and tolerable limits for soil and water resource needs should be established. Prescription elements will include such factors as fire weather, slope aspect, soil moisture and fuel moisture, which influence the fire intensity. These elements have a direct effect on whether or not a litter layer remains after burning and whether or not a water repellent layer is formed. The amount of remaining litter significantly affects erosion rates, water quality and runoff volumes.

PRACTICE 18.03 - Protection of Soil and Water from Prescribed Burning

OBJECTIVE: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris form entering surface water.

EFFECTIVENESS: High

COMPLIANCE: No Related FPA Rule

IMPLEMENTATION: Forest Service and/or other crews are used to prepare the units for burning. This includes water barring firelines and reducing fuel concentrations. The interdisciplinary team identifies Riparian Areas and soils with water repellant tendencies as part of the environmental analysis. Some of the techniques used to prevent soil erosion and water quality degradation are: (1) construct water bars in fire lines; (2) reduce fuel loadings in drainage channels; (3) maintain the integrity of the Riparian Area; (4) avoid intense fires, which may promote water repellency, nutrient leaching, and erosion; (5) retain or plan for sufficient ground cover to prevent erosion of the burned sites and (6) removal of all debris added to stream channels as a result of prescribed burning, unless debris is prescribed to improve fisheries habitat.

7. Foaming agents will not be used for water control lines where any of the category INFS buffers have been applied nearer units which these channels could carry the material to intermittent or perennial streams;
8. Machine constructed firelines will not be used on the sensitive landtypes displayed in Figures 3.5;
9. Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill);
10. Maintain large organic debris appropriate to the habitat type (see "Managing Coarse Woody Debris in the Forests of the Rocky Mountains" by Graham et. al. 1994);
11. Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns (Guideline developed by J. Neihoff, USFS – IPNF).

AQUATICS APPENDIX B

INFS STANDARDS & GUIDELINES APPLICABLE TO THE Prichard Murray RESOURCE AREA

TIMBER MANAGEMENT (A-7)

TM-1. Prohibit timber harvest, including fuelwood cutting, in Riparian Habitat Conservation Areas, except as described below.

a. Where catastrophic events such as fire, flooding, volcanic, wind, or insect damage result in degraded riparian conditions, allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives, and where adverse effects can be avoided to inland native fish. For priority watersheds, complete watershed analysis prior to salvage cutting in RHCAs.

b. Apply silvicultural practices for Riparian Habitat Conservation Areas to acquire desired vegetation characteristics where needed to attain Riparian Management Objectives. Apply silvicultural practices in a manner that does not retard attainment of Riparian Management Objectives and that avoid adverse effects on inland native fish.

Using "Standard Widths Defining Interim RHCAs," no commercial timber harvest activities are proposed under the action alternatives within RHCAs in the project area. In some units, non-commercial (i.e. ladder fuel reduction) treatments were deemed necessary in order to reduce fuel hazards and loading. This form of activity would meet the intent of silvicultural practices that would not retard RMOs and avoid adverse effects to inland native fish (see Fire/Fuels) by preventing long-term RMO damage or reduction.

Effectiveness*: *High. No commercial harvest is to occur within the RHCAs.

ROADS MANAGEMENT (A-7, A-8)

RF-1. Cooperate with Federal, Tribal, State, and county agencies, and cost-share partners to achieve consistency in road design, operation, and maintenance necessary to attain Riparian Management Objectives.

The proposed activities are all on USFS and BLM publicly managed lands and the activities associated with the project have been coordinated with all those listed where applicable (e.g. RAC, Community of Wallace and BLM Projects).

Effectiveness*: *High. This coordination is standard policy.

RF-2. For each existing or planned road, meet the Riparian Management Objectives and avoid adverse effects to inland native fish by:

a. Completing watershed analyses prior to construction of new roads or landings in Riparian Habitat Conservation Areas (RHCAs) within priority watersheds.

   This project area is not within an INFS priority watershed nor are any activities (e.g. roads, landings, etc.) proposed within RHCAs.

b. Minimizing road and landing locations in Riparian Habitat Conservation Areas.

   No new roads or landings are proposed within RHCAs under any of the action alternatives.

Effectiveness*: *High.

c. Initiating development and implementation of a Road Management Plan or a Transportation Management Plan. At a minimum, address the following items in the plan:

(1) Road design criteria, elements, and standards that govern construction and reconstruction.

(2) Road management objectives for each road.

(3) Criteria that govern road operation, maintenance, and management.

(4) Requirements for pre-, during-, and post-storm inspections and maintenance

(5) Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives such as protection of the road surface.

(6) Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control.

(7) Mitigation plans for road failures.

The interdisciplinary team (IDTeam) evaluated access and road improvement needs within the project area (i.e. Placer RAP process). Several access options were critically reviewed and selected on based on the implementation of these actions having the least impact on all resources. The project includes several opportunities to improve road surfaces and decommissioning.

***Effectiveness*: Moderate to High. The Roads Analysis Process (RAP) will be employed to assist in making these management decisions.**

d. Avoiding sediment delivery to streams from the road surface.

(1) Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe.

This standard is applied directly for the proposed temporary roads.

***Effectiveness*: High. Roads would be constructed with this design criterion.**

(2) Route road drainage away from potentially unstable stream channels and hillslopes.

***Effectiveness:* High. Improved road drainage would be part of the road package. Water would be less concentrated below existing roads than at present.**

e. Avoiding disruption of natural hydrologic flow paths.

Roadwork associated with this project including road reconstruction, storage and decommissioning will be completed.

***Effectiveness:* High. Road related work of any kind that would be improvement by classification would restore the hydrologic flow paths.**

f. Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

No streams in the Prichard Murray Project Area are listed as priority watersheds.

***Effectiveness:* High. Sidecasting of snow and/or soils would be prohibited at all stream crossings**

RF-3. Determine the influence of each road on the Riparian Management Objectives. Meet Riparian Management Objectives and avoid adverse effects on inland native fish by:

a. Reconstructing road and drainage features that do not meet design criteria or operation and maintenance standards, or that have been shown to be less effective than designed for controlling sediment delivery, or that retard attainment of Riparian Management Objectives, or do not protect priority watersheds from increased sedimentation.

b. Prioritizing reconstruction based on the current and potential damage to inland native fish and their priority watersheds, the ecological value of the riparian resources affected, and the feasibility of options such as helicopter logging and road relocation out of Riparian Habitat Conservation Areas.

c. Closing and stabilizing; or obliterating and stabilizing; roads not needed for future management activities. Prioritize these actions based on the current and potential damage to inland native fish in priority watersheds, and the ecological value of the riparian resources affected.

The proposed road reconstruction and maintenance described in Chapters II and III originate from the above standards. The action alternatives would meet this standard.

***Effectiveness:* High. Existing roads are proposed for reconstruction with the Timber Sale Contract, so the likelihood that the projects would be completed is high.**

RF-4. Construct new, and improve existing, culverts, bridges, and other stream crossings to accommodate a 100-year flood, including associated bed load and debris, where those improvements would/do pose a substantial risk to riparian conditions. Substantial risk improvements include those that do not meet design and operation maintenance criteria, or that have been shown to be less effective than designed for controlling erosion, or that retard attainment of Riparian Management Objectives, or that do not protect priority watersheds from increased sedimentation. Base priority for upgrading on risks in priority watersheds and the ecological value of the riparian resources affected. Construct and maintain crossings to prevent diversion of streamflow out of the channel and down the road in the event of crossing failure.

The proposed road crossing improvements originate from the above standard. The action alternatives would meet this standard.

***Effectiveness:* High.**

RF-5. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

These types of crossings were identified for this project to minimally provide and maintain fish passage, under the current proposed road reconstruction and temporary road construction plan these crossings were identified in the access routes with the implementation of the Prichard Murray Project Area. However, with the NEPA process complete the five identified locations where road crossings exist on fish bearing streams would likely be funded by other dollars, specifically RAC monies since they exist under county road jurisdiction for maintenance. Decommissioning other roads in the project area would automatically follow this standard.

***Effectiveness*: Low to High. There are currently five crossings that are known fish barriers in the project area.**

RECREATION MANAGEMENT (A-9)

RM-1. Design, construct, and operate recreation facilities, including trails and dispersed sites, in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish. Complete watershed analysis prior to construction of new recreation facilities in Riparian Habitat Conservation Areas within priority watersheds. For existing recreation facilities inside Riparian Habitat Conservation Areas, assure that the facilities or use of the facilities would not prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Relocate or close recreation facilities where Riparian Management Objectives cannot be met or adverse effects on inland native fish cannot be avoided.

RM-2. Adjust dispersed and developed recreation practices that retard or prevent attainment of Riparian Management Objectives or adversely affect inland native fish. Where adjustment measures such as education, use limitations, traffic control devices, increased maintenance, relocation of facilities, and/or specific site closures are not effective in meeting Riparian Management Objectives and avoiding adverse effects on inland native fish, eliminate the practice or occupancy.

RM-3. Address attainment of Riparian Management Objectives and potential effect on inland native fish in Wild and Scenic Rivers, Wilderness, and other Recreation Management plans.

These standards are part of the design criteria of the Pulaski Trail Project or have been incorporated to meet fisheries and watershed concerns through field reviews and its design.

Effectiveness of Standards: High.

FIRE/FUELS MANAGEMENT (A-11)

FM-1. Design fuel treatment and fire suppression strategies, practices, and actions so as not to prevent attainment of Riparian Management Objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could perpetuate detrimental conditions, or be damaging to, long-term ecosystem function or inland native fish.

FM-2. Locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of Riparian Habitat Conservation Areas. If the only suitable location for such activities is within the Riparian Habitat Conservation Area, an exemption may be granted following a review and recommendation by a resource advisor. The advisor would prescribe the location, use conditions, and rehabilitation requirements, with avoidance of adverse effects to inland native fish a primary goal. Use an interdisciplinary team, including a fishery biologist, to predetermine incident base and helibase locations during presuppression planning.

FM-3. Avoid delivery of chemical retardant, foam, or additives to surface waters. An exception may be warranted in situations where overriding immediate safety imperatives exist, or, following a review and recommendation by a resource advisor and a fishery biologist, when the action agency determines that an escape fire would cause more long-term damage to fish habitats than chemical delivery to surface waters.

FM-4. Design prescribed burn projects and prescriptions to contribute to the attainment of the Riparian Management Objectives.

The proposed prescribed burn projects described in the EA originate from the above standards. The action alternatives would meet this standard.

Effectiveness*: *High. Planting of long-lived tree species to provide for large woody debris recruitment would follow prescribed burning within the RHCAs.

FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan to attain Riparian Management Objectives and avoid adverse effects on inland native fish whenever a wildfire or a prescribed fire burning out of prescription significantly damages Riparian Habitat Conservation Areas.

The proposed fires/fuels management described in Chapter II and III originate from the above standards. The action alternatives would meet this standard.

Effectiveness: Moderate to High. Prescribed fire in the project area is designed to meet these standards.

GENERAL RIPARIAN AREA MANAGEMENT (A-12)

RA-1. Identify and cooperate with Federal, Tribal, State and local governments to secure instream flows needed to maintain riparian resources, channel conditions, and aquatic habitat.

This project does not adversely affect instream flows.

RA-2. Trees may be felled in Riparian Habitat Conservation Areas when they pose a safety risk. Keep felled trees on site when needed to meet woody debris objectives.

Slashing of the understory may occur within RHCAs in order to accomplish burning and planting of long-lived species such as cedar, larch, and white pine.

RA-3. Apply herbicides, pesticides, and other toxicants, and other chemicals in a manner that does not retard or prevent attainment of Riparian Management Objectives and avoids adverse effects on inland native fish.

By following the BMPs (Appendix A) and fisheries criteria as listed in the Coeur d'Alene River Ranger District Noxious Weed FEIS, all alternatives would meet this standard.

Effectiveness: High. Standards would be met as required by the Coeur d'Alene River Ranger District Noxious Weed FEIS.

RA-4. Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling with Riparian Habitat Conservation Areas unless there are no other alternatives. The Forest Service must approve refueling sites within a Riparian Habitat Conservation Area or Bureau of Land Management and have an approved spill containment plan.

Effectiveness: High. This is a standard BMP that is part of the timber sale contract.

RA-5. Locate water-drafting sites to avoid adverse effects to inland native fish and instream flows, and in a manner that does not retard or prevent attainment of Riparian Management Objectives.

This standard would be applied in the prescribed burn plans associated with the Prichard Murray Project Area. However, wildfire suppression is beyond the scope of this project and water drafting associated with such an emergency would be addressed as a separate issue.

Effectiveness: Moderate to High.

GENERAL RIPARIAN AREA MANAGEMENT (A-12)

WR-1. Design and implement watershed restoration projects in a manner that promotes the long-term ecological integrity of ecosystems, conserves the genetic integrity of native species, and contributes to attainment of Riparian Management Objectives.

The proposed watershed restoration projects originate from the above standard. The action alternatives would meet this standard.

Effectiveness: Moderate to High.

WR-2. Cooperate with Federal, State, local, and Tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other cooperative agreements to meet Riparian Management Objectives.

Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project and that future resource management will develop a CRMP for the South Fork Coeur d'Alene system.

Effectiveness: Low to Moderate.

FISHERIES & WILDLIFE RESTORATION (A-13)

FW-1. Design and implement fish and wildlife habitat restoration and enhancement actions in a manner that contributes to attainment of the Riparian Management Objectives.

Improvements to culverts, road decommissioning, and riparian plantings are habitat enhancement actions that will be implemented in a manner that contributes to attainment of Riparian Management Objectives.

Effectiveness: High.

FW-2. Design, construct, and operate fish and wildlife interpretive and other user-enhancement facilities in a manner that does not retard or prevent attainment of the Riparian Management Objectives or adversely affect inland native fish. For existing fish and wildlife interpretive and other user-enhancement facilities inside Riparian Habitat Conservation Areas, assure that Riparian Management Objectives cannot be met and adverse effects on inland native fish are avoided. Where Riparian Management Objectives cannot be met or adverse effects on inland native fish avoided, relocate or close such facilities.

FW-4. Cooperate with Federal, Tribal, and State fish management agencies to identify and eliminate adverse effects on native fish associated with habitat manipulation, fish stocking, fish harvest, and poaching.

Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project. Using the INFS Standard Widths Defining Interim RHCAs for the project activities, habitat manipulation does not apply. Fish stocking, harvest and/or poaching are all regulated by State management guidelines.

Effectiveness: High. Existing habitat would be preserved under this project.

FOREST PLAN FISH GUIDELINES (USDA 1987, pp. II-29 through II-31)

Fish Standards:

1. Activities on National Forest lands will be planned and executed to maintain existing water uses. Maintain is defined as "limiting effects from National Forest activities to maintain at least 80 percent of fry emergence success in identified fishery streams." The percent is measured from pristine conditions. Current methodology will not detect an impact of less than 20 percent. During the life of the plan, new technologies may permit more precise assessments; however, the goal of this standard will remain as "to maintain 80 percent of fry emergence success.
2. Streams providing spawning and rearing habitat, which are considered critical to the maintenance of river and lake populations of special concern, will be managed at a standard higher than the 80 percent standard. Monitoring will be needed to detect this higher standard. "*High Value Streams*"

The IPNF Forest Plan contains standards for fry emergence that are no longer valid since the Inland Native Fish Strategy (INFS, 1995) was developed. This section explains why.

The objectives for fisheries in the Forest Plan state that the forest "will be managed to maintain and improve fish habitat capacities in order to achieve cooperative goals with the State Fish and Game Department and to comply with state water quality standards. Sediment arising from land management activities will be managed so that in forest fisheries streams the objective is to maintain 80 percent fry emergence success as measured from pristine condition" (II-7). The first two standards for fish use similar language (II-29). The Fishery/Watershed Analysis to determine effects of land management activities on fry emergence is described in the Forest Plan in Appendix I (I-1, 2).

Appendix I (Forest Plan) requires that if, during the environmental assessment process, cumulative effects of the proposed and past activities on stream sedimentation are projected to result in greater than 20% reduction in fry emergence, then additional detailed analysis will be undertaken. The analysis is then used to determine the significance of the project on water resources. If the project is judged to have a "significantly negative effect" on water resources, it will be reviewed by the State for conformance with water quality standards prior to the final decision.

At the time the Forest Plan was written, models determining fry emergence (e.g., Stowell et al. 1983) were popular. These empirical models were later found to have limited application and were unreliable outside of where they were developed (Kershner 2001 personal communication). In addition, the use of fry emergence survival (regardless of the threshold) as a surrogate for viability came into question, primarily for two reasons:

- *First, fry emergence is highly variable. This can be due to changing natural conditions (e.g., floods, temperature regimes, geology) or human-induced causes (e.g., increased sediment input, chemical spills). Both agents are at work in most cases so it is difficult to determine what proportion of egg-to-fry mortality is due to each cause. As a result the underlying relationship between sediment in redds and survival is difficult to predict (Chapman 1988).*
- *Second, and more important, egg-to-fry mortality is usually density-independent (i.e., a percentage of fry will survive regardless of the number of eggs). This means that in most cases there are enough fry to inhabit all available habitat within a stream. Therefore fry-to-smolt (sub-adult) survival, where density dependent mortality plays a significant role, is a more effective and appropriate predictor of population viability than egg-to-fry survival (for a review of these concepts see Hilborn and Walters 1992). Currently the indicator used as a surrogate of fry-to-smolt survival is stream habitat characteristics.*

The 1989 Forest Plan Evaluation and Monitoring Report documents the change away from use of the fry emergence standard (Item G-1, pages C-1 and C-2). The findings were that it was not a good monitoring tool to report stream health. G-1 was combined with item G-3, which includes a comprehensive array of fisheries and hydrology parameters.

The Inland Native Fish Strategy (INFS; USDA 1995) amended the Forest Plans "…except where existing Plan direction would provide more protection" for inland native fish habitat (page 4). All INFS standards and guidelines are intended to either make progress toward Riparian Management Objectives (which describe "good" fish habitat within the context of what is capable of the watershed) or to ensure that activities will not retard the natural rate of recovery of RMOs in a watershed (USDA 1995, A6-A16). In addition, the strategy states that actions that reduce habitat quality, whether existing conditions are better or worse than objective values, are not consistent with INFS direction (USDA 1995, A-3).

INFS (1995) supersedes the original IPNF Forest Plan direction because it offers far more protection to inland native fish habitat for the following reasons:

- *INFS (1995) directs the establishment of Riparian Habitat Conservation Areas (RHCAs) and only allows activities within RHCAs that maintain or improve, and do not retard, the attainment of the RMOs. The original Forest Plan direction actually permitted degradation of water resources at the discretion of the line officer, and allowed "significant" degradation after review by the State.*
- *Activities that reduce habitat quality to any extent are contrary to INFS direction, regardless of whether RMOs have been attained. The original Forest Plan direction allowed for apparent degradation of fish habitat by permitting up to a 20 percent reduction of potential fry emergence.*

In The Lands Council v. Vaught the U. S. District Court for the Eastern District of Washington, in its reading of the plain language of the INFS documents and giving deference to the Forest Service's expertise in interpreting its Forest Plans, concluded that INFS does supersede the Forest Plan in all areas where RHCA guidelines and standards apply (i.e., where delivery of sediment to streams is the identified threat that proposed project activities pose to fish habitat). The Forest Plan standards remain in effect in all other areas.

In conclusion, this project complies with original Forest Plan direction because, although fry emergence was not computed, a detailed analysis of the effects to fish habitat and water resources was developed as required in Appendix I; and the project has been determined to be fully consistent with the INFS Forest Plan amendment and state water quality standards for supporting beneficial uses (see Watershed discussion).

3. The stream and river segments (if listed) will be managed as low access fishing opportunities to maintain a diversity of fishing experiences for the public and to protect sensitive fish populations. Special road management provisions will be used to accomplish this objective. "<u>Low Access Fishing Streams</u>"

   Forest Plan standards 3 are not inclusive to this analysis because no streams in the analysis area are listed under "low access fishing streams." However, streams within the analysis area are recognized as to providing beneficial uses.

4. Provide fish passage to suitable habitat areas, by designing road crossings of streams to allow fish passage or removing in-stream migration barriers.

   Within the project area, known fish barriers were identified through project review. Currently there are two human-caused fish migration barriers identified in the Prichard Murray Project Area (EA, Chapters 2 and 3; Fisheries BA/BE; above INFS standards and guidelines).

5. Utilize data from stream, river, and lake inventories to prepare fishery prescriptions that coordinate fishery resource needs with other resource activities. Pursue fish habitat improvement projects to improve habitat carrying capacities on selected streams.

As stated in Chapter 3, information was utilized from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists and electrofishing/stocking data from the Idaho Department of Fish and Game (IDF&G), and the United States Fish and Wildlife Service (USFWS).

6. Coordinate management activities with water resource concerns as described in MA 16, Appendix I, and Appendix O.

   Water resource concerns are protected in Management Area 16 through INFS standards and guidelines.

STATE OF IDAHO, GOVERNOR'S BULL TROUT PLAN

The following describes the mission from the Governors Bull Trout Plan. Governors Bull Trout Plan (State of Idaho 1996):

- The mission of the plan is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho.

Based on all the information available during development of this EA, bull trout in the South Fork Coeur d'Alene River drainage do not persist; rather they are recognized as historic in the drainage. The Plan, under the Panhandle Basin (Appendix F- F6) identifies "the entire Coeur d'Alene River Drainage" as a key watershed for a bull trout metapopulation.

AQUATICS APPENDIX C
AQUATICS CORPORATE MONITORING:

Prichard Murray Resource Area

Table AQ-A-1. Issues and core data tracked for this project.

Issue	Core Data	Unit of Measure	No Action	Alternative 2	Alternative 3
Water Yield	Intensity and duration of water increases above existing condition. Comparison to Historic Range of Variation	Percent increase	**0%** increase above existing levels due to dead and dying trees.	**0% to 1%, Mean of 0.2%** increase above existing levels. Intensity and duration of peak flows within HRV.	**0% to 1%, Mean of 0.2%** increase above existing levels. Intensity and duration of peak flows within HRV.
Peak Flow	Intensity and duration of peak flow increases above existing condition. Comparison to Historic Range of Variation	Percent increase	**0%** increase above existing levels due to dead and dying trees.	**0% to 1%, Mean of 0.2%** increase above existing levels. Intensity and duration of peak flows within HRV.	**0% to 1%, Mean of 0.3%** increase above existing levels. Intensity and duration of peak flows within HRV.
Sediment Yield	Anticipated percent increase in sediment yield above existing condition. Comparison to Historic Range of Variation	Percent Increase	**0%** increase above existing levels due to ground disturbance associated with logging activities	**0% to 3%, Mean of 1.8%** increase above existing levels due to ground disturbance associated with logging activities.	**0% to 3%, Mean of 1.6%** increase above existing levels due to ground disturbance associated with logging activities
Stream Channel Condition	Repeat cross section survey in lower reach of Rookie Creek	Detectable change in channel shape. Monitor year 1, 3 and 5 after harvest activity	2 years of baseline data to compare against current channel conditions. Should detect **no change or positive trend in channel condition.**	**Slight risk of detectable changes in channel shape after treatment**	**Slight risk of detectable changes in channel shape after treatment**

Table AQ-A-2. Issues and core data <u>not</u> tracked for this project.

Issue/Core Data	Reason not considered in analysis
Riparian Function	Riparian road density would not change with the project within the Prichard Murray Resource Area, as no roads within the riparian area will be decommissioned. The construction of temporary roads and the decommissioning of existing roads are not within riparian areas
Mass Failures and Erosion – Road density on sensitive landtypes	Does not apply. No proposed new or temporary roads are on sensitive landtypes with high landslide potential or high sediment erosion / delivery.
Riparian Function, temperature, and large wood recruitment	INFS (1995) standard and guidelines are included as design criteria for this project. The only work proposed in the Riparian Habitat Conservation Areas is the improvement of 4 road crossings in Brown Creek, and incidental burning in RHCAs from prescribed fire. No change in riparian hydrologic opening acreage is expected with this work.
Restricted Fish Use	There are no known culverts that restrict fish passage in the Prichard Murray Resource Area. Inventories are not scheduled at this time but will occur within the next 5 years to determine fish passage problems but as funding and opportunities arise, inventories will be conducted.

AQUATICS APPENDIX D
WATSED MODEL LIMITATIONS:

Prichard Murray Resource Area

Introduction

WATSED is a computer program watershed response simulation model used by several Forests in the Northern Region, developed and updated specifically to do the following:

- Estimate changes in watershed responses in terms of stream flows and sediment yields as a cumulative result of logging, roading, and fire;
- compare differences among management alternatives in forested mountain watersheds;
- identify trends; and
- characterize potential risks.

The model is a tool that objectively estimates expected changes in water and sediment regimens that are likely to result from the cumulative forest practices over time throughout a watershed. It is not designed to produce absolute or accurately quantified solutions; rather, the model is meant to be reasonably precise in terms of changes and trends. It is supported with scientific literature, field review, and field data collected by qualified scientists (hydrologists, fluvial geomorphologists, or soil scientists) and used to provide decision makers with an understanding of different likely watershed responses in response to various forest management alternatives.

WATSED is a watershed response model designed to address the cumulative effects of timber harvest operations, roads, and fire on watersheds generally between 4 and 40 square miles in size. Its precursor the WATBAL model was developed using empirical data primarily from the Clearwater National Forest and north-central Idaho; and its precision has been validated with averaged measured data collected on Forests within the Northern Region of the USDA Forest Service over sequences of years. This validation work will be expanded during 2006.

WATSED is designed to objectively compare relative differences among forest management alternatives in terms of changes in trend, risks, and regimen of water and sediment yield. Estimates are calibrated using measured data that include a combination of primary watershed processes. The model is driven by local climatic conditions and it uses Equivalent Clearcut Area (ECA) notation to represent the apparent degree of landscape disturbance through time. Recovery curves for various road designs and configurations (clearing width, cutslope area, width, and length), logging systems and harvest methods (tractor, cable, aerial), wildfire, and site preparation (mechanical, prescribed fire, or hand) are used to characterize the watershed disturbances that result in cumulative effects.

Watershed processes in WATSED are stratified relative to *landtypes* (USDA Forest Service, 1992). The Forests have measured and rated the typical erosion and slope stability hazards of the landtypes that characterize the Forests' watersheds. They use that information to calibrate the model and resulting interpretations. Slope characteristics and activity data are WATSED input information used to modify the typical values for mapped landtypes. Project-level field investigations may identify local unusual or non-typical conditions. Such information is used to adjust model input or it can be factored into interpretation of the modeled results by the watershed specialist with appropriate skills and experience (e.g., wildland hydrologist, fluvial geomorphologist, or soil scientist).

WATSED incorporates the concepts of the R1/R4 Sediment Guides (Cline et al, 1981), which focus on slope hydrology, erosion, stability, and sediment delivery processes. It generally estimates the water flow and sediment likely to be delivered to the channel network of a study watershed over time as forest management actions occur within the entire watershed from its headwaters to a downstream reach. The routing of sediment and water through the main channel system is estimated using broadly based regional curves. Channel erosion is not modeled directly; however it is represented in the empirical data used to calibrate the model.

WATSED is not intended to simulate watershed response for individual or episodic storm, mass erosion events or extreme drought or flood years. It is not intended to accurately predict sediment and water yields that might occur as a result of stochastic events or non-forest related actions. It does not address or analyze the effects of grazing or mining (other than vegetation removal and road construction) or other non-silviculture related practices.

The expected response to individual events, including singular rain-on-snow events, high intensity thunderstorms, and extreme runoff events (e.g. flood flows) can be addressed using other modeling tools and methods Several supplemental hydrology and watershed analysis tools are available in Region One:

- *Surface erosion models such as WEPP (not used in this analysis) is appropriate to use in helping address some episodic events at the site scale for a specific hillslope. These models and tools coupled with other available information (climate and runoff) and spatial data (soil type, topography, vegetation cover, etc.) may also help estimate the risks and likely impacts of some episodic events. The assumptions and limitations of WEPP (or any model used) should also be documented when they are utilized. These include scale or aerial extent and specific site factors.*

- *Slope stability (including mass erosion and delivery potential can be addressed on a broad scale using the databases associated with the Land System Inventory (landtypes) and the known history of mass erosion. On-the-ground reviews and observations by trained personnel must be conducted to address project level mass erosion potential. In cases where roads or other ground disturbing activities are proposed in unstable sites, geotechnical experts must be utilized to access specific risks. Tools such as the "Level I Stability Analysis" (LISA) are available to estimate the risks associated with slope stability and mass erosion under certain circumstances.*

- *Flood and peak flow in response to storm events can be addressed using many tools published and available from USGS and other sources.*

Model results are not the sole source of information used to support important resource decisions.

The WATSED Model used in this analysis was not the only tool utilized for analysis of watershed responses. The model results have been incorporated with other analysis tools and sources of information to provide the basis for interpretation by the watershed specialist. Important sources of information include:

- *Locally-derived monitoring or monitoring of similar systems;*
- *Reviews of pertinent scientific literature and reports;*
- *Reasonably local calibration of the driving variables used in the models (i.e., land type response variables and hydrologic response curves);*
- *Validation of the model, using independent data for major geomorphic groups used on the Forest (i.e., rock belts, border zone, granitics, etc.); and*
- *Professional judgments and interpretations of skilled watershed specialists with local experience and observations.*

The resource interpretations are based on the integration of these sources and with model results have been used to provide a clear understanding of expected hydrologic responses and changes produced by alternative. The judgments and determinations of the professional resource specialists were based on the integration of available tools and were factored into resource recommendations and considered in management decisions. This relationship should is documented in Decision document, supporting NEPA and project files.

Concluding Remarks

WATSED like any quantitative model is only a tool. Estimates have been verified with, compared to, and evaluated against measured flow and sediment yield data from sites with similar characteristics. User interpretations are expected to have the best possible degree of validity when they are made by trained and

experienced water resource specialists who have the basis to understand the logical framework of the model itself as well as the hydrologic, hydraulic, and slope stability principles and processes that are actually taking place on the watershed and in the stream.

It is the author's intention that WATSED model and its supporting databases and landtype interpretations be continually calibrated and validated and re-calibrated again. The specialists on this project have verified for themselves the results and trends that WATSED simulates. Significant decisions have not been made solely on the results of the model. Interpretation of modeling results, review of pertinent scientific literature, on the ground field observations and measurements have all be used in concert with the informed and educated judgment of the water resource scientist.

Specialist's Report on Soils in the Prichard-Murray Resource Area

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November 2006

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SPECIALIST'S REPORT ON SOIL PRODUCTIVITY IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework

The regulatory framework providing direction for protecting a site's inherent capacity to grow vegetation comes from the following principle sources:

- *The Multiple Use-Sustained Yield Act of 1960*
- *The National Forest Management Act of 1976 (NFMA)*
- *The Code of Federal Regulations for Forest Planning (36 CFR 219.6)*
- *The Forest Plan and Regional Soil Quality standards (2554.03-R1 Suppl. 2500-99-1)*

The Multiple Use-Sustained Yield Act of 1960 directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

Section 6 of the National Forest Management Act of 1976 (NFMA) charges the Secretary of Agriculture with ensuring research and continuous monitoring of each management system to safeguard the land's productivity.

The Code of Federal Regulations for Forest Planning that followed NFMA requires the Forest Service to measure effects of prescriptions, including "significant changes in land productivity" (Code of Federal Regulations 36, CFR Part 219.6, 2005; PF Doc. SOIL-R-8).

To comply with NFMA, the Chief of the Forest Service has charged each Forest Service Region with developing soil quality standards for detecting soil disturbance and indicating a loss in long-term productive potential. These standards and guidelines are built into Forest Plans.

Forest Plan direction (Forest Plan, p. II-17, PF Doc. CR-002) is to manage the soil resource to maintain long-term productivity. The objective is that management activities on forest lands will not significantly impair the long-term productivity of the soil or produce unacceptable levels of sedimentation resulting from soil erosion. Forest plan standards are addressed in Section 5 of this report.

The Regional Soil Quality Standards (R-1 Supplement 2500-99-1; PF Doc. SOIL-R-58) were revised in November 1999. Manual direction recommends maintaining 85% of an activity area's soil at an acceptable productivity potential with respect to detrimental impacts, including the effects of compaction, displacement, rutting, severe burning, surface erosion, loss of surface organic matter,and soil mass movement. This recommendation is based on research indicating that a decline in productivity would have to be at least 15% to be detectable (Powers, 1990; PF Doc. SOIL-R-48). In areas where more than 15 percent detrimental soil conditions exists from prior activities, the cumulative detrimental effects from project implementation and restoration should not exceed the conditions prior to the planned activity and should move toward a net improvement in soil quality. These standards do not apply to intensively developed sites such as permanent roads/landings, mines, developed recreation and administrative sites.

2. Methodology Used in the Soil Productivity Analysis

Analysis of the soil resource was carried out utilizing aerial photography, geographic information system (GIS) data, timber stand data base (TSMRS), roads database, and published literature. Natural erosion and sediment production hazards were gathered from landtype descriptions in the Idaho Panhandle National Forests Land Systems Inventory (USDA 1999, PF Doc. CR-019 and SOIL-2). The alternatives were analyzed to allow for various harvest unit proposals and to identify those units that would require design modifications to achieve Regional and Forest Plan standards. Discrepancies of acres are possible due to rounding.

Each proposed harvest unit was field reviewed in 2005/2006 by the District's Soil Specialist to verify existing soil conditions by conducting the "Onsite Assessment Method" outlined in Niehoff (2002; PF Doc. SOIL-R-44). See soil assessment sheets/data (PF Doc. SOIL-1). Within the resource area, most of the previous harvests (PF Doc. SOIL-16) are identified in the TSMRS record though few past harvests in the earlier part of the 20th century have no historical records.

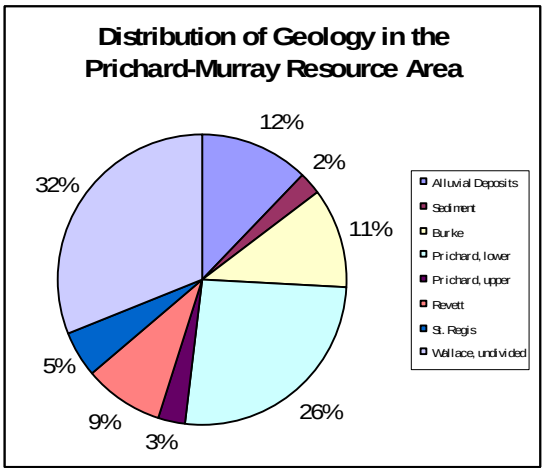
Data lists were developed for all proposed treatment units and summarize existing conditions that include acres of constructed or designated trails and roads (permanent/temporary) within or adjacent to harvest units (PF Doc. SOIL-5 and SOIL-10). Potential disturbance for the soil resource was determined using Niehoff's (2002; PF Doc. SOIL-R-44) guidelines for soil NEPA analysis, the Soil Disturbance Spreadsheet (PF Doc. SOIL-8, SOIL-9, SOIL-19, and SOIL-20), and field verification (PF Doc. SOIL-1). The disturbance spreadsheet evaluates detrimental disturbance on proposed harvest units for each harvest method based on empirically derived coefficients that were obtained and averaged from numerous monitored sites throughout the Idaho Panhandle National Forests (Forest Plan Monitoring and Evaluation Reports, 1988, 1991, 1993 and 1997; PF Doc. CR-004, CR-007, CR-009, and CR-013). The disturbance spreadsheet is limited to the harvest and slash disposal methods for which coefficients have been determined and its coefficients assume that best managaement pratices (BMPs) have been implemented since 1990. The disturbance spreadsheet does not account for changes in soil types or the recovery of soils over time from existing previous harvest activities.

Affected Environment

Geology and Soils

The resource area encompasses a segment of the middle reach North Fork Coeur d'Alene River at its confluence with the lower reach of Prichard Creek. This setting is situated within the Coeur d'Alene Mountains, a well eroded feature characteristic of a mature landscape with steep main ridges trending to the northwest.

Figure SOIL-1: Distribution of geology in the Prichard-Murray resource Area.



Numerous subsidiary ridges and benches have been created as tributary stream courses formed steep V-shaped channels along the sides of the main ridges. All subordinate drainages flow to the flat valley bottoms that are adjacent to the North Fork Coeur d'Alene River, Prichard, and Eagle Creeks.

Evidence of aggradation is seen as river gravel capped terraces and old abandoned channels well above the present alluvial filled valley bottoms. The gravels are from the damming of the Lower Coeur d'Alene River by basalt flows and later by glacial lobes. Bedrock geology consists of Precambrian Belt Series metasediments of the Prichard, Burke, Revett, St. Regis, and Wallace Formations.

Throughout the resource area, the soil has developed in a mosaic pattern as dictated by topographic relief, vegetation, and aspect. An elevation difference of over 2000 feet is attained between the North Fork Coeur d'Alene Rivers valley bottom and Prichard Peak and consists of a mostly steep sided and incised topography with tributary stream courses.

Under the predominant timber stands a silt loam textured, ash capped soil has developed. The volcanic material accumulated from several of the Cascade volcanoes eruptions with most of the ash originating from Mt. Mazama (Crater Lake) in Oregon about 6,700 years ago. The uppermost part of the ash is usually enriched with organic matter that is incorporated into this part of the soil and has a high water- and nutrient-holding capacity, both of which are important for soil productivity, while the subsoils are not as fertile.

On some of the open slopes with scattered trees and light ground cover, the soil is ash influenced but not capped. In these locations, the soil texture is more of a sandy loam and skeletal because of higher rock fragment content due to the close proximity of bedrock. Vertical rock cliffs are predominant along the rivers west side and only support intermittent vegetation that has gained a foothold where shallow pools of soil occur.

Along the broader valley bottoms, the upper riverine terraces exhibit moderately deep ash capped silt loam soils. On the lower alluvial flats that are influenced by fluvial events, the soil can be shallow and not well developed. These areas are not ash capped but have silt to coarse sandy loam textures. On some lower benches, an aggraded river cobble cap can be encountered that represent abandoned stream and river courses. Here the soil can be moderately thick with a loam or clay loam texture and is ash influenced.

Soils in the resource area are generally weakly weathered and have moderately good timber production potential. The ash cap soils are of a silt loam texture and light reddish brown in color with a rock fragment content of 5 to 30 percent and depths of 6 to 10 inches. On the poorly vegetated slopes, usually on south aspects and steep ridge crests, soils are shallow (3 to 6 inches deep) and skeletal because of the high rock fragment content (40 to 50 percent) and are ash influenced with a brown to light brown color and silt loam to sandy loam texture. On the lower gradient drainages where the ash capped soils have pooled, their depths are moderately deep (12 to 18 inches).

The subsoil is more influenced by the underlying bedrock with a light brown color and sandy loam texture. Rock fragments in the subsoil can range between 20 and 65 percent. On a few subsidiary benches where subsoil is exposed in a road cut, its depth can be greater then 2 feet. Bedrock outcroppings are found close to some steep ridge crests, along steeply incised drainages, and the predominate cliff formations adjacent to the rivers valley. These are usually indicative of drier habitats, especially on the more southerly aspects.

Soils and Productivity

The practice of timber management can have long-lasting impacts on the soil resource if precautions are not taken. The following three design and management criteria relate to soil productivity in the Resource Area.

1. Detrimentally disturbed soils within activity areas (harvest units).

Detrimental soil impacts are defined as the proportion of an activity area that may be subjected to displacement, compaction, erosion, or severe burning due to a particular management activity (such as harvest or fuels treatment), exclusive of dedicated resources (such as system roads). The soils in an activity area are considered detrimentally disturbed when the following soil conditions exist as a result of Forest practices:

a. Soil displacement results in the loss of either one inch of or half of the humus-enriched surface layer (A-soil horizon), whichever is less. The loss of the litter layer alone could be detrimental on some marginal sites. Displacement removes the most productive part of the soil resource. Roading, ground-based yarding, dozer piling and cable corridors are the major contributors to displacement.

b. Soil compaction that results in a 15 percent or more increase in bulk density, or a 50% reduction in water infiltration rates typical for volcanic ash influenced surface soils. Soil compaction reduces the supply of air, water and nutrients to plants. Roading, ground based yarding and piling are the major contributors to compaction.

c. Surface erosion is indicated by rills, gullies, pedestals, and soil deposition and should be kept within tolerable limits by retaining enough ground cover, depending with onsite conditions.

d. Fire consumes most woody debris and the entire duff and litter layer, exposing mineral soil. Burn ash that is white or reddish color, indicates that much of the carbon was oxidized by fire (Burned-Area Emergency Rehabilitation Handbook FSH 2509.13). Burns that create very high temperatures at the soil surface when soil moisture content is low result in an almost complete loss of surface and upper soil horizon organics. Many of the nutrients and ectomycorrhizae associated with these organics can be lost to the atmosphere through volatilization and removed from the site in fly-ash (Garrison and Moore 1998; PF Doc. SOIL-23) or lost to high ground temperature flux (Harvey et al. 1986 p. 7; PF Doc. SOIL-R-24).

2. Low Potassium Sites - Sites containing geologic formations that are naturally deficient in potassium bearing minerals.

Whole-tree yarding and removal of treetops can lead to the direct loss of potassium (Morris and Miller 1994, PF Doc. SOIL-R-42). On some sites, 45 percent of the available potassium is detained in trees, with the remainder being held in subordinate vegetation, forest floor, and soil pools. Within the trees, about 85 percent of the potassium is held in the branches, twigs, and foliage (Garrison and Moore 1998, PF Doc. SOIL-R-17). It is therefore vital to recycle as many nutrients as possible before removal which can be done by overwintering small-scale debris to leach out potassium (Baker et al. 1989, PF Doc. SOIL-R-2; Barber and Van Lear 1984, PF Doc. SOIL-R-3; Edmonds 1987, PF Doc. SOIL-R-14; Garrison and Moore 1998, PF Doc. SOIL-R-17; Laskowski et al. 1995, PF Doc. SOIL-R-32; and Palviainen et al. 2004, PF Doc. SOIL-R-46).

Under most natural circumstances, potassium returns to the soil when the tree dies. Unlike many other soil nutrients, potassium is derived primarily from underlying geologic formations and is a product of slow weathering processes. Most of the Prichard-Murray Resource Area's underlying bedrock formations are the Precambrian metasedimentary Belt series group and include: 32 percent Wallace, 11 percent Burke, 29 percent Prichard, 9 percent Revett, 5 percent St. Regis, 2 percent sediment, and 12 percent alluvial deposits (Resource Area Geology Map, PF Doc. SOIL-15).

The Intermountain Forest Tree Nutrition Cooperative (IFTNC) continues to research potassium contents within tree species and different rock types in order to establish specific minimum thresholds for retention and effects of potassium on tree growth and resistance to root diseases (Mika 2005, PF Doc. SOIL-R-39; Shaw 2005, PF Doc. SOIL-R-52). Until these minimum thresholds are developed through research, the Idaho Panhandle National Forests are using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. These measures have been incorporated into the features designed to protect soils (EA Part 3; PF SOIL-21).

3. Maintenance of large woody debris and organic matter.

The third soil productivity criterion relates to the management of coarse woody debris and organic matter, and follows the research guidelines contained in Graham et al. (1994, PF Doc. SOIL-R-21). Retaining coarse woody debris and organic matter is important to maintaining the soils most productive layer. Coarse woody debris is defined as material derived from tree limbs, boles, and roots greater than three inches in diameter and in various stages of decay and performs many physical, chemical, and biological functions in forest ecosystems and is a key habitat component for many wildlife species and for stream ecology (Graham et al., 1994, PF Doc. SOIL-R-21). Because coarse woody debris is such a valuable part of a functioning ecosystem, a portion of the material must be maintained to ensure that organic matter is recycled for long-term productivity. Nevertheless, in natural systems organic matter fluctuates with forest growth, mortality, fire, and decay.

The average optimum level of fine organic matter is 21 to 30 percent (Graham et al. 1994, PF Doc. SOIL-R-21), which equates to 1 to 2 inches of surface litter and humus. Optimum levels of fine organic matter relate to ectomycorrhizae fungus, which is a good indicator of healthy forest soil. In moist western hemlock and cedar habitat types, strong levels of ectomycorrhizae exist when organic levels exceed 30 percent. Soil survey data indicates that most forest sites have adequate organic matter levels to support strong ectomycorrhizae populations.

This soil productivity criterion is addressed as a guideline and is not part of the alternative evaluations because project alternatives are designed to meet the large woody debris guidelines as referred to in Graham et al. (1994, PF Doc. SOIL-R-21) and silvicultural prescriptions.

3. Existing Conditions

Four criteria were used to assess existing conditions for soil resources:

3.A Landtypes and hazard ratings of the Idaho Panhandle National Forests;
3.B Soils and productivity;
3.C Wildfire and severely burned soils;
3.D Site conditions from past activities in the activity units in which proposed treatment would occur.

3.A. Land Types and Hazard Ratings

Thirty-nine landtypes have been identified and mapped in the resource area out of which 24 are in proposed harvest units under Alternative 2 and 22 under Alternative 3. Descriptions of each landtype, detailed acreages for Alternative 2 and 3, and maps displaying landtypes and hazards are contained in the project file (PF Doc. SOIL-2, SOIL-3, SOIL-4, SOIL-11, SOIL-12, SOIL-13, and SOIL-14). Hazard ratings have also been compiled and are listed in subcategories for mass failure, surface erosion, sediment delivery potential, and soil productivity. These are rated as low, moderate, or high for each landtype (Tables SOIL-1 and 2).

Table SOIL-1. Sensitive landtypes associated with harvest activities in the Prichard-Murray Resource Area and their potential for hazards.

Harvest	Mass Failure Potential			Surface Erosion Potential			Sediment Delivery Potential			Soil Productivity		
	L	M	H	L	M	H	L	M	H	L	M	MH
Alt. 2	59%	41%	0%	100%	0%	0%	48%	33%	19%	52%	21%	27%
Alt. 3	58%	42%	0%	100%	0%	0%	44%	33%	23%	63%	21%	16%

L – Low; M – Moderate; H – High; MH – Moderately High

Table SOIL-2. Sensitive landtypes associated with prescribed burning and fuelbreak activities in the Prichard-Murray Resource Area and their potential for hazards.

Fuels	Mass Failure Potential			Surface Erosion Potential			Sediment Delivery Potential			Soil Productivity		
	L	M	H	L	M	H	L	M	H	L	M	MH
Alt. 2	30%	70%	0%	100%	0%	0%	26%	29%	45%	22%	16%	62%
Alt. 3	30%	70%	0%	100%	0%	0%	26%	29%	45%	22%	17%	61%

L – Low; M – Moderate; H – High; MH – Moderately High

Mass Failure Potential is the relative probability of downslope movement of masses of soil material. Besides natural failure, landslides or slumping can be triggered by a number of mechanisms, including harvest activities, severe burning, and related road building.

For proposed Alternative 2, the 671 acres (acre differences due to rounding) of harvest activity areas contain 59 percent (398 acres) of soils that have a low, 41 percent (273 acres) that have a moderate, and 0 percent that have a high mass failure potential (Table SOIL-1; PF SOIL-3). For modified Alternative 3, the 540 acres (acre differences due to rounding) of harvest activity areas contain 58 percent (315 acres) of soils that have a low, 42 percent (225 acres) that have a moderate, and 0 percent that have a high mass failure potential (Table SOIL-1; PF SOIL-4).

Within the 1,750 acres (acre differences due to rounding) of prescribed burning and fuelbreak activity areas under proposed Alternative 2, 30 percent (530 acres) of soils have a low, 70 percent (1220 acres) have a moderate, and 0 percent have a high mass failure potential (Table SOIL-2; PF SOIL-3). Within the 1,436 acres (acre differences due to rounding) of prescribed burning and fuelbreak activity areas under proposed Alternative 3, 30 percent (429 acres) of soils have a low, 70 percent (1007 acres) have a moderate, and 0 percent have a high mass failure potential (Table SOIL-2; PF SOIL-4).

Landtypes that exhibit moderate mass failure potential are located primarily on dissected stream breaklands, alluvial fans, moderate side slopes, incised drainages, their toe slopes, and stream headlands. After field reviewing all harvest activity areas along with 0.26 miles of new road construction and 1.21 miles of road reconstruction, the potential for soil mass movement is low.

Removal of forest canopy and cover from either clearcutting or wildland fire increases landslide occurrence (Gray and Megahan 1981, PF Doc. SOIL-R-22; Megahan et al. 1978, PF Doc. SOIL-R-38). This is primarily due to root decay, soil disturbance, increased snow accumulation and altered melting rates, and soil water increases from reduced interception and transpiration.

Little research has been conducted to determine if partial cutting affects landslide rates. Megahan et al. (1978, PF Doc. SOIL-R-38) found that landslide occurrence increased only slightly when overstory canopy was reduced from 100 percent to 11 percent, but increased dramatically when canopy closure went below 11 percent. They also found that crown cover from shrubs affected landslide occurrence after 80 percent crown removal and indicated that landslide occurrence is more sensitive to shrub than tree crown removal.

Surface Erosion Potential is a rating of the relative susceptability of exposed soils to sheet and rill erosion.

All soil landtypes associated with proposed Alternative 2 harvest (671 acres) and prescribed burning and fuelbreak activities (1750 acres) as well as modified Alternative 3 are rated low for surface erosion (Tables SOIL-1 and SOIL-2; PF SOIL-3 and 4). The potential for soil erosion concerns on the Coeur d'Alene River Ranger District is not so much associated with harvest treatments as with existing roads (Cacek 1998, PF Doc. SOIL-R-7). The dominant processes in roaded portions are surface erosion from bare soil areas of roads, including the cutslope, fillslope, and travelway.

Revegetation of cut slopes and fill slopes are often difficult because of lack of soil moisture, organic material, low productivity potential, and desiccation of seeds and seedlings, especially on south-facing slopes. On moist slopes, revegetation efforts are more successful since erosion of road cut slopes and fill slopes is generally lower.

Road erosion and sediment yield usually decline after construction (Jones 2000, PF Doc. SOIL-R-30; Switalski et al. 2004, PF Doc. SOIL-R-56) but can provide a chronic, long-term source of sediment to streams within the resource area. Periodic large pulses of erosion may occur during intense water yield and overland flow events in interaction with road drainage systems. Roads and their associated impacts are analyzed in detail in the hydrology section.

Sediment Delivery Potential is a rating of the probability of eroded soil reaching a stream channel. By using slope gradient, slope shape, and distance to channel, a rating of low, moderate, or high potential is determined.

Within the 671 acres of proposed Alternative 2 harvest activity areas, 48 percent (321 acres) of soils have a low, 33 percent (221 acres) have a moderate, and 19 percent (129 acres) have a high sediment delivery potential (Table SOIL-1; PF SOIL-3). Within the 540 acres of proposed Alternative 3 harvest activity areas, 44 percent (238 acres) of soils have a low, 33 percent (176 acres) have a moderate, and 23 percent (125 acres) have a high sediment delivery potential (Table SOIL-1; PF SOIL-4).

Within the 1750 acres of proposed Alternative 2 prescribed burning and fuelbreak activity areas, 26 percent (456 acres) of soils have a low, 29 percent (510 acres) have a moderate, and 45 percent (784 acres) have a high sediment delivery potential (Table SOIL-2). Within the 1436 acres of proposed Alternative 3 prescribed burning and fuelbreak activity areas, 26 percent (376 acres) of soils have a low, 29 percent (412 acres) have a moderate, and 45 percent (648 acres) have a high sediment delivery potential (Table SOIL-2; PF SOIL-4).

The landtypes that exhibit moderate sediment potential are situated at low- to mid elevation on mid- to lower side slopes and adjacent to incised drainages. Because drainage courses and riparian zones are buffered and will not be entered or logged, the potential for increased sediment delivery from the moderately rated landtype units is minimal.

The landtypes in the resource area that rated as having a high sediment delivery potential to stream channels vary in their topographic setting from wide, low elevation stream bottoms to mid-elevation lower

slopes/breaklands on deeply incised drainages and stream headlands. All activity units are located on Belt geology. As part of project planning, all stream bottoms have an INFISH designated buffer zone that will not be entered by any proposed harvest activities. With established buffer zones, the potential sediment increases from fuel or timber management work is minimal.

Roads are considered a potential source for sediment delivery and are analyzed in detail in the Specialist's Report on Aquatics.

Productivity Potential is a rating of the relative capacity or ability of a soil to produce and sustain biomass.

Within the 671 acres of proposed Alternative 2 harvest activity areas, 27 percent (180 acres) of soils have a low, 52 percent (350 acres) have a moderate, and 21 percent (141 acres) have a moderately high productivity potential (Table SOIL-1; PF SOIL-3). Within the 540 acres of proposed Alternative 3 harvest activity areas, 16 percent (86 acres) of soils have a low, 63 percent (342 acres) have a moderate, and 21 percent (112 acres) have a moderately high productivity potential (Table SOIL-1; PF SOIL-4).

Within the 1750 acres of proposed Alternative 2 prescribed burning and fuelbreak activity areas, 62 percent (1089 acres) of soils have a low, 22 percent (389 acres) have a moderate, and 16 percent (272 acres) have a moderately high productivity potential (Table SOIL-2; PF SOIL-3). Within the 1436 acres of proposed Alternative 3 prescribed burning and fuelbreak activity areas, 61 percent (882 acres) of soils have a low, 22 percent (309 acres) have a moderate, and 17 percent (245 acres) have a moderately high productivity potential (Table SOIL-2; PF SOIL-4).

Soils susceptible to reduced productivity potential are generally those located on shallow, rocky steep slopes on southerly aspects. Removal of canopy can affect soil moisture content in several ways. Precipitation may enter previously intercepted areas and provide existing or establishing vegetation with additional needed moisture and increase decomposition rates. Conversely, rain events may increase erosion on the now exposed soil, especially if the potential is high, and reduce the availability of a growing medium. Furthermore, increased sunlight may also support plant growth or heat up soils to the extent that vegetation is inhibited.

When soils have adequate moisture conditions to retain their biological, chemical, and physical integrity, effects from the loss of forest floor can be minimized (Barnett 1989, PF Doc. SOIL-R-4; Frandsen and Ryan 1985, PF Doc. SOIL-R-15; Hungerford et al. 1991, PF Doc. SOIL-R-26; McNabb and Cromack 1990, PF Doc. SOIL-R-36). Direct effects of prescribed underburning and pile burning could potentially remove woody debris that would otherwise provide nutrients to the soil as the decay process occurs (Page-Dumroese et al. 2006, PF Doc. SOIL-R-29). To minimize potential impacts, burning during high soil moisture would help maintain coarse woody debris requirements.

However, on an unpredictable site-specific basis, some drier sites may burn at a severity level that removes all of the protecting duff and litter layers, even under managed fire conditions. The duff and litter layer is important in protecting the soil horizons, both as reducing erosion potential and in maintaining soil moisture. Litter prevents the breakdown of soil aggregates and reduces the velocity of any overland flow, thereby reducing the erosion potential (Beschta 2004, PF Doc. SOIL-R-5). Project design features and mitigation measures are expected to minimize this effect (PF Doc. SOIL-21).

3.B. Soils and Productivity

The soils found in the Prichard-Murray resource area owe their productivity to excellent nutrient-holding capacities and other favorable characteristics provided by an ash layer that can extend to over two feet deep in certain locations. However, these generally young and poorly developed soils can experience long-term deficiencies when biologically essential elements, like organic matter and coarse woody debris, are not sufficiently available.

Organic matter content varies throughout the resource area (PF Doc. SOIL-1 and SOIL-6) and appears to be optimum or low on the south-facing and higher on the north-facing slopes. Its variability and depth is natural

and usually correlates to habitat type and aspect with excessive needle cast often decreasing the establishment of a more herbaceous cover. Exclusion of fire has also contributed to increased duff accumulations.

Coarse woody debris was found to be variable as well (PF Doc. SOIL-1 and SOIL-6). Some stands contain higher amounts of downed wood, generally on moist north-facing slopes, that have never been harvested and have been excluded from wildfire for a long period of time. Drier south-facing slopes have lower CWD levels that reflect past management and more recent wildfire activities. Decomposition may also be affected due to light and moisture variations under different canopy densities.

Whole-tree yarding and removal of treetops can also reduce nutrients, woody material, and lead to the direct loss of potassium (Morris and Miller 1994, PF Doc. SOIL-R-42). However, none of the proposed activity areas will be whole-tree logged.

3.C. Wildfire and Severely Burned Soils

In 1889, a possible human caused fire associated with mineral prospecting occurred. Portions of the resource area burned again in 1910 followed by a wildfire in 1919 which represents the last major natural fire event that took place in the Prichard-Murray Resource Area (see Specialist's Report on Fire/Fuels).

Natural disturbance events commonly reset watersheds and influence water quality and stream habitat. Wildfire is a natural component in forest watersheds, and has influenced forest soils and watershed processes for thousands of years. However, as a result of fire suppression during the last century, natural fire regimes do not exist anywhere in north Idaho today (Smith and Fisher 1997, PF Doc. SOIL-R-54).

Depending on the intensity of the fire and the severity of its effects, wildfire can alter watershed soils by consuming the erosion-limiting litter layer at the top of soils and the binding organics within the soil (Ice 2003, PF Doc. SOIL-R-27). Condensation of volatized organics on soil surfaces often result in water-repellant (hydrophobic) soil conditions (DeBano 1981, PF Doc. SOIL-R-10; Doerr et al. 2000, PF Doc. SOIL-R-11; Dyrness 1976, PF Doc. SOIL-R-13) that can contribute to overland flow and increased in-channel failures (Ice 2003).

3.D. Site Conditions from Past Activities

Past Logging

Within the proposed harvest units, field verification located evidence of past harvesting activities (PF Doc. SOIL-1 and Table SOIL-3). Also noted are the existing road networks associated with the power-line corridor and past timber harvests. Other areas of activity are past helicopter yarding units and some skid trails on gentler ground. In all of the locations that revealed past timber harvests, the stumps are not concentrated but randomly dispersed across the landscape.

Past salvage logging primarily targeted overmature, single tree extractions that began in 1920 and continued through the 1950s. These harvests were horse/chute operations through the early 1940s, then short cable-jammer work from newly constructed roads. A few areas were mechanically skidded in the 1950s as evidenced from visible trails. When sampled, the trails have high compaction levels. Where cable or horse/chute operations occurred, soil compaction is non-existent with no surface disturbance. The areas that were salvaged after the 1919 forest fire have fully recovered and support 80+ year old timber stands.

Previous salvage harvest in 2002 utilized helicopter yarding that created 0.5 acres of openings in a few locations that are currently proposed for reentry thinning harvest by helicopter (Unit 10). Except for the stumps and some slash that remains, little to no soil impacts are visible. What little disturbance there is was created when the log ends skidded across the forest floor before they became airborne.

Where overmature single tree were harvested in old cable-jammer units from the 1950s, few stumps are present. Again, there is no evidence of soil compaction or displacement and, with the exception of some stumps, it was difficult to see where any harvest activities had occurred. The major disturbance factor associated with the 50 year old cable-jammer units are the remaining road transportation routes. These roads were calculated as part of the past disturbance level as an irretrievable effect when not considered as part of the District's Forest Development Road system.

Table SOIL-3. Existing conditions for harvest treatment units following guidelines in Niehoff (2002, PF Doc. SOIL-R-44). See project file for proposed prescribed burning and fuel break units (PF Doc. SOIL-17).

Unit	Disturbance (%)			Organic Matter (%)#			Coarse Woody Debris tons/acre
	Class 1	Class 2	Class 3	<¾ inch (low)	¾ to 1¾ (optimal)	>1¾ (too much)	
1	100	0	0	20	70	10	4.9
2	100	0	0	25	67	8	4.7
3	100	0	0	17	77	6	4.9
4	96	4	0	14	84	2	4.5
5	97	3	0	5	70	25	7.5
6*	100	0	0	5	77	18	9.8
7	100	0	0	10	63	27	4.1
8	90	8	2	10	77	13	5.0
9	70	15	5	5	75	20	9.8
10	90	9	1	22	74	4	5.8
11	96	4	0	13	77	10	5.4
12	97	0	3	10	83	7	4.8
13	93	5	2	20	77	3	4.4
14	92	7	1	10	85	5	4.2
15	87	10	3	17	80	3	4.0
16	100	0	0	14	84	2	5.9

*Unit was split and re-numbered 60, 61, 62, 63, 64, 65, 66, 67, 68, and 70.

based on Graham et al. 1994.

Class 1: Natural Condition – Soil is undisturbed and therefore, represents the condition against which other categories are compared.

Class 2: Slight Soil Disturbance – Evidence of disturbance from logging or burning but observable soil characteristics do not meet detrimental soil damage criteria defined in Regional Soil Quality Standards.

Class 3: Detrimental Soil Disturbance – Evidence of detrimental disturbance based on observable soil characteristics indicating that the site meets detrimental soil damage criteria defined in the Regional Soil Quality Standards. Detrimental soil disturbance cannot exceed 15% of an activity area.

3.E. Existing Roads and Transportation

Except for some road construction in the late 1940s, the early harvest activities reveal little to no impact to the soil. The primary transportation route through the resource area prior to the early 1930s along the North Fork Coeur d'Alene River was a railroad operated by the Oregon Railroad and Navigation Co. Upon its abandonment after the high water events of 1933, portions of the grade became Forest Highway 9 and Forest Development Road 208. The impetus for road access began in the late 1950s and continued to the late 1980s.

The present road system designated as "classified" (Forest Development Roads) on the National Forest transportation system are considered dedicated lands and total approximately 112 miles within the Resource Area (PF Doc. SOIL-5). There are approximately 82 miles of unclassified roads that are not considered Forest Development Roads (PF Doc. SOIL-5), the majority of which were created during bulldozer mineral exploration activities in the 1950's and 1960's. Approximately 40 miles of these roads extend through private land. Roads are categorized as "classified" (dedicated under the area transportation plan) or "unclassified" (non-dedicated roads, which are not considered necessary for long-term forest management objectives). In both cases, the loss of soil productivity on either category of road is considered irretrievable.

4. Environmental Consequences to Soils

4.A. Methodology Used to Analyze Environmental Consequences to Soils

This analysis includes potential effects from proposed logging systems, unclassified and temporary roads, landings, and prescribed burning and fuel break treatment on soils. To determine whether proposed activities would detrimentally impact or have cumulative effects on soils, the IPNF Soil NEPA Analysis Process (Niehoff 2002, PF Doc. SOIL-R-44) was used. For each alternative, the detrimentally disturbed acres were calculated using coefficients based on past IPNF soil monitoring data. The coefficients were developed as an average soil disturbance level and equated to harvest equipment, time of year (summer vs. winter logging), fuel treatment methods, and the time of year fuel treatment took place. Since the coefficients are based on an average, the areas that have had prior harvest activities could have soil disturbance levels lower or greater then the coefficient's average. This monitoring information is contained in Forest Plan Monitoring and Evaluation Reports and is summarized in the IPNF Soil NEPA Analysis Process (Niehoff 2002, PF Doc. SOIL-R-44). Calculations incorporated the acres and types of proposed logging, burning, and roads/landings constructed for direct and indirect effects.

Based on past monitoring efforts (Niehoff 2002, PF Doc. SOIL-R-44), tractor logging prior to 1990 has had the most detrimental soil impact and ranged between 24 and 42 percent. Since 1990, tractor logging methods and recommended protection measures have decreased most detrimental impacts to an average of 13 percent (Niehoff 2002, PF Doc. SOIL-R-44), which is two percent less than the maximum allowable criteria established by the Regional guidelines. Helicopter and skyline/cable logging systems tend to have between 0 and 2 percent detrimental effects (Niehoff 2002, Doc. SOIL-R-44) and (McIver and Starr 2000, pp. 11-16, PF Doc. SOIL-R-35). These logging systems have less impact than tractor systems because the equipment stays on the road and the logs are partially suspended, restricting impacts to times when logs are being dragged over the ground (Krag 1991, PF Doc. SOIL-R-31; Seyedbagheri 1996, pages. 7-9; PF Doc. SOIL-R-51). Helicopter logging has minimal impacts as the logs are lifted into the air and transported to a landing site (Poff 1996, PF Doc. SOIL-R-47; McIver and Starr 2000, pages 11-16; PF Doc. SOIL-R-35). The landing site is usually one-half to one acre in size and receives the most impact from ground-based equipment that processes and transports the logs.

Direct effects on soils from proposed activities were measured by analyzing the effects of compaction, erosion, severe burning, rutting, and displacement on the soil surface that is the most productive layer and also the easiest to disturb through activities. Potential impacts would result from the type of logging system and fuel treatments used and area disturbed due to construction of roads and landings.

Compaction, displacement, rutting, and severe burning can affect the soils physical, chemical, and biological properties, which indirectly can affect the growth and health of trees and other plants. Compaction reduces soil permeability and infiltration, which can cause soil erosion. Displacement reduces plant growth where topsoil and organic matter are removed. Severely burned soils can become hydrophobic (water repellent) and lead to increased erosion, runoff, and/or reduced productivity.

Tractor, skyline/cable, and helicopter logging systems would be utilized under the Proposed Action. Roads and landings that are to remain on the landscape for future use cause irretrievable effects on productivity as those lands become "dedicated" lands. Those roads that are temporarily needed for project work and are planned for decommissioning have detrimental effects initially, but rehabilitation efforts (ripping, recontouring) would initiate a long-term recovery sequence. Vegetative recovery time is approximately 30 to 40 years as the second growth timber becomes established around the disturbed areas and develops enough crown foliage to intercept and evapotranspirate moisture (Dykstra and Curran 2002, PF Doc. SOIL-R-12; and Froehlich et al. 1985, PF Doc. SOIL-R-16).

Table SOIL-4. Potential detrimental distrubance coefficients used for various logging and prescribed fire scenarios.

Tractor Logging	% Detrimental Disturbance Coefficients
With spring burning	13
With grapple piling or fall burning	15
Skyline or Helicopter Logging	
Helicopter logging	0 - 1
Skyline or helicopter logging with fall burning on south/southwest aspects	2
Skyline or helicopter logging with grapple piling	8

Acres of detrimental disturbance were calculated by multiplying the areas of activity disturbance by the disturbance coefficient derived from monitoring reports. Coefficients used for proposed logging systems are displayed in Table SOIL-4.

Road calculations used 30-foot widths that take into account a 14-foot wide running surface and includes the cut and fill slope disturbance. Log landing areas associated with proposed units are accounted for in the calculations. Log landings that are proposed outside of any harvest units are each calculated as one acre. Effects to these areas would be considered irretrievable and identified as “dedicated” lands.

Indirect effects include the loss of site productivity due to the removal of large woody debris and nutrients. Large woody debris is essential for maintenance of sufficient microorganism populations and long-term site productivity. Research has indicated that potassium (among other nutrients) is an important element for site productivity and may be deficient among certain Belt Supergroup formations. Design features are incorporated into the activities to meet the management of large woody debris and organic matter as detailed in the research guidelines contained in Graham et al. (1994, PF Doc. SOIL-R-21). These recommendations emphasize tons per acre and are defined as any woody residue larger than three inches in diameter.

On potassium limited sites, tree tops, foliage, and branches would be left to overwinter, which allows potassium to leach out of these materials (Baker et al. 1989, PF Doc. SOIL-R-2; Barber and Van Lear 1984, PF Doc. SOIL-R-3; Edmonds 1987, PF Doc. SOIL-R-14; Garrison and Moore 1998, PF Doc. SOIL-R-17; Laskowski et al. 1995, PF Doc. SOIL-R-32; and Palviainen et al. 2004, PF Doc. SOIL-R-46). The reduction of available potassium leaching back into the soil profile could affect tree growth.

Since this is a fuels reduction project, determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer. Where fire risk is considered high, especially near structures, flexibility will be given to treat slash prior to it being left for 6 months.

Cumulative effects include the combination of direct and indirect effects from past, present, and reasonably foreseeable activities. Since direct and indirect effects on soils are measured within the activity areas, the cumulative effects analysis area for the soil resource consists of the Project Resource Area. Reasonably foreseeable actions, such as road construction/reconstruction and timber harvesting, would continue to affect soils.

Existing roads and landings designated as classified on the National Forest transportation system are considered dedicated lands. The loss of soil productivity on these sites occurred when the roads and landings were constructed and are an irretrievable effect. These lands are not considered a part of the cumulative effects because they are now included as a capital investment to the permanent transportation system.

4.B. Effects to Soils under the No-Action Alternative

Under this alternative, no new management induced detrimental soil impacts would occur in the Prichard-Murray resource area. Stands currently at high mortality risk would not be treated, which may increase the risk of stand loss due to wildfire, severe burning, erosion concerns, and loss of soil nutrients. On a landscape scale the restoring of ponderosa pine, western larch and white pine would not occur. Timber stands would continue to reflect past management practices that selectively harvested seral species, leaving the more pathogenicly prone Douglas- and grand firs. Stand conversion to more site-appropriate tree species would be delayed or may never occur relative to the proposed Action Alternative 2.

No direct effects to the soil resource would occur under the No Action Alternative since there would be no road construction, logging, or fuel treatment activities. There would be no compaction or displacement beyond what currently exists. Throughout the silvicultural landscape, tree mortality from pathogens and weather events would continue as in the past, which has a direct influence on the area's recycling of organic matter and changes in fuel loading. In moist habitat sites, the increase in organic matter is a benefiting function to overall soil productivity. In dry habitat types, increases of organic matter may result in a negative response.

Under the No-Action Alternative, no new management-induced detrimental impacts would occur in the resource area. Stands currently at high risk for mortality would not be treated, which may increase the risk of stand loss due to wildfire, severe burning, and loss of soil nutrients. Moreover, the introduction of weeds and unwanted flora following a fire could lead to higher competition between less desirable and native vegetation. In the absence of such a hot fire, nutrients would be retained on site. However, stand conversion back to more site-appropriate tree species would be delayed in comparison to the Proposed Action.

4.C. Effects to Soils under all Alternatives

Given the decades of fire suppression in the resource area, the chance of a lethal wildfire occurring could be high if an ignition starts in an untreated area during extreme dry weather conditions. The proposed vegetation and fuels treatment in the resource area would not necessarily prevent lethal wildfires from occurring, but would increase the ability to suppress such a fire should the ignition occur in the treated areas. Vegetation and fuels treatments would reduce the chance that a wildfire could have as severe of an effect on the soils in treated areas as it could in untreated areas because there would be a reduction in the tons per acre of fuels on those treated sites.

The occurrence of a high intensity wildfire would have a high potential for impacts to soils and soil productivity in severely burned areas, especially since the risk of soil erosion increases proportionally with fire intensity (Megahan 1990, p. 146; PF Doc. SOIL-R-37). Ashes that have burned white or a reddish color indicate that much of the organic carbon was oxidized and is no longer available to the soil. Other effects would include the loss of organics, loss of nutrients, and a reduction of water infiltration (Wells et al. 1979, p. 26; PF Doc. SOIL-R-57). Burns that create very high soil surface temperatures, particularly when soil moisture content is low, result in an almost complete loss of soil microbial populations, woody debris, and the protective duff and litter layer over mineral soil (Hungerford 1991, PF Doc. SOIL-R-26; Neary et al. 2005, PF Doc. SOIL-R-42). Nutrients stored in the organic layer (such as potassium and nitrogen) can also be lost or reduced through volatilization and as fly ash (DeBano 1991, pp. 152-153; PF Doc. SOIL-R-9; Amaranthus et. al. 1989, p. 48; PF Doc. SOIL-R-1).

Fire-induced soil hydrophobicity is presumed to be a primary cause of the observed post-fire increases in runoff and erosion from forested watersheds (Huffman et al. 2001). Though hydrophobicity is a naturally occurring phenomenon that can be found on the mineral soil surface, it is greatly amplified by increased burn severity (Huffman et al. 2001, PF Doc. SOIL-R-25; Neary et al. 2005, PF Doc. SOIL-R-43).

Soil hydrophobicity usually returns to pre-burn conditions in no more than six years (DeBano 1981, PF Doc. SOIL-R-10). Dyrness (1976, PF Doc. SOIL-R-13) and other studies have documented a much more rapid recovery of one to three years (Huffman et al. 2001, PF Doc. SOIL-R-25). The persistence of a hydrophobic layer will depend on the strength and extent of hydrophobic chemicals after burning and the many physical

and biological factors that can aid in breakdown (DeBano 1981, PF Doc. SOIL-R-10). This variability means that post-fire impacts on watershed conditions are difficult to predict and to quantify.

If hydrophobic soils result from severe, high temperature fire, moderate surface erosion would occur but the potential for mass failures would be low to moderate because of the Prichard-Murray Resource Area's overall landtype characteristics; however, debris flows would be possible. The areas of primary risk after a severe burn are toe slopes and breaklands adjacent to streams. Following a severe fire, rehabilitation efforts to mitigate the fire's effects on erosion and sediment delivery would be performed as funding became available. If completed in a timely manner, rehabilitation work could negate most of the erosion concerns.

4.D. Effects to Soil under the Action Alternative

The effects of the action alternatives on the soil resource were assessed based on their potential to create detrimental impacts and to affect soil productivity. The difference between Alternatives 2 and 3 is a 20 percent reduction (~131 acres) in activity acres for harvest units and a 18 percent (~315 acres) reduction in burn only acres. Table 5 shows the change between Alternative 2 and Alternative 3 which occurred because some or all of the units were within allocated old growth stands.

Table SOIL-5. Change in activity acres between Alternatives 2 and 3.

Activity	Unit	Alt 2 (acres)	Alt 3 (acres)	Change (acres)
Thin	10	161	109	52
Thin	11	13	0	Unit dropped
Thin	12	16	3	13
Thin	14	14	12	2
Shelterwood	16	48	0	Unit dropped
Burn (only)	38	127	23	104
Burn (only)	41	67	0	Unit dropped
Burn (only)	49	85	46	39
Burn (only)	50	105	0	Unit dropped

To reduce the impacts to soils and soil productivity, the alternatives utilize Soil and Conservation practices as described in the Soil and Water Conservation Practices (SWCP) Handbook FSH 2509.22. This handbook outlines Best Management Practices (BMPs) that protect the soil and water resources at a higher level than do existing Idaho Forest Practices rules and regulations, thereby incorporating all Idaho state standards.

The techniques and their effectiveness are documented in several publications (Seyedbagheri 1996, PF Doc. SOIL-R-51; Lynch and Corbett 1989 and 1990, PF Doc. SOIL-R-34 and PF Doc. SOIL-R-33; Idaho DEQ 2001, PF Doc. SOIL-R-28). The BMPs would have a high effectiveness in minimizing soil compaction and displacement, address seeding of disturbed areas, limit operations when soil moistures are high, and address conduct of logging. "Features Designed to Protect Soil and Site Productivity", would be implemented as part of the action alternatives to ensure that activities are consistent with Forest and Regional guidelines in terms of soil compaction, displacement and nutrient retention (PF Doc. SOIL-21).

Effects of Harvest Treatments - A direct effect of management actions would be an increase in detrimental soil disturbance such as compaction and displacement, particularly in activity units where multiple activities such as road and landing construction, fuel treatments, and tractor logging are planned. Minor disturbances would occur on skyline units and where hand fireline is constructed around a perimeter. Past monitoring shows these impacts result in virtually no detrimental conditions (USDA 1991, PF Doc. CR-007; Niehoff 2002, PF Doc. SOIL-R-44).

Table SOIL-6 displays activity units that contain tractor, helicopter, and skyline logging for proposed Alternative 2 (a complementary table for Alternative 3, which is a subset of proposed Alternative 2, is located in the project file under PF Doc. SOIL-7). Fuel treatments are not shown in the table because design features would ensure impacts would be negligible (between 0 to 2 percent). Effects of fuel treatments are discussed later in this section.

Results (Table SOIL-6) for proposed Alternative 2 show that two of the 26 proposed harvest units could go over the detrimental disturbance limit of 15 percent. Unit 2, which is proposed for all tractor yarding as a first entry, could exceed. Unit 9 contains old roads that need to be incorporated into the harvest design to keep impacts below the required standards. Other units with elevated disturbance levels that are primarily cable yarding show that the measured disturbance levels are generally directly related to existing non-system roads. Design features and ground skidding specifications are therefore incorporated into the harvest standards (EA Part 3; PF SOIL-21) to reduce potential impacts.

Alternative 2 proposes commercial thinning on 339 acres, commercial thinning and regeneration on 242 acres, and shelterwood harvest on 95 acres utilizing a combination of helicopter, skyline/cable, and tractor yarding (Table SOIL-7). In Alternative 3, commercial thinning is proposed on 256 acres, commercial thinning and regeneration on 242 acres, and the 48 acres of shelterwood harvest is dropped (Table SOIL-7). This is a 20 percent reduction in total proposed harvest activities.

Table SOIL-6. Summary of existing conditions and potential impacts for Alternative 2 following guidelines in Niehoff (200;, PF Doc. SOIL-44).

Unit	Activity Area (Acres)*	Proposed Treatment	Proposed Logging System	Proposed Slash Treatment	Existing Condition %	Predicted Impact from Temporary Road* or Reconstruction/ Recondition^			Helicopter Landing Disturbance* *%	Potential Detrimental Disturbance with Mitigation		
						Proposed Road Construction (miles)	Estimated Road Disturbance (acres)	Disturbance %		In Part of Unit %	Est. Acres	In Unit Total %
1	96	CT/R	C	UB	0					2	3	3
	5	CT/R	T	UB	0					13		
2	9	CT/R	T	UB	0						1	13
3	55	CT/R	C	UB	0	0.06+	0.2	1	2	2	4	6
	2	CT/R	C	GP	0	0.04+	0.1	5		8		
	10	CT/R	T	UB	0					13		
4	7	CT/R	C	UB	0					2	1	6
	2	CT/R	T	UB	0					13		
	1	CT/R	T	GP	0					15		
5	55	CT/R	C	GP/UB#	0	0.6	2.2	4			7	12
7	14	CT	H	UB	0						0.3	2
8	12	CT	C	UB	2	0.16	0.6	5		10	2	11
	8	CT	T	UB	2					13		
9	15	CT	T	GP	5						2	15
10	161	CT	H	UB	1						3	2
11	13	CT	C	UB	5	0.3	1.1	9			2	11
12	16	CT	H	UB	4						1	6
13	22	CT	H	UB	6						2	9
14	14	CT	C	UB	1						0.3	2
15	16	CT	H	UB	3						0.5	3
16	48	SW	H	UB	0						1	2
51	3	CT	T	GP	0					13	0.9	11
	5	CT	C	GP	0					8		
60	3	SW	H	GP	0						0.2	8
61	26	CT	H	GP	0						2	8
62	11	CT	H	GP/UB#	0						0.5	5
63	10	SW	H	GP	0						1	8
64	6	SW	H	GP	0						0.5	8
65	10	SW	H	GP	0						1	8
66	8	SW	H	UB	0						0.2	2
67	1	SW	H	UB	0						0.02	2
68	3	CT	H	HP	0						0	1
70	9	SW	H	GP	0						1	8
Harvest	**676**				**0.9%**	**1.1+**	**4.2**	**0.6%**			**37**	**5%**
Fuels	**1,745**				**0.3%++**						**35**	**2%**
Total Alt. 2	**2,421**				**0.5%**						**72**	**3%**
Harvest Alt. 3	**545**				**0.7%**	**0.9+**	**3.2**	**0.6%**			**32**	**6%**
Fuels Alt. 3	**1,430**				**0.4%++**						**29**	**2%**
Total Alt. 3	**1,975**				**0.5%**						**61**	**3%**
RA Alt 2	**25,071**				**0.5%**	**1.1+**	**4.2**	**0.02%**			**72**	**0.26%**
RA Alt 3					**0.4%**	**0.9**	**3.2**	**0.02%**			**61**	**0.25%**

+ Total length of new road is 0.06 mi. to extend into the C/UB part of Unit 3; road only extends 0.04 mi to reach through C/GP part of Unit 3 and was calculated separately but is still part of the overall 0.06 miles therefore should not count twice.

All multi-site prep unit acres were divided 50/50 - GP/UB; GP = 8% and UB = 2% disturbance.

** Each helicopter landing assumes 1 acre. There are 8 landings total in the resource area (only one in Unit 3, the others along system roads) and 1 outside the project boundary at Brown Ck. Saddle.

++ See project file for table displaying existing conditions for fuels treatment areas (PF Doc. SOIL-17).

* Minor acre differences due to rounding error.

- Non-system road miles/acres were included as applicable in all proposed aerial units under existing condition.

- Complete table as above is available for Alternative 3 in project file (PF Doc. SOIL-7).

- Fuels disturbance assumed an impact of 2% for all fuel treatment units.

Proposed Treatment Abbreviations

R – Regeneration
CT – Commercial Thin
SW – Shelterwood
RA – Resource Area

Proposed Logging System Abbreviations

H – Helicopter
S – Skyline
T – Tractor

Proposed Slash Treatment Abbreviations

GP – Grapple Pile
UB - Underburn

The fuel treatments in harvest units for both alternatives consist of a combination of underburns and grapple piling (Table SOIL-7). Alternative 2 proposed 517 acres of harvest unit underburns, 3 acreas of hand piling, 75 acres of grapple piling, 15 acres of grapple pile and chunk, and a combination of grapple piling and underburning on 66 acres. In Alternative 3, the harvest unit underburning is reduced by 131 acres.

Table SOIL-7. Distribution of harvest treatments for Alternatives 2 and 3.

Treatment	Alternative 2	Alternative 3
Helicopter	348	232
Cable	275	260
Tractor	53	53
Total	**676**	**545**
Underburn	517	386
Grapple pile	75	75
Grapple pile/chunk	15	15
Hand pile	3	3
Grapple pile/underburn	66	66
Total	**676**	**545**
Commercial Thin	339	256
Commercial Thin/Regeneration	242	242
Shelterwood	95	47
Total	**676**	**545**

Most of the proposed harvest activities (Table SOIL-7), i.e. helicopter and skyline/cable, would occur during the dry summer and early fall months. In Alternative 2, 348 acres are identified for helicopter yarding and 275 acres of skyline/cable yarding. With Alternative 3, helicopter yarding is proposed on 232 acres and skyline/cable yarding on 260 acres. Tractor yarding is planned on 53 acres in either alternative. All tractor work would be scheduled during the summer months and early fall when the soil profile is dry. This scheduling would further reduce effects of compaction and displacement.

For proposed Alternative 2, approximately 37 acres are estimated to be potentially disturbed throughout the entire resource area with an additional 7 acres established for helicopter log landings and therefore removed from a long-term productive growing state due to the effects from soil compaction. A 5 acre reduction in detrimental disturbance to 32 acres is realized with modified Alternative 3 due to elimination of harvest acres. The disturbance for both alternatives is predicted to occur primarily in activity locations subjected to tractor logging during non-winter months. When considering all harvest activities for both alternatives within the resource area, the total disturbance level for Alternative 2 is 5 percent and 6 percent for Alternative 3. Results of disturbance calculations are included in the Project File, Doc. SOIL- 19 and SOIL-20.

The logging proposed for this project consists mostly of helicopter and skyline/cable which, based on past monitoring, would result in an overall soil disturbance level of ~1 to 2 percent. Grapple piling instead of underburning would result in ~8 percent disturbance (Table SOIL-3). As previously discussed, tractor logging is a minor yarding component, but can have the most detrimental effect to the soil resource. "Features Designed to Protect Soils and Site Productivity" in addition to BMPs would be used to decrease the effect of ground-based yarding systems (PF Doc. SOIL-21). Based on monitored existing conditions and estimated potential impacts, proposed harvest Units 2 and 9 along with portions of Units 1, 3, 4 and 8 should receive the highest attention levels to ensure that proper design features are used to meet required soil quality standards.

All skyline landings would be located on system roads. Disturbance on these sites due to compaction, displacement, rutting, and pile burning could have additional detrimental effects. Landings located within harvest units that have higher compaction levels (Units 2 and 9, and portions of 1, 3, 4 and 8) would be rehabilitated with scarification, seeding, and allowing slash to decompose on site. These measures would help restore soil productivity in the long term. From past timber sale activities within the resource area, 4 helicopter log landings have been established and 4 more would be constructed. These sites total approximately 8 acres that are irreparably disturbed and are considered part of the permanent transportation system. One additional existing landing is located outside of the resource area at Brown Creek Saddle.

The logging slash would remain within all harvest units and be allowed to overwinter one or two seasons before underburning. This would allow the foliage and branches to leach into the soils organic layer to recycle nutrient capital, especially potassium. Where fire risk is considered high, flexibility will be given to pile slash prior to it being left for 6 months. The amount of coarse woody debris will likely be kept at the lower end of the recommendations in several locations near structures or roadsides in order to address the hazardous fuels reduction requirements. Determination of fire risk where slash is left untreated for prolonged periods of time will be made by the district fire management officer.

Effects of Prescribed Burning and Fuelbreak Treatments – The proposed prescribed burning and fuel break treatments in both alternatives would re-introduce fire to dry-site ecosystems using prescribed underburns that consist of a combination of underburn only fuel reduction units and several small fuel breaks associated with structures of concern (Table SOIL-8). The total underburn fuel reduction only acres are 1725 acres and 22 acres of fuel breaks for Alternative 2. In Alternative 3, fuel reduction only and fuel break acres amount to 1432 acres.

Table SOIL-8. Distribution of prescribed burning and fuel break treatments for Alternative2 and Alternative 3.

Treatment	Alternative 2	Alternative 3
Burn	1725	1410
Fuelbreak	22	22
Total	**1747**	**1432**

Approximately 35 acres for Alternative 2 and 29 acres for Alternative 3 are estimated to be potentially disturbed by fuels treatment within the activity units (PF SOIL-8 and 9). The disturbance for both alternatives is predicted to occur primarily from localized areas that may be subjected to increased temperatures during the burning. When considering all fuel treatment activities within the resource area in both alternatives, the total disturbance level for both alternatives is 2 percent. Results of disturbance calculations are included in the Project File, Doc. SOIL- 8 and SOIL-9.

The fuel break units are immediately adjacent to private property and near homes and are intended to create defensible space during a potential fire event. No commercial harvest is proposed though noncommercial thinning, pruning, piling, or chipping will occur. The slash next to homes in the fuel breaks will not be overwintered and will be disposed of by either hand piling, burning, or chipping soon after treatment.

From on site observations (PF Doc. SOIL-1 and SOIL-17), the fuel reduction only units contain limited coarse woody debris. Because these units lack a heavy fuel bed and have a flashy fuel component (grass/forbs), prescribed fuel management may adversely effect the soil, therefore all prescribed fire activities would utilize BMPs to minimize the potential of overheating the soil.

Burning under controlled conditions of high soil moisture reduces potential nutrient losses and the chance of creating hydrophobic soils that can lead to increased erosion, sedimentation, and debris flows (Neary et al. 2005, PF Doc. SOIL-R-43; Robichaud 2000, PF Doc. SOIL-R-50; Swanson 1981, PF Doc. SOIL-R-55). No measurable negative soil effects are anticipated from prescribed burning if soil moisture is 25 percent or greater (Niehoff 1985, PF Doc. SOIL-R-45). This is especially crucial for slopes with a more southerly aspect if prescribed burning takes place in the fall.

Effects of Road Construction - Under the Proposed Action, the construction or reconditioning of roads would produce an irreversible effect to site productivity through compaction and displacement. Once sale activity ends, temporary roads would be obliterated, which would begin to reduce compaction of the soil and return a portion of the topsoil to the surface, which helps restore soil productivity and decreases hydrologic effects from road surface runoff.

Alternatives 2 and 3 have scheduled approximately 0.2 miles of temporary road construction associated with harvest Units 3 and 8. There is an additional 0.9 miles of road reconstruction with the proposed action Alternative 2. Under the modified Alternative 3 there are 0.6 miles, a reduction because Unit 11 is eliminated. Either alternative will cause long-term soil compaction, displacement, and effects to site productivity on approximately 4 acres in Alternative 2 and ~3 acres in Alternative 3. When compared to the project's total proposed harvest acreage, the disturbance in Alternative 2 and Alternative 3 is 0.6 percent.

After all sale activities have ended, the temporary roads in Units 3 and 8 would be recontoured and seeded. Road decommissioning and soil restoration would contribute to a reduction in compaction, thus improving infiltration and reducing surface runoff (Switalski et al. 2004, PF Doc. SOIL-R-56). No further roads have been identified for decommissioning in either action alternative. However, several culverts will be removed on FR990 in Brown's Creek (outside of resource area) as mitigation for activities in Rookie Creek. Where culvert are upgrades or removed, there will be short durations of increased sediment yields while in-stream work is accomplished. Roads classified for long term storage are considered capital investments and an irretrievable disturbance, which are part of the permanent transportation system.

Effects of Road Maintenance - No additional soil impacts would occur from proposed road maintenance activities such as blading, drainage improvements, and surfacing on existing dedicated roads.

Effects on Soil Productivity – The resource area is underlaid by Belt formation metasedimentary rock (Geology map, PF. Doc. SOIL-15). It is suspected that Belt Series rock can be potassium deficient, with certain formations more deprived then others (Garrison-Johnston 2004, PF. Doc. SOIL-R-19). Because of the lower rates of weathered potassium, it is necessary that fine residue (foliage and branches) is allowed to overwinter on-site within each proposed harvest unit. This allows potassium and other nutrients to leach out of the fine residue and back into the soil where it would be available for future uptake. Thinning harvest would reduce competition for soil nutrients resulting in higher nutrient concentrations available for uptake by the remaining stand vegetation.

As a direct effect, harvesting on all sites would remove within each tree bole about 14 percent of the potassium that is contained within a tree. This may have an indirect affect on some plants that remain in the stand. Douglas-fir and grand fir consume and store more potassium than other tree species. The release and availability of this stored potassium would benefit western larch, ponderosa pine, and western white pine, which require less potassium for growth and maintenance (Garrison and Moore 1998, PF. Doc. SOIL-R-17). These more potassium efficient tress would be planted as necessary in all post harvest silvicultural work. Measuring the effects of on-site productivity cannot be done with certainty until more research information becomes available. At this time, management recommendations from the IFTNC are used as guidelines for maintaining sufficient potassium on a site.

Approximately 7 to 14 tons per acre of coarse woody debris would be left on Douglas-fir/grand fir sites. The majority of harvest units presently display reduced coarse woody debris levels and could benefit from additional material. This would provide protection against soil erosion as well as a long-term source of nutrients and organic matter (Brown et al. 2003, PF Doc. SOIL-R-6; Graham et al. 1994, PF Doc. SOIL-R-21). However, removal of excess woody debris reduces the potential for high-temperature uncontrolled fires that could otherwise sterilize the soil at high temperatures, cause highly erosive hydrophobic soil conditions, and reduce overall soil productivity (Pritchett and Fisher 1987, PF Doc. SOIL-R-49).

Indirect effects of soil wood loss also includes altered processes of forest regeneration and growth, favoring species requiring lower soil moisture and nutrient levels. Additional effects could include loss of habitat for species requiring soil wood as dens or substrate for invertebrates, bacteria and fungi, which affect food availability for small rodents and their predators.

The commercial thinning of Douglas-fir and grand fir in association with leaving western larch would allow the release of stored foliar potassium from the Douglas-fir as a beneficial nutrient for uptake by western larch (Garrison and Moore 1998; PF Doc. SOIL-R-17). Western larch is a more potassium-efficient species and would be planted throughout the units where it already is a primary stand component. Where it is not, white pine would also be planted.

Cumulative Effects of Ongoing and Reasonably Foreseeable Activities

Past, Present, and Reasonably Foreseeable Activities

Timber Harvest – The resource area has been influenced by past harvest activities (PF Doc. SOIL-16) and could be affected by present and future land management. The majority of previous logging began in the 1910s and through the early 2000s. Mostly little to some moderate soil disturbance was found throughout the resource area. There are no ongoing or reasonably foreseeable timber harvest activities on National Forest lands beyond what is currently proposed within the analysis area.

Outside the analysis area approximately 5 miles to the east, the District is proposing a timber management project near Thompson Pass, primarily within the Cat Creek and Jo Gulch drainages (T49N, R6E, sections 7-9 and 16-21). This proposal, identified as the Jo-Cat Environmental Assessment, considers salvaging some of the timber mortality resulting from a mountain pine beetle attack and treating lodgepole pine stands in the area with a moderated to high risk of beetle infestation. Treatments will also include commercial thinning within stands of western larch to help retain this larch component on the landscape over the long term. The proposal will consider the construction of approximately 1.3 miles of new road with reconstruction of an existing roadway. Skyline, tractor, and helicopter operations would be required to yard this timber. The proposed action is expected to generate approximately 3000 ccf (1.5 million board feet) of merchantable timber products over 293 acres. The proposal will also consider some non-commercial thinning treatments along the Forest Highway 9 travel corridor to reduce potential fire intensities along the roadway. Soil disturbance would be site-specific and would consist of primarily aerial logging systems with less than 80 acres of ground-based harvest. No cumulative effects on soils are expected to arise from this proposed project in regards to the Prichard-Murray fuels reduction.

On non-Forest Service land, logging activities and an associated right of way exchange and road construction are reasonably forseeable within the next 5 years near Fancy Gulch (T50N, R4E, sections 25-26) that connects with the Eagle Creek drainage. The area is located south of proposed helicopter harvest Unit 16. Timber harvest on non-Forest Service land must follow the rules and Best Management Practices set by the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code). Though most of the activities on non-Forest Service land that detrimentally disturb soils, impair soil productivity, and increase soil water content are site specific, potential contribution to the cumulative condition are possible due to its proximity to a nearby harvest unit and several scattered fuel treatment areas within the Eagle Creek drainage.

Roads – Roads constructed in the past provide access to public and private land in the Prichard-Murray resource area. System roads were removed from productivity when they were constructed and have little to no additional effect on the area if properly maintained. Up to 1.1 miles (~4 acres) of temporary and reconditioned roads are proposed with the Prichard-Murray Project. At this time, there are no existing roads proposed for decommissioning throughout the resource area.

Recreation – The resource area was open for general motorized use through the early 1990s, which allowed for hunting, fuel wood gathering, gathering of miscellaneous forest products, dispersed camping, and motorized touring. Under the current District's Travel Access Plan, motorized access to most of the resource area is not permitted. Some roads have been decommissioned but most have been closed with a barrier and nearly all hunting and the gathering of miscellaneous forest products are now carried out on foot. Illegal incursions by off road vehicles is not a regular occurrence since a majority of the roads are well barriered or brushed in. With the implementation of this project, a large majority of the area would be managed for non-motorized use and some additional road decommissioning may occur if funding becomes available.

Wildfire – Wildfires have been common in the past with the most recent one having started in 1919. In 1889, a possible human caused fire associated with mineral prospecting occurred followed by another fire in 1910 that burned portions of the resource area. Fire should not be eliminated as an ecological process and proper management through fuel reduction and prescribed burning should sustain an environment were fire plays an integral role in stand maintenance and healthy forests with minimal soil damage.

Successful fire suppression actions would eliminate the chance of detrimental effects to soil productivity. Most hand fire-line construction would have only minor disturbance to the soil resource. As needed, closed

roads would be reopened for access and incorporated as part of the fire line construction. As part of post fire-work, the areas of disturbance would be rehabilitated and again the roads would be returned to their previous condition.

Noxious Weeds - Noxious weed monitoring and treatment would continue and would follow guidelines established in the Coeur d'Alene Noxious Weeds EIS (USDA 2000, PF Doc. CR-029). Effects to soil resources were analyzed in the document and its adaptive strategy. No additional effects to soils beyond what was analyzed for and disclosed in the EIS are expected to occur.

5. Consistency with Forest Policy and Legal Mandates

All alternatives would comply with Forest Plan standards (PF Doc. CR-002, pages II-32 and II-33) and Regional Soil Quality Standards (USDA 1999, PF Doc. SOIL-R-58) related to detrimentally disturbed soils.

Forest Plan Soil Standard #1

Soil disturbing management practices will strive to maintain at least 80 percent of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation. Unacceptable productivity potential exists when soil has been detrimentally compacted, displaced, puddled, or severely burned as determined in the project analysis.

All alternatives would comply with this standard; soil disturbing management practices would not exceed 15 percent detrimental conditions and would maintain at least 85 percent of each activity area in a condition of acceptable productivity potential for trees and other managed vegetation (PF Doc. SOIL-18).

Forest Plan Soil Standard #2

Projects should strive to maintain sufficient large woody debris to maintain site productivity. Large woody debris is essential for maintenance of sufficient micro-organism populations.

All alternatives would comply with this standard; large woody debris would follow the research guidelines of Graham et al. (1994; PF Doc. SOIL-R-21) to ensure the maintenance of site productivity.

Forest Plan Soil Standard #3

In the event of whole tree logging, provision for maintenance of sufficient nutrient capital should be made in the project analysis.

There is no whole-tree logging proposed in any of the alternatives.

Regional Manual Recommendations

Detrimental disturbance would not exceed the recommended 15 percent in any individual activity area.

Organic matter layer thickness would be retained as appropriate for local conditions.

Large woody debris would be maintained at recommended volumes (Graham et al. 1994, PF Doc. SOIL-R-21) in each proposed activity area.

6. References Cited in the Soils Analysis

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Specialist's Report on Wildlife in the Prichard – Murray Resource Area

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SPECIALIST'S REPORT ON WILDLIFE IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework for Wildlife

Although a variety of sources are used to assess wildlife species and habitat (including historic records, current databases, large scale assessments, scientific studies and management recommendations), the regulatory framework providing direction for the protection and management of wildlife and habitat comes from the following principle sources:

- *Endangered Species Act of 1973 (as amended)*: Section 7 of the Endangered species Act (ESA) directs that actions authorized, funded, or carried out by federal agencies do not jeopardize the continued existence of any threatened or endangered species, or result in the adverse modification of habitat critical to these species.
- *National Forest Management Act of 1976:* The National Forest Management Act (NFMA) provides for balanced consideration of all resources. It requires the Forest Service to plan for a diversity of plant and animal communities. Under its regulations the Forest Service is to manage for viable populations of existing native and desired non-native species, and to maintain and improve habitat of management indicator species.
- *Forest Plan:* The Idaho Panhandle National Forests Forest Plan (1987), in compliance with NFMA, establishes Forest-wide management direction, goals, objectives, standards and guidelines for the management and protection of wildlife habitat and species, including old growth habitat, management indicator species, sensitive species, and threatened and endangered species. Sensitive species are designated by each Region of the Forest Service based on the occurrence of the species and their habitats within Regional boundaries. Region 1 sensitive species are evaluated in this document.
- *Migratory Bird Executive Order:* The Migratory Bird Executive Order (2001) describes the responsibilities of federal agencies to protect migratory bird species through a Memorandum of Understanding (MOU) with the Fish and Wildlife Service. The order directs federal agencies to consider these species in agency plans, and to evaluate the effects of proposed actions on migratory bird populations and their habitat, with emphasis on species of concern (PF Doc. WL-R67)

2. Methodology Used in the Wildlife Analysis

2.A. Introduction

USDA Forest Service policy (Forest Service Manual 2670.32) requires a documented review of Forest Service programs or activities in sufficient detail to determine how an action may affect threatened, endangered, candidate, or sensitive species. This environmental assessment serves as the primary **biological evaluation (BE)** for sensitive wildlife species. Effects to wildlife species listed under the Endangered Species Act are addressed separately in a **biological assessment (BA).** Much of the wildlife analysis is tiered to the following documents and information, which provide the primary direction and methods used to develop the analysis for potential effects on wildlife**:**

- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*
- *Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin*
- *The Road Analysis Process and the District Travel Plan*
- *Recorded species observations*
- *Suitable and potential habitat models*
- *Applicable scientific research, literature, management recommendations and conservation strategies*

The wildlife analysis is done at different levels, ranging from coarse filter to fine filter, as appropriate to address issues and concerns relative to each species. According to CEQ regulations, the level of analysis should be commensurate with the importance of the impact, the risk associated with the project, the species involved, and the current level of knowledge (CEQ 1502.15). Species for which it has been determined there would be no measurable effects are not analyzed in detail.

Direct, indirect, and cumulative effects are disclosed by alternative and by species. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action but occur later in time, yet are still reasonably foreseeable to occur (40 CEQ 1508.8). CEQ regulations (40 CFR 1608.7) define cumulative effects as impacts that result from the incremental impact of an action when added to other past, present and reasonably foreseeable actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. Refer to the EA (Appendix B) for a list of ongoing and reasonably foreseeable projects.

For each wildlife species analyzed, the cumulative effects analysis area has been identified based on the species' or guilds' relative home range size in relation to available habitat, topographic features that affect how species move and utilize their home range (such as ridges and streams on watershed boundaries), and boundaries that represent the furthest extent of effects. Maps depicting wildlife habitat by species are provided in the project files. Based on habitat relationships, appropriate indicators of habitat with a potential to be impacted by the proposed action have been measured. Queries of the Timber Stand Management Records System database (TSMRS) were used to identify capable and suitable habitat within each wildlife analysis area. Changes in habitat for each relevant species are disclosed with a discussion of the effects on species. Queries have been designed to best utilize the information stored within the TSMRS database (USDA Forest Service, Idaho Panhandle National Forests. PF Doc. WL-77). Field surveys by the wildlife biologist were conducted to verify the habitat queried in the TSMRS database (Taylor 2006. PF Doc. WL-143).

2.B. Habitat Model Validation

The Forest Service has developed Forest-wide wildlife habitat capability/suitability models for several Threatened, Sensitive, and Management Indicator wildlife species or species guilds (Canada lynx, fisher/marten, Northern goshawk, black-backed woodpecker, pileated woodpecker, and elk) on the Idaho Panhandle National Forests. Information used for suitable habitat included: habitat type, size class, past activities, forest type, elevation, basal area, presence of snags, and number of trees above a specific size class (PF Doc. WL-64). Information used for each species varies, based on the specie's particular needs. Forest Service personnel conducted site visits to representative suitable and capable habitats for these species, with emphasis placed on stands modeled as "currently suitable." Several proposed treatment areas were not visited if they were determined to be unsuitable for modeled species based on field notes and unit descriptions provide by the project team silviculturist or verification by aerial photo interpretation. Capable habitat is determined by habitat type and topographic factors which do not change over time. Data used in wildlife habitat suitability models was validated for each species, as follows:

Canada Lynx: Only 2,057 acres of the resource area is in a Lynx Analysis Unit or LAU (PF Doc. WL-9). No activities are proposed in lynx habitat (PF Doc. WL-9). Suitable lynx habitat was determined using the Forestwide Habitat Model (PF Doc. WL-143). In the Prichard-Murray Resource Area, 99 acres of suitable lynx denning habitat, 39 acres of high quality forage habitat and 770 acres of low quality forage habitat were identified (PF Doc. WL-9). Low quality forage habitat is used primarily for travel habitat. Lynx habitats were not verified by the wildlife biologist because they were outside all the planned units. Fire suppression has been very effective in preventing the creation of lynx foraging habitat (stands between 25 and 40 years) old that could provide habitat for the snowshoe hare.

Northern Goshawk: The Forestwide Habitat Model (PF Doc. WL-143) identified 185 acres of suitable goshawk habitat in the analysis area (PF Doc. WL-19). Areas burned in the early 1900s have not grown back to large trees that would provide suitable goshawk habitat in most of the analysis area. A callback survey was conducted for goshawks in July 2006. No goshawk responded, but one was seen during the survey.

Fisher/Marten: Only 1,108 acres of suitable fisher habitat were identified by the forestwide habitat model, largely as a result of extensive stand-replacing fires from 1889 to 1919, which have grown back to mid-aged forests in the analysis area (PF Doc. WL-19). Fisher habitat is provided by moist forest habitat types with an average diameter tree size of nine inches (PF Doc. WL-143). Stand exams record these as mature high-risk sawtimber, mature low-risk sawtimber, and sawtimber. There is no marten habitat in this Resource Area because the elevation is too low. Capable fisher habitats are stands with moist habitat types that currently do not have large enough trees to provide suitable habitat for the fisher (PF Doc. WL-143). Based on their current age, many of the capable stands could provide suitable fisher habitat in a few decades if allowed to grow without large diameter snags and logs being removed.

Pileated Woodpecker: Pileated woodpecker habitat was assessed based on stands with live or dead trees at least 20" dbh (PF Doc. WL-28). Forest Inventory and Analysis (FIA) is a national forest inventory protocol. The district silviculturist ran a report on 8/8/06 using the latest FIA data for the Central North Fork Coeur d'Alene landscape area, which includes the Prichard-Murray analysis area. This report estimated this area contains an average of 2 snags/acre > 20" dbh (PF Doc. WL-17). These are the size pileated woodpeckers use for nesting. Pileated woodpeckers can forage on small & large snags. The FIA snag analysis estimated 68.2 snags/acre smaller than 20" dbh in the Central North Fork Coeur d'Alene watershed area (PF Doc. WL-144). Recruitment of snags is not a concern at the present time, based on aerial surveys for trees recently killed by insects and diseases (PF Doc. WL-145).

Black-backed Woodpecker: Black-backed woodpeckers select habitats with high densities of wood-boring beetles. These are typically large diameter trees or stands which have experienced moderate to high severity fires within the last several years. This species occurs at lower density in ponderosa pine, western larch, lodgepole pine, spruce and sometimes other forest stands with an average tree diameter larger than 5 inches. This species selects fairly large diameter trees for nesting. Seventy-six black-backed woodpecker nest trees averaged 36.4 cm (14.3") dbh (PF Doc. WL-22). Aerial insect and disease detection maps were also used to locate forage habitat for the black-backed woodpecker (PF Doc. WL-145).

Elk: The elk model relies on security acres, road density, cover/forage ratio, and distance to cover. This model does not rely on TSMRS data. Security was calculated using GIS data verified by district engineers for the district access management project.

2.C. Wildlife Conservation Assessments and Strategies

Conservation assessments and strategies are written to assist federal agencies in managing habitat for threatened and endangered species and other species of concern. They are most often joint efforts among participating agencies to increase awareness and knowledge of the species by describing life history strategies, habitat requirements and usually present management recommendations and guidelines to assist in maintaining suitable habitat and populations. This information, in conjunction with scientific literature, is used to assist in planning and in developing project design features that minimize or avoid effects to wildlife and wildlife habitat.

The *Pacific Bald Eagle Recovery Plan*, the *Northern Rocky Mountain Wolf Recovery Plan*, the *Recovery Plan for Woodland Caribou in the Selkirk Mountains,* and the *Species Conservation Assessment and Conservation Strategy for the Townsend's Big-eared Bat* provide requirements for habitat management for these species. The Prichard-Murray Resource Area is not within a recovery area for the threatened grizzly bear or the endangered woodland caribou. In February of 2000, a *Lynx Conservation Assessment and Strategy* was released in an effort initiated by the U.S. Fish and Wildlife Service in cooperation with the Forest Service and Bureau of Land Management. The purpose of the Strategy is to provide a consistent and effective approach to avoid or reduce adverse effects from management activities to the Canada lynx or its habitat. The assessment is applied using Lynx Analysis Units (LAUs) where habitat is managed to provide for lynx denning and foraging habitat.

2.D. Viability

The Northern Region, USDA Forest Service has developed a conservation assessment of the northern goshawk, black-backed woodpecker, flammulated owl and pileated woodpecker in the Northern Region (Samson 2005, PF Doc. WL-R67). For each species, the conservation assessment includes:

1. *A brief overview of ecology, behavior and habitat use*
2. *A brief overview of habitat use in the Northern Region*
3. *Estimates of well-distributed habitat by National Forest*
4. *Evaluation of short-term viability*
5. *Evaluation of long-term viability and ecosystem sustainability*

The assessment is intended to satisfy the statutory requirement to provide for diversity of native animal communities based on suitability and capability of the specific land area to meet overall multiple-use objectives as required by the National Forest Management Act (16 U.S.C. 1604 (g)(3)(B)). The appropriate scale for this viability analysis is the regional level, and the results of this analysis refer to the region as a whole. The Prichard-Murray resource area by itself is too small a scale for a population viability analysis.

The conservation assessment was based on a principle-based approach to population viability (PVA). The methods and background for this approach use point observation data and vegetation inventory based on Forest Inventory and Analysis (FIA) to build wildlife habitat relationship models to analyze short-term viability. The conservation assessment also looked at peer-reviewed literature, non-peer reviewed publications, research reports and data accumulated by the Forest Service. Where possible, the peer-reviewed professional society literature is emphasized because it is the accepted standard in science.

In summary, the conservation assessment shows that short-term viability (less than 100 years) is not an issue in Region 1 for the goshawk, black-backed woodpecker, flammulated owl or pileated woodpecker. Because of habitats trending away from historic range now and in the future, long-term viability (more than 100 years) is low. An explanation of the reasons viability would be maintained in the Northern Region for the next 100 years is provided in the Table WL-1.

Table WL-1. Reasons why viability would be maintained in the Northern Region for the next 100 years, by species (from Samson 2005, PF Doc. WL-67).

Species	Reasons Viability is Maintained
Northern goshawk *(Samson 2005; pages 38-39)*	No scientific evidence exists that the northern goshawk is decreasing in numbers. Increases in the extent and connectivity of forested habitat have occurred since European settlement. Well-distributed and abundant northern goshawk habitat exists across the Forest Service's Northern Region. Level of timber harvest is insignificant (in 2004, harvest occurred on 0.0009 percent of the forested landscape in the Northern Region). Suppression of natural ecological processes has increased and continues to increase amounts of northern goshawk habitat.
Black-backed woodpecker *(Samson 2005; pages 51-52)*	No scientific evidence exists that the black-backed woodpecker is decreasing in numbers. Increases in the extent and connectivity of forested habitat have occurred since European settlement. Amounts of small and mid-size trees have increased since European settlement. Well-distributed and abundant black-backed woodpecker habitat exists on today's landscape. Level of salvage timber harvest or overall timber harvest of forested landscapes in the Northern Region is insignificant.
Flammulated Owl *(Samson 2005; pages 62-63)*	No scientific evidence exists that the flammulated owl is decreasing in numbers. Increases in the extent and connectivity of forested habitat have occurred since European settlement. Well-distributed and abundant flammulated owl habitat exists on today's landscape. Level of timber harvest in the Northern Region is insignificant. The barred owl represents a significant threat to the flammulated owl.
Pileated Woodpecker *(Samson 2005; pages 68-69)*	No scientific evidence exists that the pileated woodpecker is decreasing in numbers. Increases in the extent and connectivity of forested habitat have occurred since European settlement. Well-distributed and abundant pileated woodpecker habitat exists on today's landscape. Level of timber harvest in the Northern Region is insignificant.

For more detailed information on methodology, peer-reviewed background literature, and statistical analysis in the conservation assessment refer to PF Doc. WL-67.

2.E. Geographic Scope of the Wildlife Analysis

The geographic scope of analysis varies by species according to the appropriate methodology and level of analysis needed to determine potential effects. A number of variables define the level of analysis for each species including, but not limited to, species occurrence, presence of suitable or potential habitat, existing condition, the potential for impacts and the difference in effects between alternatives. Generally, the geographic scope is the Prichard-Murray Resource Area; however, due to species and habitat distribution, home range size, linkages between suitable habitats or between winter and summer range, distances of dispersal, the potential for immigration and emigration into a population, and other variables, the analysis may include an area as large as northern Idaho or an area smaller than the Prichard-Murray Resource Area.

Private land and land managed by the Bureau of Land Management (BLM) are inside the project boundary. Because the Forest Service does not have jurisdiction on lands off the national forest, this analysis only applies to National Forest System lands within the analysis area. One reasonably foreseeable action is the BLM's plan to acquire permanent administrative access into three BLM parcels at Dream Gulch and Alder Gulch (approximately 100 acres). Their planned treatment would include understory removal of small diameter trees and salvage harvest of Douglas-fir. The proposed project would use helicopter, cable and tractor yarding systems. Less than 1,000 feet of new temporary road construction may be needed in Dream Gulch. These areas would be mechanically treated and broadcast burned. Reforestation activities would also occur. Without site-specific logging prescriptions, it is impossible to determine the potential effects these activities would have on wildlife and their habitats.

2.F. Wildlife Species Relevancy Screen

Wildlife species listed under the Endangered Species Act, Sensitive Species and Management Indicator Species known to occur on the Idaho Panhandle National Forests were screened for their relevancy to the Coeur d'Alene River Basin and to the Prichard-Murray Resource Area by reviewing sighting records, planning documents, habitat suitability models and other sources such as historic records and scientific literature. Relevancy is determined based on whether there is evidence of species or habitat present within the analysis area, and whether any such species or habitat could potentially be affected by the proposed activities. Some habitat and species may occur in the Coeur d'Alene River Basin yet not be applicable to the Prichard-Murray Resource Area or surrounding areas. A coarse filter screen was applied at the Coeur d'Alene River Basin scale, and then a finer screen was used to assess species relevancy at the watershed scale.

The analysis is commensurate with the importance of the impact (40 CEQ 1502.15), the risk associated with the project, the species affected, and the level of knowledge available. Some wildlife species or their habitat are present in the analysis area, but would not be measurably affected because they would not be impacted by the proposed activities, the impacts would not be sufficient to influence their use or occurrence, or the species' needs can be adequately addressed through design of the project. No further discussion or analysis is necessary for those species and/or suitable habitat that are not found in the Resource Area or for those which would not measurably be affected (see Table WL-2).

Wildlife Species Considered

The U.S. Fish & Wildlife Service provided an updated list of **Threatened, Endangered & Candidate Species** that may occur in the Idaho Panhandle National Forests on March 1, 2006 PF Doc. WL-R105). These species, their listing status and the probability that they occur in the Resource Area are displayed in Table WL-1.

Sensitive species are designated by each Region of the Forest Service based on regional distribution of the species and their habitat. Table WL-1 shows the probability of each R1 Sensitive species occurring in the Prichard-Murray Resource Area. The analysis for sensitive species serves as the primary biological evaluation for this project. A biological checklist with a summary of rationale and effects determinations is included in the wildlife project files (PF Doc. WL-49).

The Forest Plan (Appendix L-4; PF Doc. WL-R53) identified elk and moose as **Big game Management Indicator Species** because they are a general forest species easily affected by management activities, particularly access management, and of social concern for hunting. Moose frequently use the bottomlands associated with the North Fork Coeur d'Alene River and its tributaries, but since elk are the primary big game species using the area, this analysis focuses on elk. The effect of management activities on elk is one of the main issues the Forest Plan identified through public involvement. Elk are a priority big game species for Idaho Fish and Game, and elk hunting is a significant economic factor in Northern Idaho.

The Forest Plan designated three **Old growth Management Indicator Species** for the monitoring and management of old growth or late successional conditions: pine marten, pileated woodpecker, and northern goshawk (Table WL-1). None of these species uses old growth forests exclusively. These species use large diameter trees, snags and down wood for nesting and/or foraging. The status of these species depends on the availability of forest structures that support older forests with these components. Old growth is discussed in more detail in the Specialist's Report on Forest Vegetation (PF Doc. SR-02). The discussion of old growth habitats in this chapter tiers to that information. Goshawks have been placed on the list of sensitive species for Region 1 and are addressed under the sensitive species discussion.

Nongame species are those managed by Idaho Fish & Game as species that are not hunted or trapped. They include many species of amphibians, reptiles, rodents, raptors and songbirds. Nongame species are often important prey for furbearers and large predators like wolves, lynx and bears. Changes in vegetation composition and structure are used to assess effects to nongame species. Two basic types of habitat in the Prichard-Murray Resource Area have changed dramatically over the last 100 years: riparian areas characterized by their abundance of water, cottonwoods, alder and willows; and old forests dominated by long-lived seral conifers such as western red cedar, white pine and western larch (PF Doc. SR-02). The effect of human activities on these two habitats has been analyzed and the changes to populations of nongame species dependent upon these forests are discussed.

Neotropical migrant birds are those that breed and nest in temperate habitats and migrate to tropical habitats for the winter. The Upper Columbia Basin Draft Environmental Impact Statement states that breeding bird surveys on national forests found an increase of ten species of neotropical birds and a decrease of five species. Often the increases in populations are of less desirable species such as the brown-headed cowbird (USDA et al., 1994; PF Doc. WL-R55). Little population or habitat data are available for many species of neotropical migrant birds, and changes that may benefit one species may have undesirable effects on other species.

Probability of Wildlife Occurrence

The probability of a specific species occurring in the Resource Area is based on records of species sightings, presence of suitable habitat and the potential of the area to provide suitable habitat in the future.

Recorded observations come from several sources, including Forest Service records and information from the Idaho Conservation Data Center, Coeur d'Alene Audubon Society and other organizations that record observations or conduct surveys for wildlife species in the area. Reports of wildlife sightings are on file in the wildlife office at the Coeur d'Alene River Ranger District (PF Doc. WL-10).

For species considered in this analysis, modeling methods for suitable and potential habitat, field verification, current knowledge of species distribution, scientific studies and applicable management recommendations are discussed in detail. Refer to the Wildlife Appendix A for further explanation of species not addressed further.

No probability of occurrence
No suitable habitat occurs in the area, and/or the area is outside the known range of the species, and there are no recorded observations in the area.

Low probability of occurrence
Marginally suitable habitat is limited and isolated, and there are no recorded observations of the species in the area.

Moderate probability of occurrence
Suitable habitat exists in the area and it is within the known range of the species, but there are no confirmed observations.

High probability of occurrence
Suitable habitat is present in the area and there have been confirmed observations of the species.

Table WL-2. Summary of Wildlife Presence and Level of Analysis.

Species Common Name	Species Scientific Name	Species or Habitat on District?	Probability of Occurrence in Resource Area?	Species or Habitat Potentially Affected?	Species Further Analyzed? (Section)
Threatened & Endangered Species					
Gray Wolf (E)	*Canis lupus*	Yes	Moderate	Yes	Yes (3.B)
Canada Lynx (T)	*Lynx canadensis*	Yes	Low	Yes	Yes (3.C)
Bald eagle (T)	*Haliaeetus leucocephalus*	Yes	High (observed)	Yes	Yes (3.D)
Grizzly Bear (T)	*Ursus horribilis*	Yes	Low	No	No
Woodland Caribou	*Rangifer tarandus*	No	None	No	No
Sensitive Species					
Flammulated owl	*Otus flammeolus*	Yes	High (observed)	Yes	Yes (3.E)
Black-backed woodpecker	*Picoides arcticus*	Yes	Low	Yes	Yes (3.F)
Fisher	*Martes pennanti*	Yes	Low	Yes	Yes (3.G)
Wolverine	*Gulo gulo*	Yes	Moderate	No	No
Coeur d'Alene salamander	*Plethodon idahoensis*	Yes	High (observed)	Yes	Yes (3.H)
Townsend's big-eared bat	*Plecotus townsendii*	Yes	Moderate	Yes	Yes (3.I)
Fringed Myotis	*Myotis thysanodes*	Yes	Moderate	Yes	Yes (3.I)
Boreal toad	*Bufo boreas*	Yes	Low	Yes	Yes (3.J)
Peregrine falcon	*Falco peregrinus anatum*	Yes	None	No	No
Common loon	*Gavia immer*	No	None	No	No
Harlequin duck	*Histrionicus histrionicus*	Yes	High (observed)	Yes	Yes (3.K)
Northern bog lemming	*Synaptomys borealis*	No	None	No	No
Black swift	*Cypeloides niger*	Yes	None	No	No
Pygmy nuthatch	*Sitta pygmaea*	Yes	High (observed)	Yes	Yes (3.L)
Old Growth Management Indicator Species					
Pileated woodpecker	*Dryocopus pileatus*	Yes	High (observed)	Yes	Yes (3.M)
Pine marten	*Martes americana*	Yes	Moderate	Yes	Yes (3.N)
Northern goshawk	*Accipiter gentilis*	Yes	High (observed)	Yes	Yes (3.O)
Big-Game Management Indicator Species					
Rocky Mountain elk	Cervus elaphus	Yes	High (observed)	Yes	Yes (3.P)
Other Species and Habitat					
Nongame and Migratory Birds	N/A	Yes	High (observed)	Yes	Yes (3.Q)

Suitable and Potential Wildlife Habitat

Of primary consideration in the wildlife analysis is the current and potential capability of the structure, composition, arrangement and patch size of the vegetation to provide the habitat components necessary to meet the life history requirements of a particular species. Quantitative modeling to assess current habitat and potential effects are not always applicable due to a lack of available knowledge about many species and their habitat requirements, and limited amount of information regarding some key habitat components such as size and amount of down wood in certain stands. Models are used when appropriate based on available information and applicability. When feasible, suitable and potential habitat are modeled using databases describing forest vegetation (such as TSMRS) and Geographic Information Systems (GIS) mapping which delineate variables such as slope, aspect, soils, road density and riparian habitats. These data are supported by species observation records, field verification, and field surveys for specific species and habitats.

Suitable habitat defines wildlife habitat that has a combination of features meeting the habitat requirements of a given species at the present time.

Potential capable habitat does not currently provide suitable habitat, but because of certain characteristics has the potential to provide suitable habitat in the future as stand conditions change. For example, changing stand conditions may include seral stage, cover type, stand density, tree size, stand age, and stand condition.

Habitat models approximate the acres of habitat for each species. They do not predict the exact acres of habitat due to the manner in which different habitat components are grouped and the detail of information

available. Differences may occur in the values due to the scale at which the analysis is conducted, the level at which effects become apparent, and the consequences of the action on different resource values. Detailed descriptions of the specific analysis method or modeling process used for each species can be found under the section of this report pertaining to that particular species, and in the associated project files cited in that section.

2.G. Features Designed to Protect Wildlife Habitat

The proposed action was designed to be implemented in a manner that would protect resources in the Prichard-Murray Resource Area. The following guidelines would be met during implementation:

- *Snags would be retained to meet the Northern Region (Region 1) Snag Management Protocol and snag standards in the IPNF Forest Plan (PF Doc. VEG-20 and VEG-21).*
- *Long-lived early seral conifer species (ponderosa pine, western white pine and western larch) of all sizes (with emphasis on those 18 inches or greater in diameter) would be favored to remain on site unless removal is unavoidable due to safety reasons or special circumstances.*
- *All closed roads that are opened, constructed, or reconstructed during this project and the road shown on the Travel Plan as Road 343 would be closed with an effective gate or barrier during project activities, and then effectively closed (as good as or better than existing closure) after activities are complete. The analysis of effects to wildlife under the Proposed Action is based upon meeting these guidelines.*
- *Prescribed burning would be implemented in a manner that would avoid disturbance of roosting bats (Ormsbee 2001. PF Doc. WL-147). This could be achieved by preventing fire within 400 meters of the entrance to a cave or mine when bats may be present, unless a site-specific assessment indicates a more appropriate distance to avoid effects of heat and smoke on bats. Areas upslope of cave or mine openings would be protected to prevent erosion and disturbance. A map of mine locations is in the project file (PF Doc. WL-26).*
- *Protect large diameter snags 20" dbh or larger from burning during fuels treatments to protect habitat for pileated woodpecker, pygmy nuthatch and other species which use large trees and snags. Incidental trees charred during prescribed burning operations would be retained on site for black-backed woodpecker habitat and habitat or other species which use snags.*
- *If any threatened, endangered or sensitive wildlife species are observed in the Resource Area before or during project implementation, the district wildlife biologist will be notified immediately. The biologist would determine any project modifications necessary to protect the species and its habitat based on applicable laws, regulations and management recommendations for the species. If any threatened, endangered or sensitive species is found to be nesting (or denning with young) in an area scheduled for prescribed burning or silvicultural treatment, the district wildlife biologist will be notified immediately and activities would be delayed in the area until recommendations of the wildlife biologist can be implemented.*

3. Affected Environment & Effects to Wildlife

3.A. Overview of Terrestrial Wildlife Habitat in the Prichard-Murray Resource Area

Old and Mature Forests

Many wildlife species occurring on the Idaho Panhandle National Forests prefer or occur only in mature and old forests. This includes the bald eagle, these sensitive species: northern goshawk, flammulated owl, black-backed woodpecker, pygmy nuthatch, fringed myotis and fisher, and numerous other nongame species. Stands with old and mature structure provide habitat for species that rely on large trees, large snags and/or large down logs for nesting, foraging or raising young. Existing structurally immature stands could provide mature stands and old growth habitat over time if not disturbed, or if managed to maintain the large, old, dead and decaying structural components of the forest within the levels needed to provide suitable habitat. The Forest Service requires maintenance of approximately ten percent old growth across the Idaho Panhandle National Forests to provide for viable populations of old growth dependent species (Forest Plan, p. II-5; PF Doc. WL-41, WL-R53). Several stand-replacing fires in the early 1900s and timber harvest in the late 1900s reduced the old growth in the Prichard-Murray Resource Area. For more information on old growth, please refer to the Specialist's Report on Forest Vegetation (PF Doc. SR-02). The Prichard-Murray Resource Area includes all or part of Old Growth Management Units (OGMU) 109, 100, 112, 115, 116, 123 and 127. These OGMUs average 16.2 percent allocated old growth (PF Doc. SR-02, page 17).

This analysis reflects changes in habitat conditions (such as stand structure) resulting from past, present and reasonably foreseeable actions.

Except where specifically stated, it is assumed that private lands do not provide habitat, in order to provide the most conservative ("worst case") assessment on these federal lands, since the Forest Service has no authority or information base concerning private lands.

Dry Forest Habitats

Dry forest habitats are found in limited amounts on the Coeur d'Alene River Ranger District and within the Prichard-Murray Resource Area. Some wildlife species prefer open, dry forests with large trees, including the flammulated owl, pygmy nuthatch, and others. Many forest stands that have lost much of their larger structural component and developed a dense understory of shade-tolerant conifers are no longer suitable for these species. Dry forest habitats have evolved with frequent low or mixed intensity ground fires. The mean fire return interval for all habitat types in the Interior North Fork of the Coeur d'Alene River before Euro-American settlement was 62 years (PF Doc. FF-9, p. 9). Fires were more frequent on drier habitats, and left large seral trees and decreases fuels in the understory (refer to the Specialist's Report on Fire/Fuels, PF Doc. SR-01). To protect human developments and future timber resources, fire suppression in the Coeur d'Alene River Basin has been practiced for an extended period of time. This practice allows the establishment of smaller shade-tolerant tree species under the canopy, changing the structure of dry site habitat from a relatively open-grown forest with a large diameter overstory into dense multi-canopy stands with many immature trees. Remaining stands are at risk for high intensity, stand-replacing fires and high levels of insects and disease.

Figure WL-1. Tree cavities provide habitat for a number of wildlife species which use snags.

Snag and Down Woody Habitat

The amount of snags and down woody material present has been identified as a measure of forest integrity (Quigley et al. 1996; PF Doc. WL-R44). Dead trees, both standing and on the ground, are critical habitat components for dozens of wildlife species which use snags for nesting, foraging and/or cover. Sensitive species and management indicator species which nest in snags include pileated woodpeckers, black-backed woodpeckers, flammulated owls and pygmy nuthatch. Some of these species cannot excavate cavities and depend on the other species to create cavities for nesting, denning or shelter. Fringed myotis and other bats roost in snags. Fishers use snags and large down wood for dens where they give birth and raise their young. Retaining habitat for cavity excavators is vital to other wildlife dependent on snags.

In the Prichard-Murray Resource Area, large-diameter standing and dead trees are less abundant now than they were historically, and the wildlife species associated with these habitat components are probably less abundant as well. Large fires after the turn of the last century consumed large live and dead trees. Logging, mining and firewood cutting have removed dead and down trees for several decades. Today, over ½ of the resource area is small/medium size classes that lack large diameter snags. Large diameter snags provide habitat for the greatest variety of wildlife and remain standing longer than smaller snags. Ponderosa pine and western larch tend to last longer than other snags. Even after falling to the ground, large diameter snags provide important habitat for many wildlife species. Down wood is essential in providing den sites, cover and foraging substrate for a variety of species including boreal toads, lynx, fishers, pine martens and other small mammals. Many birds that nest in snags promote forest health by controlling forest insect populations. Without these insectivorous birds, populations of Douglas-fir beetle and other forest pests increase and cause more damage to conifers.

Selective harvest for seral species and salvage logging have occurred historically in the Coeur d'Alene River Basin. Large stand-replacing fires occurred between 1910 and 1930, resulting in the current middle-aged stands. These types of activities have reduced snag habitat across the Coeur d'Alene River Ranger District and in the Prichard-Murray Resource Area:

- *Old stands have shifted to mature or middle-aged classes.*
- *Direct removal of large diameter snags and green trees has decreased snag availability*
- *Diseases and longer fire intervals from fire suppression have changed the species composition of the forest, reducing seed sources for species such as western white pine and western larch, which both are important for providing large snags for wildlife.*
- *Longer fire intervals have increased non-seral species that are more prone to insects and disease and are less likely to live long enough to provide large snags.*

Recognizing changes and losses in snag habitat has led to management plans designed to provide an amount of snags and down wood shown to support viable populations of species that use these habitat components.

Several studies have suggested the number of snags that should be made available or retained for snag-dependent species. This assessment uses the Region 1 Snag Protocol (USDA 2000; PF Doc. WL-R44) and the Idaho Panhandle National Forests' Forest Plan to determine appropriate snag retention guidelines. Snag monitoring on the Idaho Panhandle National Forests has shown that snag retention has not always been fully met following timber management. Several factors can impact snags during a project including inadequate marking of leave trees, inadequate contractual control, activities involved with felling and yarding, fuels treatment and woodcutting following logging.

Fragmentation and Road Density

Road density affects the degree to which wildlife species are vulnerable to direct mortality (roadkill and hunting) and the degree to which the habitat provides species' needs. Motorized traffic displaces wildlife and decreases the amount of suitable habitat and habitat security. Openings associated with roads may act as a barrier to some species, or a travelway for predators. For other species, roads affect movement patterns and the ability for dispersal. Often roads and timber harvest units are in preferred wildlife habitat such as riparian

areas, ridgetops and flat benches. Roads increase habitat fragmentation and add to edge effects. The access provided by roads can cause direct and indirect mortality to wildlife. Direct mortality may result from vehicle collisions, incidental trapping and random shooting. Indirect mortality is caused primarily by the level of disturbance and displacement and by alteration of habitat. The primary causes of fragmentation in forests are roads and regeneration harvests. Roads and urban development and other conversions to non-forest types have caused fragmentation on private lands. A road density less than one mile per square mile is considered a high security area, providing habitat for wide-ranging carnivores and other wildlife (PF Doc. WL-R95).

To evaluate and manage habitat security for elk, the district has been divided into several Elk Habitat Units or EHUs. The Forest Plan established an overall Elk Habitat Potential (EHP) goal of 52 for the Wallace portion of the district, in which the Prichard-Murray Resource Area is located. These EHPs are a cumulative rating based on the EHUs which make up each part of the district. The overall EHP rating on the Wallace side is currently 55.3 percent, which meets Forest Plan goals. Each EHU has a recommended goal, but this does not have to be met in every EHU as long as cumulatively all the EHUs on the Wallace side meet the Wallace goal. Most of the proposed treatment acres are in WEHU 3. WEHU 3 does not meet the recommended level based on the Forest Plan, but WEHU 7 does.

Table WL-3. Current Elk Habitat Potential

Elk Habitat Analysis Area	Forest Plan Goal for Elk Habitat Potential (EHP)	Current Elk Habitat Potential (EHP)
Wallace EHU3	65%	57%
Wallace EHU7	33%	53%

All closed roads that are constructed, reconstructed, or reconditioned for this project would be closed during and following project activities. Under Alternative 2, reconstruction would temporarily re-open roads that have been brushed in, had earth barriers installed or the front end of the road obliterated (PF Doc. WL-43). These roads would be gated during project activities, and then gated or barriered after all project activities are complete, to maintain no net increase in the amount of open roads. Short-term disturbance would be low to moderate depending on how effective the gates are. Since the roads to be gated are close to Murray and based on past road closures being violated, it is likely that gates will not be an effective tool to maintain habitat security. Over the long term, wildlife security could be improved with the installation of more effective barriers that discourage unauthorized use of roads. Following completion of project activities, there would be no increase in open road density in the Prichard-Murray Resource Area.

3.B. Gray Wolf (Endangered Species)

Life History of Gray Wolves

Historically, wolves roamed widely throughout North America. In 1915, the United States government began sponsoring control programs providing for the extirpation of the species to reduce perceived threats to humans, livestock and big game. The program was very successful in its objective, and by the late 1930s wolves were virtually eliminated from the western United States. Although government control programs ceased in the early 1960s, it was over 50 years before wolf reproduction was again confirmed in the western states in 1986.

The northern Rocky Mountain wolf (a subspecies of the gray wolf) was listed as endangered in 1973. Due to enforcement problems and a trend to recognize fewer subspecies of wolves, the entire species was listed as endangered in the lower 48 states except Minnesota in 1978 (USDI 1987). In 1994, the U.S. Fish and Wildlife Service published final rules in the Federal Register (Volume 59, Number 224) making a distinction between wolves that occur north vs. south of Interstate 90 in Idaho. Gray wolves occurring north of Interstate 90 where this project is located are listed as endangered species and receive full protection in accordance with provisions of the Endangered Species Act. Gray wolves occurring south of Interstate 90 are listed as a nonessential experimental population, with special regulations defining their protection and management.

Reference Condition for Gray Wolves

Conservation requirements for wolf populations are not fully understood, but prey availability and limiting the risk of human-caused mortality are key components (USDI 1987; Northern Rocky Mountain Wolf Plan; Tucker et al 1990, PF Doc. WL-R146). Elk and deer are the primary prey of wolf packs in Idaho; lone wolves also prey on beaver, snowshoe hares and other smaller animals. The risk of human-caused wolf mortality is directly related to the density and distribution of open roads.

Access management is the most important tool for providing wolf habitat security, to meet the needs of its prey and to limit direct human-caused mortality. However, some wolf packs have recently been found occupying areas in Montana with road densities greater than two miles of road per square mile of land. Reducing human-caused mortality is an important factor in maintaining wolf populations. Reducing access can be effective when human-caused wolf mortality cannot be reduced by other management.

Management Recommendations for Gray Wolves

Wolves are highly social animals requiring large areas to roam and feed. Key elements in gray wolf habitat include a year-round prey base, secluded areas for raising pups, and isolation from frequent human disturbance (Hansen 1986). Studies suggest that there is a strong relationship between key big game summer ranges and calving and fawning areas, and reliable reports of wolves (U.S. Fish and Wildlife Service 1987).

Affected Environment for Gray Wolves

Wolves are not restricted to any particular habitat. They travel great distances when pursuing their prey and when lone wolves are dispersing. Wolves are known to occur near the Prichard-Murray Resource Area as transient visitors, and are likely to occur in the Resource Area. Two wolf packs occur on the St. Joe Ranger District south of the Prichard-Murray Resource Area and others reside in Montana northeast of the Resource Area. There is no known wolf pack activity in the Prichard-Murray Resource Area, but it is likely a wolf pack could become established on the Coeur d'Alene River Ranger District in the next few years.

Figure WL-1. Gray wolf south of I-90 in 2003 (photo courtesy of Idaho Department of Fish & Game).

Environmental Consequences to Gray Wolves

Since the Prichard-Murray Resource Area is north of Interstate 90, the gray wolf is protected under the Endangered Species Act. Under the No Action Alternative, the vigor and biomass of brush fields could be reduced over the long term, resulting in a reduction of prey for wolves.

Under Alternatives 2 and 3, elk habitat effectiveness potential for EHUs would not change, since less than 1 mile of new road would be constructed. Therefore, activities under this project **would not jeopardize gray wolves or gray wolf populations**. Viability of the species would be maintained, since the goal to have 30 breeding pairs well distributed throughout three states for three successive years has been met (2001 Wolf Recovery Report; PF Doc. WL-30).

3.C. Canada Lynx (Threatened Species)

Life History of Canada Lynx

Lynx occur in mesic coniferous forests that have cold, snowy winters and provide a prey base of snowshoe hare. Primary vegetation that provides lynx habitat includes lodgepole pine, subalpine fir, and Engelmann spruce (Ruggiero et al. 2000; PF Doc. WL-R81). In extreme northern Idaho, northeastern Washington, and northwestern Montana, cedar-hemlock habitat types may also be considered primary vegetation. In central Idaho, Douglas-fir on moist sites at higher elevations may also be considered primary vegetation. Secondary vegetation that, when interspersed within subalpine forests, may also contribute to lynx habitat; these include cool, moist Douglas-fir, grand fir, western larch and aspen forests.

Lynx prefer to hunt in sapling stands adjacent to old growth. Low numbers and a dispersed population make lynx vulnerable to overexploitation from trapping, and habitat disruption (Koehler and Aubry in Ruggiero et al. 1994; PF Doc. WL-R68). Snowshoe hares are the primary prey of the lynx, comprising 35 to 97 percent of the diet. Other prey species include red squirrel, grouse, flying squirrel, and ground squirrels. Southern populations of lynx (south of Canada's boreal forest) may prey on a wider diversity of species than northern populations because of lower average hare densities and differences in small mammal communities.

Reference Condition for Canada Lynx

Historical records of lynx are relatively numerous in the Idaho Panhandle; this species appears to have always had a scattered distribution in the U.S. (Davis 1939 in Ruggiero et al. 1994, PF Doc. WL-R68, PF Doc. WL-10). In 1946 lynx were fairly well distributed in wooded areas of Idaho's northern counties with 25 to 30 being taken annually by trappers and hunters (Rust in Koehler & Aubrey 1994, PF Doc. WL-R68). Although lynx are relatively common throughout forested areas of Alaska and Canada, past trapping in the lower forty-eight states of the U.S. and recent lynx hunting in Canada have eliminated or reduced numbers in localized areas. The conservation of lynx populations is a concern particularly in the western mountains of the contiguous United States, at the southern periphery of the species' range.

Lynx occupy arctic and boreal habitats from western Alaska to eastern Newfoundland. Resident lynx populations currently exist only in Washington, Montana, Maine and possibly Minnesota in the lower 48 states. The northern boundary of this range coincides with the northern extension of the boreal forests. The southern boundary of lynx range is along the high elevation or boreal forests of the Cascades and Rocky Mountains. They are considered to exist but no longer sustain self-supported populations in Idaho, Oregon, Wyoming, Utah, Colorado, Wisconsin and Michigan; lynx may no longer exist in New Hampshire, Vermont, New York, Pennsylvania, and Massachusetts (Ruediger, et al. 2000 WL-R80).

Lynx (*Lynx canadensis)* are associated with the cold winters and deep snows of northern latitudes occurring primarily above 4,000 feet in Washington, Idaho, and Montana; above 6,500 feet in Wyoming, and above 8,000 feet in Colorado & Utah. In Idaho lynx habitat includes subalpine fir, spruce, and lodgepole pine forests generally above 4,000 feet. The home range of females is from 15 to 30 square miles. At least 80 percent of their diet is snowshoe hares, which require deciduous browse and dense lodgepole pine and/or subalpine fir canopies. Lynx also need mature forests for denning and cover. Lynx avoid large openings (greater than 330 feet from cover); very large openings may disrupt movement between isolated populations (Koehler & Aubry, 1994; PF Doc. WL-R68). Lynx are considered low-density species with home ranges averaging 24 square miles, depending on prey abundance. Even though lower elevations can be important in some instances, evidence suggests lynx tend to use these areas less because of competition with other predators and overheating in the summer.

Most of the Prichard-Murray analysis area is too low elevation and unsuitable for Canada lynx. Only 2,057 acres are in a Lynx Analysis Unit or LAU (WL-9). Of that, 908 acres are suitable habitat for Canada lynx (see Table 4 below).

Management Recommendations for Canada Lynx

In accordance with the Canada Lynx Conservation Assessment and Strategy, federal actions are analyzed relative to their potential for affecting lynx or lynx habitat according to the following recommendations, which are based on the most current information available. The analysis is based on Lynx Analysis Units or LAUs, which approximate the home range of the species. LAUs were delineated on the Coeur d'Alene River Ranger District by the U.S. Fish and Wildlife Service and the Forest Service according to protocol established in the Lynx Conservation Assessment and Strategy. Topography, elevation and vegetation were the main characteristics used to identify LAUs on the Idaho Panhandle National Forests. The extent to which these recommendations are implemented assists in the evaluation of effects on lynx habitat and facilitates Section 7 consultation and counterpart regulations with the U.S. Fish and Wildlife Service (PF Doc. WL-80):

- *Within each Lynx Analysis Unit (LAU), no more than 30% of lynx habitat can be unsuitable at any time. Management activities will not change more than 15% of lynx habitat into unsuitable condition within a 10-year period.*
- *Within an LAU, maintain denning habitat on at least 10% of the area that is capable of producing stands with these characteristics. Denning habitat should be well distributed and in patches larger than 5 acres.*
- *Allow no net increase of regularly used or groomed over-the-snow routes and play routes. Open road densities should be managed to not exceed 2 miles per square mile within the LAU.*
- *Maintain vegetative structure that facilitates movement of lynx along important connectivity corridors (e.g. riparian areas, saddles, ridges).*

Affected Environment for Canada Lynx

Although most sightings of lynx in the Idaho Panhandle National Forests have occurred on the Priest Lake, Bonners Ferry, and Sandpoint Ranger Districts, lynx observations have been reported on the St. Joe Ranger District south of Interstate 90 and on the Coeur d'Alene River Ranger District. There have been no recorded observations of lynx in the Prichard-Murray Resource Area.

Table WL-4 displays the amount of lynx habitat in the assessment area and in the Bitterroot Divide South LAU which is partially included in the analysis area for this project. Modeled lynx habitats were not field verified by a wildlife biologist. No proposed treatment units are in lynx habitats.

There are 844 acres in the LAU in the Prichard-Murray Resource Area that are unsuitable for lynx and are not managed for lynx. Unsuitable habitat generally is a habitat type such as Douglas-fir which lynx do not use.

Table WL-4. Lynx Habitat Classification

Habitat component for the portion of the Bitterroot Divide South LAU which is in the Prichard-Murray analysis area	Acres of Suitable Lynx Habitat in Prichard-Murray Resource Area	Acres of Capable Lynx Habitat in Prichard-Murray Resource Area
High Quality Forage	39	
Denning	99	
Low quality forage	770	
TOTAL SUITABLE LYNX HABITAT	908	
TOTAL CAPABLE LYNX HABITAT		306

Environmental Consequences for Canada Lynx

No Action Alternative: The Prichard-Murray Resource Area would lose low quality forage habitat for lynx over the next 50 years as some of these stands matured into denning habitat. Snowshoe hare populations and prey for the lynx would remain low because very little pre-forage and high quality forage acreage exists today. As some of these low quality forage area stands begin to open up as mature trees die, understory regeneration could provide habitat for snowshoe hares. If stand-replacing wildfires or human-caused fires occur in the future, they could result in large patches of preforage, which would likely become high quality lynx forage habitat 25 to 35 years after the fires. The pre-forage and high quality forage components are currently in short supply in the analysis area. The amount of unsuitable habitat would not change. Groomed snowmobile routes would remain at current levels.

Alternatives 2 and 3: No timber harvest or prescribed burning units are proposed in lynx habitat or in a Lynx Analysis Unit (LAU). These alternatives would maintain all habitat identified as current lynx habitat for a short time. Snowshoe hare populations and prey for the lynx would remain low because very little pre-forage and high quality forage acreage exists today. Habitats which are young stands currently classified as pre-forage areas for lynx would become lynx high quality forage within about 25-40 years. If stand-replacing wildfires or human-caused fires occur in the future, they could result in large patches of preforage, which would likely become high quality lynx forage habitat 25 to 35 years after the fires. The pre-forage and high quality forage components are currently in short supply in the analysis area. The amount of unsuitable habitat would not change. Groomed snowmobile routes would remain at current levels.

Cumulative Effects to Canada Lynx: None of the proposed thinning or burn units are in suitable lynx habitat, so this project will have no cumulative effects on lynx or their habitat. In the Bitterroot Divide South LAU in the Prichard-Murray Resource Area, management activities in the last decade have changed less than 15 percent of lynx habitat into unsuitable condition. This project would not make more than 30 percent of the LAU unsuitable, and denning habitat would be maintained where it occurs. There would be no net increase of regularly used or groomed over-the-snow routes or play routes. Open road densities would not change in the Bitterroot Divide South LAU, and vegetation would be maintained in the portions of the LAU that are in the Prichard-Murray Resource Area. Therefore, the implementation of either action alternative **would have no effect on the Canada lynx or its habitat.** The No Action Alternative would have no effect on the Canada lynx or its habitat.

3.D. Bald Eagle (Threatened Species)

Life History of Bald Eagle

Bald eagles typically nest within a few hundred yards of the shore of a lake or large river, selecting large nest trees which are often taller than adjacent trees and offer good visibility of the water. They typically return to the same nest for several years. Cottonwoods, ponderosa pines and other open-canopy trees are frequently used as nest trees by bald eagles. Bald eagles' primary diet is fish, but they also eat waterfowl, waterbirds such as coots and shorebirds, carrion and occasionally small mammals. As lakes and rivers freeze in the winter, bald eagles migrate to open freshwater and marine habitats where fish are available.

Reference Conditions for Bald Eagles

Bald eagles nest and winter on large lakes and rivers in Idaho and other western states and provinces. No bald eagle nests have been found on the North Fork of the Coeur d'Alene River, although adult and immature eagles are seen during most years roosting or flying along the river (PF Doc. WL-10).

Management Recommendations for Bald Eagles

If a bald eagle nest is found in the resource area, the district wildlife biologist will be consulted on how to avoid disturbing bald eagles during the nesting season. This could include timing restrictions and no-flight zones around the nest.

Affected Environment for Bald Eagles

Bald eagles are summer residents on the Coeur d'Alene River and are frequently seen perched between Prichard Creek and Shoshone Creek. No bald eagle nests have been found on this river.

Environmental Consequences for Bald Eagles

No Action Alternative: This alternative would have no effect on bald eagles or their habitat. Over the long term, cottonwoods in the floodplain of the North Fork of the Coeur d'Alene River would continue to decline, reducing the number of perches for bald eagles close to the river; numerous conifers are available for bald eagle perches and nesting on the slopes at the edges of the floodplain.

Alternatives 2 and 3: These alternatives would have no effect on the bald eagle or its habitat. No potential nest trees or perch trees would be harvested close to the North Fork of the Coeur d'Alene River. Foraging habitat for bald eagles would not be affected because riparian vegetation would filter sediment and the elevated roadbed of Forest Highway 9 would trap sediment if it occurs (Specialist's Report on Aquatic Resources, p. AQ-33 & 34, PF Doc WL-14), so there would be no effect on turbidity in the river where bald eagles forage.

Cumulative Effects to Bald Eagles: There are no known bald eagle nests on the North Fork of the Coeur d'Alene River. No activities are planned that would affect roost trees, potential nest trees or foraging habitat for the bald eagle in the resource area, therefore there would be no cumulative effects on bald eagles or their habitat. Therefore, implementation of either action alternative **would have no effect on the bald eagle or its habitat.** The No Action Alternative would have no effect on the bald eagle or its habitat.

3.E. Flammulated Owl (Sensitive Species)

Life History of Flammulated Owls

Flammulated owls occupy dry, open Douglas-fir and ponderosa pine forests with low understory vegetation such as grasses and shrubs. These understory plants are important for the reproduction of moths. Moths comprise this species' primary diet (Goggans 1985. PF Doc. WL-R17). The flammulated owl is a small owl which nests in cavities in trees. It cannot excavate its nest cavity, so this secondary snag species depends on woodpeckers, other birds and natural decay processes to create suitable nest cavities. Cavities excavated by pileated woodpeckers are preferred where they are available (The Birds of North America website). In British Columbia flammulated owls were found in stands with 35% - 65% canopy (Howie and Ritcey PF Doc. WL-26). Flammulated owls are migratory, and only occur in North Idaho between late spring (April or May) and early fall. They are one of the last migratory bird species to return to this area in the spring. Each nesting pair of flammulated owls forages in a small area (approximately 35 acres) around its nest tree. Nest trees / snags are at least 14" dbh.

Reference Conditions for Flammulated Owls

The distribution of flammulated owls is scattered in dry coniferous forests of western United States and Canada from British Columbia to Central America. Their habitats are dominated by ponderosa pine and/or Douglas-fir forests. Patches of short trees are important for hiding cover and roosting for fledgling flammulated owls. Their distribution in Idaho is largely unknown. The Forest Service has conducted several surveys for this species on the Idaho Panhandle National Forests (IPNF). Flammulated owls have been heard at a few locations on the IPNF, including in the Prichard-Murray resource area. No surveys to identify flammulated owl nests have been conducted on the Coeur d'Alene River Ranger District.

There is no information about historic sightings or populations of this species in the Idaho Panhandle. Records of this species were not kept by the Forest Service before this species was listed as sensitive in the early 1990s. Flammulated owl habitat has declined greatly over the past century from fires, logging and fire exclusion. Fire exclusion has resulted in a dense understory in many forest stands; this type of forest structure is not generally considered suitable for this species. Although flammulated owl habitat is not as widely distributed as it was historically in the northern Rockies, a Conservation Assessment of flammulated

owls found habitat to be well-distributed and abundant across the Forest Service's Northern Region (Region 1) and concluded that viability for the species will be maintained for the next 100 years (Samson 2005, p. 51-52; PF Doc. WL-67) at the regional scale. However, suitable habitat for the flammulated owl is very patchy or absent in many drainages on the Idaho Panhandle National Forests. A viability analysis for flammulated owls at the national forest level has not been completed.

Management Recommendations for Flammulated Owl

Our goal is to maintain or enhance habitat for flammulated owls in the Prichard-Murray resource area. The flammulated owl is an obligate secondary snag species. Stands managed for this species must have trees and snags at least 14 inches dbh with holes as large as those created by northern flickers. Because this species arrives later than most other migratory birds in the spring, it is at a disadvantage for selecting available nest holes. If too few nest cavities are available, other species will have already occupied them before flammulated owls arrive in the spring. Consequently, it is important to have a sufficient number of snags greater than 14" dbh with cavities to provide suitable nesting habitat for this species. Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54) may maintain snag availability for flammulated owls under either of the action alternatives. The Specialist's Report on Forest Vegetation states that up to 15% loss of overstory trees is acceptable in prescribed burning units (Specialist's Report on Forest Vegetation, page 40). Stands which are suitable habitat for this species should maintain between 35% and 65% canopy closure. Stands with less than 35% canopy closure would not be suitable for flammulated owls. Foraging and nesting habitat must be in close proximity because this species has a small home range of about 20 to 35 acres (Goggans 1986; PF Doc. WL-R17).

Affected Environment for Flammulated Owls

This species is known to occur in the Prichard-Murray Resource Area; it was detected during a 2005 flammulated owl survey. An analysis of FIA data by the district silviculturist estimates the Central Coeur d'Alene Basin averages 6.2 snags per acre at least 14 inches dbh, but not all of these are in habitats suitable for flammulated owls (PF Doc. WL-17). FVS data show the Prichard-Murray Resource Area has a higher percentage of large snags than the Coeur d'Alene River Basin. A habitat model developed by the Forest Service for the Idaho Panhandle National Forests identified several stands which are currently suitable habitat for the flammulated owl, and others which are considered capable, meaning under the right conditions (tree size, species, age, etc.) could provide flammulated owl habitat in the future (Taylor. 2000. PF Doc. WL-90). Units which are currently suitable for flammulated owls are shown in Table WL-5.

Environmental Consequences to Flammulated Owls

No Action Alternative: Increased natural tree mortality from insects and disease would increase the number and density of snags, especially the larger diameter snags (over 14" dbh) that flammulated owls select for nest trees. Some mature stands would move toward old growth, while others would deteriorate from insects, disease or other factors before they meet old growth criteria. Wildfires and human-caused fires are likely. Depending on how effectively prescribed fires are controlled, fires which burned understories without reducing the forest canopy to less than 35% could improve habitat for flammulated owls.

Alternatives 2 and 3: Table WL-5 shows the units and treatments in suitable and capable flammulated owl habitat. Thinning on 72 acres would maintain 35% canopy closure and maintain suitable habitat for flammulated owls where it currently occurs in areas proposed for thinning. (Refer to the target stand for DRY habitat groups at the beginning of PF Doc. VEG-3.) Prescribed burning in 431 acres of suitable flammulated owl habitat in Units 26, 37, 38, 41, 42 and 49 would result in a loss of foraging habitat at least one year after the prescribed fires, but understory shrubs, grasses and forbs would increase in following years, returning foraging habitat to its current condition or improving habitat for moths and foraging opportunities for flammulated owls.

Fuelbreak treatments on 8 acres of capable flammulated owl habitat in Alternative 2 would not reduce the canopy closure below 35%, so would have no effect on capable habitat for the flammulated owl in the foreseeable future.

Alternative 3 would not treat any old growth stands. This alternative would thin 20 acres of suitable flammulated owl habitat in Unit 10. These would remain suitable for flammulated owls because the canopy closure would be maintained at 35% or higher. This alternative would prescribe burn 227 acres of suitable flammulated owl habitat in Units 26, 37 and 42, resulting in a loss of foraging habitat the year of the burn, but within a few years of the burns as the understory plants grow back, moth habitat and foraging owl habitat would improve on the burned acres. Prescribed burning on 782 acres of capable flammulated owl habitat will reduce foraging habitat for flammulated owls for at least one year after the prescribed fires, but understory shrubs, grasses and forbs would increase in following years, returning the foraging habitat to its current condition or improving habitat for moths and foraging opportunities for flammulated owls. Treating these capable stands with fire would likely make some of them suitable habitat for flammulated owls within several years, which is quicker than they would become suitable for this species under the No-Action alternative.

Fuelbreak treatments on 81 acres of capable flammulated owl habitat in Alternative 3 would not reduce the canopy closure below 35%, so would have no effect on capable habitat for the flammulated owl in the foreseeable future.

Alternatives 2 and 3 would retain and possibly create more large diameter snags which flammulated owls need for nesting (PF Doc. WL-R148). Alternative 2 includes 275 acres of old growth proposed for treatments, primarily prescribed burning, which would not be treated under Alternative 3. Probably few of the snags that would be created in prescribed burn units under either alternative would be large enough to provide nesting sites for flammulated owls (at least 14" dbh). Most large diameter ponderosa pine and western larch and would survive the fire. However, Douglas-fir may experience some mortality from prescribed fire. Research in grand fir and Douglas-fir forests in Oregon found significantly fewer snags in stands that were prescribed burned in the fall compared to unburned controls (Bull et al. 2005. PF Doc. WL-R141). Spring burning would retain more snags. Snags may increase after spring prescribed fires that would kill some green trees, possibly creating new nesting opportunities for flammulated owls.

Over the next twenty years, thousands of acres of small/medium forest in the Prichard-Murray Resource Area are expected to become mature/large forest (Specialist's Report on Forest Vegetation p. 21). Depending on cover type and other forest structure variables, some of these would provide habitat for flammulated owls. Stand composition in treatment units would favor long-lived seral species which include western white pine, western larch and ponderosa pine (Specialist's Report on Forest Vegetation, page 22). If some of these stands become dominated by western white pine or western larch instead of ponderosa pine, they would become unsuitable for flammulated owls, which are not known to nest in western larch or western white pine forests.

Table WL-5. Acres of treatment in suitable flammulated owl habitat under the action alternatives.

Alternative 2		Alternative 3	
Unit	**Proposed acres/treatment in suitable flammulated owl habitat**	**Unit**	**Proposed acres/treatment in suitable flammulated owl habitat**
10	72 acres thinning	10	20 acres thinning
26	141 acres prescribed burning	26	141 acres prescribed burning
37	16 acres prescribed burning	37	16 acres prescribed burning
38	104 acres prescribed burning	42	70 acres prescribed burning
41	67 acres prescribed burning		
42	70 acres prescribed burning		
49	34 acres prescribed burning		
504 acres treatment in suitable habitat		**247 acres treatment in suitable habitat**	

Cumulative Effects to Flammulated Owls: Adhering to the Forest Service's regional snag management protocol (PF Doc. WL-R54) would retain between 1 and 4 large diameter snags per acre on the landscape. Target snag densities vary between dry and moist habitat types. A conservation assessment for the flammulated owl in the Northern Region found that viability will be maintained for the next 100 years for Region 1 national forests (PF Doc. WL-67). Therefore, the implementation of either action alternative **may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** The No Action Alternative would cause a decline in habitat for flammulated owls as natural processes and fire suppression contribute to conditions favoring dense understories in ponderosa pine and Douglas-fir stands.

3.F. Black-backed Woodpecker (Sensitive Species)

Life History of Black-backed Woodpeckers

The black-backed woodpecker is a yearlong resident in North Idaho. Black-backed woodpeckers excavate nest cavities in a variety of tree species. Research on 76 black-backed woodpecker nests in Idaho, Wyoming, Montana and Wyoming found the average size of black-backed nest trees was 14.3" dbh (PF Doc. WL-22). Black-backed woodpeckers forage for insects in the bark of live trees such as lodgepole pine and larch. Larvae of wood-boring beetles including the mountain pine beetle make up most of this species' diet (Dixon and Saab 2000; PF Doc. WL-R16). Several studies have verified that black-backed woodpeckers also prefer to forage on burned snags (Dixon and Saab 2000; PF Doc. WL-R16), and may be concentrated in areas that have recently burned. Post-fire habitat is thought to have the greatest value as source habitat for black-backed woodpeckers (O'Connor & Hillis. 2001; PF Doc. WL-R41).

Reference Conditions for Black-backed Woodpeckers

Black-backed woodpeckers are found in coniferous forests of North America including the Cascade Range, northern portions of the Sierra Nevada and the Rocky Mountains (Washington Department of Wildlife 1991; PF Doc. WL-R62). Black-backed woodpeckers have been found in scattered locations throughout Washington, with the heaviest concentrations east of the Cascade Crest. Their distribution in Idaho is largely unknown, although over 60 sightings have been documented on the Idaho Panhandle National Forests in the last 15 years, mostly in unburned forests and not close to recent fires. Annual breeding season surveys for black-backed woodpecker and other sightings have confirmed the presence of black-backed woodpeckers in the breeding season on the Coeur d'Alene River Ranger District (district wildlife sightings file).

There is little information about historic sightings or populations of black-backed woodpeckers. Records of this species were not kept by the Forest Service before this species was listed as sensitive in the early 1990s. It is likely that their habitat has declined over the past century because of their preference for post-fire habitats and ongoing fire suppression during that time period. Fire exclusion has effectively and dramatically reduced the number of forest acres burned and the size of burned areas, limiting the development of black-backed woodpecker breeding and foraging habitat. Lodgepole pine may have had greater distribution and occurred in larger patches across the forest prior to fire suppression as this conifer species relies on fire to open cones and allow seeds to regenerate. Although the role of western white pine in providing black-backed woodpecker habitat is largely unknown, this species may have used white pine snags when it existed in large blocks across the Coeur d'Alene Basin before being greatly reduced by blister rust over the last century.

Studies in Region 1 suggest that from 1940 to 1987, black-backed woodpecker habitat was below the historical range of variation in the region. From 1989 to the present, black-backed woodpecker habitat is thought to be well above the historic range on a regional scale as a result of the frequent high intensity fires that have occurred since that time in Montana. A Conservation Assessment of black-backed woodpecker found habitat to be well-distributed and abundant across the Forest Service's Northern Region (Region 1) and concluded that viability for the species will be maintained for the next 100 years (Samson 2005, p. 51-52; PF Doc. WL-67).

There have been no large fires in the Prichard-Murray Resource Area in recent years that would have created habitat for black-backed woodpeckers. In 2006 the Revett Fire burned 163 acres east of the resource area in the Prichard Creek Basin, and the Ulm Fire, farther north and outside the resource area, burned 4,152 acres. Both of these fires created habitat for black-backed woodpeckers, and are larger than most fires which have occurred in recent years on the Coeur d'Alene River Ranger District.

Management Recommendations for Black-backed Woodpeckers

Specific management recommendations for this species support re-introduction of fire into the ecosystem, particularly in larch (Dixon and Saab, 2000; PF Doc. WL-R16). Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (USDA Forest Service and USDI BLM 1997) may not maintain snag availability for black-backed woodpeckers under either of the action alternatives. Research by Bull found that black-backed woodpeckers select areas of high snag density for nesting. Current snag management guidelines require much lower levels of snag density than this species prefers. Research in Oregon found black-backed woodpeckers nested in stands with a mean snag density of 73 snags per acre (Bull et al. 1986. PF Doc. WL-R7).

Affected Environment for Black-backed Woodpeckers

Black-backed woodpeckers may inhabit the Prichard-Murray Resource Area, but the Forest Service has no records of this species in the analysis area. Western larch and lodgepole pine, which are preferred for breeding habitat, are found in the resource area (PF Doc. WL-10). Root disease has resulted in insect infestations that provide foraging opportunities for the black-backed woodpecker in the Resource Area. Wood-boring beetles provide an insect source for black-backed woodpeckers. Aerial surveys in recent years on the Idaho Panhandle National Forests found increasing beetle activity in the Prichard-Murray Resource Area .

Little information is available on the benefits of white pine to wildlife, but such stands may have historically provided habitat for black-backed woodpeckers. Blister rust has eliminated over 90% of historic white pine from the northern Rockies in the last century. An analysis of FIA data estimates the Prichard-Murray Resource Area has an average of 6.2 snags per acre at least 14 inchesdbh (PF Doc. WL-17). Fire suppression has been very effective since 1910 in the Prichard-Murray Resource Area (Specialist's Report on Fire/Fuels, p. 10). Fire suppression has effectively prevented the creation of high quality black-backed woodpecker habitat. Sixty-four fires burned only 111 acres over several decades, and one fire in 2003 was 82 acres. Insect outbreaks mapped during aerial detection surveys by entomologists found additional forage habitat for black-backed woodpeckers scattered across the Resource Area, but most insect concentration areas are too small to provide much nesting habitat for black-backed woodpeckers, whose home ranges have been measured between 178 and 810 acres (PF Doc. WL-R156).

Environmental Consequences to Black-backed Woodpeckers

Since this area provides less than optimal black-backed woodpecker habitat, there would be limited effects on black-backed woodpecker habitat under any of the alternatives.

No Action Alternative: No short-term effects or changes would result from the implementation of the No Action Alternative, because no activities are proposed. Over the long term as stands age, bark beetle populations may increase, improving foraging opportunities for black-backed woodpeckers. Increased natural tree mortality due to insects and disease would increase the number and density of snags, especially the larger diameter snags (over 10 inches dbh) that black-backed woodpeckers usually select for nest trees. Some mature stands would move towards old growth, while others would deteriorate before they meet old growth criteria. If stand-replacing fires occur in the future and burned stands are not salvage logged, they would increase habitat for black-backed woodpeckers. Depending on how effectively these fires are controlled, moderate to high intensity fires would increase forage habitat for approximately five years, and after that time insects would no longer use the burned snags and forage value would be greatly reduced.

Alternative 2: Timber harvest treatments and prescribed fire would reduce tree density and understory trees in about 3% of the Prichard-Murray Resource Area. Thinning mature conifer stands also reduces their suitability for wood-boring beetles, the primary prey of black-backed woodpeckers. Proposed thinning treatments would set back the development of black-backed woodpecker habitat, since this species primarily nests in stands with a high density of snags (PF Doc. WL-R76). Silvicultural treatments promoting western larch would benefit the black-backed woodpecker several decades from now. Prescribed burning treatments may enhance some black-backed woodpecker foraging habitat in the Resource Area if fires are moderate to high intensity. This is not the prescription, and prescribed fires are likely to be of low intensity which does not improve habitat for the black-backed woodpecker. Post-fire habitat is a short-lived resource for foraging black-backed woodpeckers. An abundance of woodborers in burned trees would begin to decline after three years, with substantial declines after five to six years (O'Connor & Hillis, 2001; PF Doc. WL-R41). In the event some trees are fire scorched during site preparation activities in the Resource Area under the Proposed Action, these trees would be retained for black-backed woodpecker foraging habitat.

Nesting habitat will not be improved for this species; adhering to Region 1 snag retention guidelines and Forest Plan snag retention guidelines will keep a relatively low density of snags on the landscape, fewer than black-backed woodpeckers typically select for nesting (Bull et al. 1986, PF Doc. WL-R76).

Alternative 3: This alternative would have similar effects as Alternative 2 on black-backed woodpeckers, except fewer acres would be treated. Timber harvest treatments and prescribed fire would reduce tree density and understory trees. Thinning mature conifer stands also reduces their suitability for wood-boring beetles, the primary prey of black-backed woodpeckers. Proposed thinning treatments would set back the development of black-backed woodpecker habitat, since this species primarily nests in high density patches of snags. Silvicultural treatments promoting western larch would benefit the black-backed woodpecker several decades from now. Prescribed burning treatments may enhance some black-backed woodpecker foraging habitat in the Resource Area if fires are moderate to high intensity. This is not the prescription, and prescribed fires are likely to be of low intensity which does not improve habitat for the black-backed woodpecker. Post-fire habitat is a short-lived resource for foraging black-backed woodpeckers. An abundance of woodborers in burned trees would begin to decline after three years, with substantial declines after five to six years (O'Connor & Hillis, 2001; PF Doc. WL-R41). In the event some trees are fire scorched during site preparation activities in the Resource Area under the Proposed Action, these trees would be retained for black-backed woodpecker foraging habitat.

Nesting habitat would not be improved for this species. Adhering to Region 1 snag retention guidelines and Forest Plan snag retention guidelines would keep a relatively low density of snags on the landscape, fewer than black-backed woodpeckers typically select for nesting (Bull et al. 1986, PF Doc. WL-R76).

Cumulative Effects to Black-backed Woodpeckers: Past timber harvest and fire exclusion have reduced the number of large snags across the Coeur d'Alene River Basin. Fire exclusion has been the primary reason much of the Coeur d'Alene Basin does not have high densities of large snags. Timber harvest has to a lesser degree (on few acres in the resource area) decreased snag densities also. The Prichard-Murray Resource Area reflects this loss of snags in the landscape. Planned timber harvest and fuels treatments on national forest and on approximately 100 acres of nearby BLM lands will also reduce habitat for black-backed woodpeckers in the foreseeable future. Although habitat is reduced in the short-term, as the trees age these forested stands may provide larger diameter trees with more insects and diseases over the long term, providing habitat for the black-backed woodpecker. Fire suppression has the potential to enhance foraging habitat for black-backed woodpeckers by allowing stands to grow dense, which results in more snags and the potential for more wood-boring beetles, the primary prey of black-backed woodpeckers. Although average nest tree diameter at seventy-six nest sites for black-backed woodpeckers was 14.3", this woodpecker can nest in small-diameter trees (6 inches dbh or larger), it can nest in dense stands where conifers are growing slowly. Over time, thinning larch stands in the Resource Area would provide larger diameter trees for black-backed woodpecker foraging and nesting. In untreated areas, forest pests and diseases would continue to provide foraging opportunities for black-backed woodpeckers.

Over the next few decades root disease will cause more tree mortality in Douglas-fir and grand fir stands than would beetles in the Prichard-Murray resource area. The landscape in the Prichard-Murray Resource Area is

trending toward climax species such as grand fir and western hemlock. These species do not have large quantities of wood-boring beetles, the primary prey of black-backed woodpeckers, so would not provide much habitat for this species.

Although Northern Idaho is below the historic range for burned habitat on the landscape, large fires in Montana in 2002 and 2003 have created a source habitat for black-backed woodpeckers in the Northern Rockies Region; burned habitat is now above historic levels in Montana. A conservation assessment for the black-backed woodpecker in the Northern Region found that viability will be maintained for the next 100 years for Region 1 national forests (PF Doc. WL-67).

Therefore, implementation of either action alternative **may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.** The No Action Alternative would improve black-backed woodpecker habitat as natural processes continue.

3.G. Fisher (Sensitive Species)

Life History of Fisher

Fishers are medium-sized carnivores associated primarily with moist, late successional northern coniferous forests. (USDA Forest Service 1994, p. 39. *PF DOC. WL-68*). Fishers use late successional forests more frequently than early or mid-successional forests (Ruggiero et al. 1994, p.53. PF Doc. WL-R68). Fishers den in hollow logs, under rocks, and in holes in trees. They are mostly arboreal and hunt in the trees for small mammals and birds. However, they also hunt on the ground for snowshoe hares and other prey species. They generally select habitats in and near riparian areas.

Reference Conditions for Fisher

Before European settlement in North America, fishers occurred across the northern forests of North America and south in the Appalachians and Sierras. Between 1800 and 1940, fisher populations declined or were extirpated in most of the U.S. and much of Canada by overtrapping and loss of habitat from logging (USDA Forest Service 1994, p. 39). Populations are extremely low in Oregon and Washington and parts of the northern Rockies (Ruggiero 1994. PF Doc WL-R68). Idaho's fisher population includes native and transplanted fishers.

The status of the fisher in the Western United States is poorly known but generally perceived as precarious and declining (Powell and Zielinski in Ruggiero 1994, WL-R68), therefore current populations may be extremely vulnerable to local and regional extirpation because of their lack of connectivity and their small population size (Aubrey et al. 2005, PF Doc. WL-R22). Overharvest and large fires between 1910 and 1934 were probably responsible for declines in fisher in Idaho (Heinemeyer, page 29 in Idaho Fish and Game 1995; PF Doc. WL-R29). Fishers are also susceptible to overtrapping and habitat loss. During the late 1800's and 1920's, fisher pelts were worth up to $300 and demand was high. Unregulated trapping, habitat losses from settlement and logging caused population reductions in many areas (Ruggiero et al. 1994, PF Doc. WL-R68). Recent genetic research in Boundary County by Forest Service researchers found that fisher populations there were descendants of a native fisher population as well as fishers transplanted to Montana from the Midwest in the early 1990s.

Fishers have been trapped on the Coeur d'Alene River Ranger District, confirming their presence. The Forest Service knows of no records of fishers in the Prichard-Murray Resource Area. A habitat model based on timber stand data in TSMRS estimated only 1,108 acres of fisher habitat exist in the Prichard-Murray Resource Area. This is insufficient to support a fisher population. Cover types are suitable for fisher, but most stands are too young to provide the large diameter snags and logs fishers need for natal dens.

Management Recommendations for Fisher

Witmer et al (1998; PF Doc. WL-R64) describes the four major issues of concern to fisher conservation and management in the Columbia River Basin in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates":

- ***Conservation of late successional forest at low to mid elevations*** - Past decades of land management activities in the Coeur d'Alene Basin have fragmented forest habitat, thereby reducing the contiguous area and creating barriers to movement. Fishers can probably tolerate small patch cuts or other small-scale disturbances, provided these occur in a larger matrix of relatively dense, closed canopy, late successional forest (Powell and Zielinski, p. 64 in Ruggiero et al. 1994. PF Doc. WL-R68). The Habitat Conservation Assessment and Conservation Strategy for Forest Carnivores in Idaho (Idaho Fish and Game et al. 1995. PF Doc. WL-R21, p. 55) state that drainages with moderate quality fisher habitat should be managed for 40% late successional habitat in preferred or suitable habitat types for fisher.
- ***Maintenance of links between populations*** - Barriers to movement may include large non-forested openings and highways.
- ***Maintenance of riparian corridors*** – Waterways and riparian habitat provide travel corridors and often are found at the lower elevations fishers prefer within a given area.
- ***Trapping pressure and human disturbance*** - Fisher trapping in Idaho is legally closed, although some fishers are incidentally killed by trappers pursuing other furbearer species. Road densities of less than 1 mile per square mile are a deterrent to incidental trapping of fisher.

Affected Environment for Fisher

Late Successional Forest: According to Idaho Fish and Game, if 40 percent of a drainage is in late successional stage, the drainage provides moderate quality habitat for fishers (Idaho Fish and Game et. al. 1995, PF Doc. WL-R21). Historically in the Coeur d'Alene River Basin late successional stage forests (mature and old growth) were found across 23 to 55 percent of the landscape, with an average of 46 percent (Geographic Assessment, Appendix A: Report #2; PF Doc. WL-R71). The loss of late successional habitat in the Coeur d'Alene Mountains is probably the most important issue for the fisher in this area.

Currently the Coeur d'Alene River Range District averages 32% late successional forest, which includes mature + old growth stands at least 100 years old. (Specialist's Report on Forest Vegetation) The Prichard-Murray analysis area includes portions of 7 old growth management units (OGMUs) and is 38% late successional forest. This includes cover types preferred by fishers and cover types fishers don't typically use such as ponderosa pine. The district silviculturist estimates that most of the small – medium size class stands could enter the mature – large size class in the next 20 years (Specialist's Report on Forest Vegetation, page 21). Root disease is common in grand fir and Douglas-fir stands on the district. Over the next 50 years, this endemic disease is projected to result in a loss of canopy in stands affected by root disease, which could result in a reduction of habitat for the fisher.

Linkages*:* In *Forest Carnivores in Idaho Habitat Conservation Assessments and Conservation Strategies* (1995, Figure 1, page 32; PF Doc. WL-R21), Idaho Fish and Game mapped the Coeur d'Alene Mountains as fisher habitat. The only linkage corridor mapped on Coeur d'Alene River Ranger District is the St. Joe Divide, which is outside this Resource Area.

Riparian Habitat*:* The quality of riparian habitat in the Prichard-Murray Resource Area has been greatly reduced by road construction and placer mining (particularly on private lands). Remnant, large cedar stumps and snags in some of the riparian zones indicate large-diameter trees were present historically. This large-diameter forest component would have provided optimal habitat for fishers, but was lost in the 1889, 1910 and 1919 fires and with logging and placer mining.

Trapping Risks: Trapping fishers has been illegal in Idaho since the 1930s, but fishers are occasionally accidentally trapped in traps set for other furbearers. Fur prices and the number of active trappers in North Idaho have declined over recent years.

Environmental effects to Fisher

No Action Alternative: The seven old growth management units partially or wholly in the Resource Area contribute 12.5% old growth to the entire Resource Area. The amount of Douglas-fir, grand fir and western hemlock would increase in the area over time. These species are all used by fishers. Excluding future timber harvest, fuels treatment and fires, most stands which are currently classified as small-medium size class are estimated to grow into the mature-large size class in the next 15 years (refer to the Specialist's Report on Vegetation). This will benefit fishers, which prefer mature and old growth forests. As trees age and die, large snags and large downed wood would increase, improving habitat for fishers. Potential stand-replacing fires could set back the trend toward late successional forests (refer to the Specialists' Reports on Fire/Fuels and Vegetation). Fishers' primary prey is snowshoe hares. Snowshoe hare habitat is very limited in the analysis area, and likely to remain scarce unless fires or other processes open up the mature and old stands, creating dense stands of young trees and shrubs which provide good habitat for snowshoe hares. With few hares, fishers in the Prichard-Murray Resource Area would prey on red squirrels and other prey species.

***Alternative 2*:** The seven old growth management units that are partially or entirely located in the Prichard Murray Resource Area contribute 12.5 percent old growth to the entire resource area. The amount of Douglas-fir, grand fir and western hemlock would increase in untreated stands, which comprise most of the analysis area. Fuelbreak treatments in Units 20 and 21 (adjacent to houses) would make 4 acres of currently suitable fisher habitat unsuitable for this species. The shelterwood treatment in Unit 16 would change 48 acres of suitable fisher habitat into unsuitable habitat for fishers by opening the canopy and changing the species composition to favor western larch and other shade intolerant species which are not preferred by fishers. This is a very small percentage of the available fisher habitat. The remaining 956 acres of suitable habitat in the resource area would continue to provide habitat for fishers in the foreseeable future, unless fires, fuels or timber treatments alter its suitability. Other stands will continue to mature and provide large trees, large snags and large downed wood for fishers over time. Fishers' primary prey is snowshoe hares. Snowshoe hare habitat is very limited in the analysis area, and likely to remain scarce unless fires or other processes open up the mature and old stands, creating dense stands of young trees and shrubs which provide good habitat for snowshoe hares. With few hares, fishers in the Prichard-Murray Resource Area would prey on red squirrels and other prey species.

***Alternative 3*:** As under Alternative 2, the amount of Douglas-fir, grand fir and western hemlock would increase in untreated stands, which comprise most of the analysis area. Fuelbreak treatments in Units 20 and 21 (adjacent to houses) would make 4 acres of currently suitable fisher habitat unsuitable for this species. No shelterwood or thinning treatments are proposed in fisher habitat under Alternative 3. The remaining 1,004 acres of suitable habitat in the Resource Area would continue to provide habitat for fishers in the foreseeable future unless they are made unsuitable by fires, fuels or timber treatments. As under Alternative 2, other stands would continue to mature and provide large trees, large snags and large downed wood for fishers over time.

Cumulative Effects to Fisher: Implementing guidelines and buffers under the Inland Native Fish Strategy would contribute toward maintaining habitat for the fisher. Road construction and associated stream crossings with heavy equipment in Fancy Gulch could potentially degrade or eliminate less than 2 acres of habitat for the fisher. It is unlikely that more riparian roads would be constructed through riparian habitats in the foreseeable future.

The alternative management options presented in this document address the four issues of concern to fisher conservation and management as outlined in *Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Coordinates* (Witmer et al. 1998; PF Doc. WL-R64). The Forest Plan provides guidelines to ensure viability of old growth-dependent species. Forest Plan monitoring reports (1998, pp. 31-33 and 38-40; PF Doc. WL-R51; 2004, pp. 66-74) indicate that these conditions are being met.

Under any of the three alternatives, several thousand acres of immature forest in the Prichard-Murray Resource Area would reach the large size class and age of at least 100 years old within 15 years, improving suitable habitat for fishers. **Either of the action alternatives may impact individuals but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**. Viability for the fisher would be maintained based on the following: Fisher trapping is illegal in Idaho; Region 1 snag protocol (exceeding IPNF Forest Plan standards) would be implemented; and old growth would be maintained on over 10 percent of the acres in the Prichard-Murray analysis area. There would be no impact to the fisher under the No Action Alternative.

3.H. Coeur d'Alene Salamander (Sensitive Species)

Life History of Coeur d'Alene Salamanders

Coeur d'Alene salamanders are restricted to cool, damp habitats that have stable temperatures and moisture levels. This mostly subterranean species has been found in three main types of habitat in northern Idaho: springs seeps, the spray zones of waterfalls and along stream edges between 1,800 and 3,500 feet in elevation.

Figure WL-4. Coeur d'Alene Salamander. (Source: Montana Natural Heritage Program (http://nhp.nris.state.mt.us).

Known populations have been located at sites where fractured bedrock, high substrate moisture, high humidity and moderate air temperatures create favorable habitat conditions (Groves 1989; PF Doc. WL-R74). This species has been found as high as 5,200 feet in Montana (Werner et al. 2004. Amphibians and Reptiles of Montana. PF Doc. WL-R142, p. 61).

Reference Conditions for Coeur d'Alene Salamanders

The Coeur d'Alene salamander is a remnant of a once diverse salamander fauna in the northern Rocky Mountains that was likely reduced by climatic changes over the past 10 million years. Like most salamanders, this species has a small home range. Surveys have found some previously known populations extinct due to roads, landslides, heavy metals and extensive logging. Historically, populations were probably higher in the Coeur d'Alene Basin and have been reduced by past human activities including rock removal, logging, mining and road building. The only known documented location of a Coeur d'Alene salamander in the Prichard-Murray resource area is in the East Fork of Eagle Creek. Coeur d'Alene salamanders have been documented at over thirty locations in the Coeur d'Alene Basin, including several on the Coeur d'Alene River Ranger District.

Management Recommendations for Coeur d'Alene Salamanders

Any changes in peak flows could have detrimental effects upon the Coeur d'Alene salamander by either flooding or drying habitat (Cassirer & Groves 1994; PF Doc. WL-R11). Forest Plan riparian management objectives provide some protection from effects from management activities in riparian or wet areas. However, road construction often alters the hydrology in an area and can result in changes of subterranean flow where Coeur d'Alene salamanders spend over 90% of their time; these changes may not be noticed above ground. If rocks are removed from an area which has subsurface water, the quarry should be inspected at the proper time of year for Coeur d'Alene salamanders before a decision is made to alter the habitat.

Affected Environment for Coeur d'Alene Salamanders

Coeur d'Alene salamanders have a patchy distribution and have been found at several sites below 5,000 feet in northern Idaho. There is one known populations of this species in the Prichard-Murray Resource Area, in the East Fork of Eagle Creek. No recent surveys have been done for this species in the Prichard-Murray Resource Area.

Environmental Consequences for Coeur d'Alene Salamanders

No-Action Alternative: No change to Coeur d'Alene salamander habitat would occur under the **No Action Alternative**, although potential stand-replacing fires could change habitat by increasing peak flows (refer to the Specialist's Report on Aquatic Resources). Changes in peak flows could have detrimental effects upon Coeur d'Alene salamanders by either flooding or drying the habitat for the salamander (Cassirer et al 1994; PF Doc. WL-R11).

Alternatives 2 and 3: Removal of forest canopy can affect subsurface flows, and heat up salamander habitats. Sites proposed for prescribed burning are mostly on south-facing slopes with dry forest types which are unlikely to provide habitat for Coeur d'Alene salamanders. Removal of forest canopy on north-facing thinning units and shelterwood units may affect hydrologic flows and affect Coeur d'Alene salamanders if they are present. No surveys for this species have been conducted in the area where road construction is proposed.

Cumulative Effects to Coeur d'Alene Salamanders: Implementing guidelines and buffers under the Inland Native Fish Strategy would contribute toward maintaining the viability of the Coeur d'Alene salamander (Cassirer et al 1994; PF Doc. WL-R11). Road construction and associated stream crossings with heavy equipment in Fancy Gulch could potentially degrade or eliminate some habitat for the Coeur d'Alene salamander; this is about three miles from a known location of the Coeur d'Alene salamander. Direct impacts would affect less than 2 acres, but road construction changes hydrologic flows and could affect more than 2 acres of habitat for the Coeur d'Alene salamander. Other reasonably foreseeable activities which could alter Coeur d'Alene salamander habitat include dredging, hydraulic and/or placer mining in Eagle Creek and a tributary of Prichard Creek east of the resource area.

Since most proposed treatment sites are on dry hillsides unlikely to support Coeur d'Alene salamanders, the proposed action is not expected to affect Coeur d'Alene salamanders or their habitat. Due to reasonably foreseeable degradation of habitat from road construction in Fancy Gulch, either action alternative **may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species**. The No Action Alternative would have no impact on Coeur d'Alene salamanders and their habitat.

3.I. Townsend's Big-eared Bat (Sensitive Species) & Fringed Myotis (Sensitive Species)

Life History of the Townsend's Big-eared Bat & Fringed Myotis

Townsend's big-eared bat and fringed myotis are both sensitive species in Region 1, but have very different habitat requirements. Townsend's big-eared bats use caves and cave-like structures for hibernacula in winter and day roosts and night roosts during the summer. Most mines in North Idaho are too cold to be suitable for bat maternity sites; buildings are likely the maternity sites for this species in North Idaho; most Townsend's big-eared bat maternity sites in British Columbia are buildings. Townsend's big-eared bats occasionally roost under bridges. This species is not known to roost in snags except for hollowed out redwoods in northern California. Townsend's big-eared bat primarily eats moths (Montana Animal Field Guide website).

Fringed myotis use caves, mines, and buildings as hibernacula, and large diameter, tall snags in sunny locations, especially those sloughing bark, are important maternity sites and day roost habitat for the fringed myotis (Schmidt 2003, PF Doc. WL-R101 and Weller & Zabel 2001, PF Doc. WL-R108).

Reference Conditions for Townsend's Big-eared Bat & Fringed Myotis

Both these species of bats are listed as Species of Greatest Conservation Need in the Idaho Comprehensive Conservation Strategy. The Idaho Comprehensive Wildlife Conservation Strategy states that the population of Townsend's big-eared bat appears to be declining in Idaho (PF Doc. WL-R152) and the population trend for fringed myotis is unknown (PF Doc. WL-R153). In northern Idaho, where caves are rarely found, Townsend's big-eared bats primarily roost in abandoned mines. Townsend's big-eared bat is known from several sites on the Priest Lake, Sandpoint and Bonners Ferry Ranger Districts, but has not yet been documented on the Coeur d'Alene River Ranger District, although much suitable habitat exists. Loss and disturbance of hibernacula and roosting habitat are the limiting factors for the species. Only two fringed myotis have been found on the Coeur d'Alene River Ranger District during abandoned mine surveys. No other surveys for this species have been conducted at habitats other than abandoned mines on the Idaho Panhandle National Forests, except acoustic surveys on the Sandpoint Ranger District in 2006; these data have not been analyzed to determine if fringed myotis were detected.

Management Recommendations for Townsend's Big-eared Bat & Fringed Myotis

Environmental temperatures are crucial in determining which habitats are suitable for bats. There are no known mine adits in any of the harvest units (PF Doc. WL-26). Smoke management guidelines developed by Region 6 of the Forest Service should be implemented near abandoned mine adits and shafts (Ormsbee PF Doc. WL-147). The conservation strategy for Townsend's big-eared bat recommends within 0.5 mile radius of Townsend's big-eared bat roost sites, no more than half of the forested habitat can be subjected to prescribed burning per decade, and prescribed burning within 0.5 mile of a roost for this species should be timed to occur only when the roost is not occupied (Pierson et al. 1999. PF Doc. WL-99, p. 39). No Townsend's big-eared bat roost sites have been found in Shoshone County. If a roost site for this species is found before or during implementation of this project, this guideline will be put into effect at that time.

Affected Environment for Townsend's Big-eared Bat & Fringed Myotis

Abandoned mines in the Prichard-Murray Resource Area have created bat habitat. This habitat is important on a broader scale since nationwide natural bat habitat (caves and rock crevices) has been altered and, in some cases, lost or made unsuitable to bats due to changes in the habitat or temperatures, or from human disturbance and direct mortality by humans. Some bat accessible mine closures have been installed at various sites on the Coeur d'Alene River Ranger District, but none in the Resource Area. Open adits on BLM and private lands in the Resource Area may provide additional habitat for bats if they are not being actively explored or mined. Old mine openings close naturally over time, as happened to the Foursquare Mine in the spring of 2006, reducing bat habitat.

Two surveys have been conducted for bats in Prichard-Murray analysis area. A mistnet survey on 9/8/05 at the Foursquare Mine caught only one bat, <u>not</u> a Townsend's big-eared bat or fringed myotis. That survey included acoustic recordings of bats. In June 2006 another acoustic survey for recording bat calls was conducted at a private pond near the confluence of Eagle and Prichard Creeks. The data from these two acoustic surveys will be analyzed this winter. It is not know if either acoustic survey recorded a fringed myotis. It is unlikely a Townsend's big-eared bat was recorded because their echolocation call is very quiet and difficult to record in the field.

Environmental Consequences for Townsend's Big-eared Bat & Fringed Myotis

<u>Alternatives 2 and 3</u>: **Townsend's big-eared bats' diet is mostly moths, many of which lay their eggs on shrubs and other understory vegetation. To reduce fuels, this understory vegetation would be reduced on 2,423 acres under Alternative 2 and on 1,977 acres under Alternative 3. This would reduce the available prey for Townsend's big-eared bats in the Prichard-Murray Resource Area until the understory vegetation grows back and moth populations become re-established on units which have been thinned and/or burned.**

Townsend's big-eared bats can fly several miles in a night, so would be displaced to other foraging areas until the shrubs and other understory vegetation grow back. Over several years, there would be an increase in

shrubs, small trees and other vegetation in the thinning and shelterwood units, which may result in an increase in bat foraging habitat.

Large snags are important to fringed myotis as maternity roosts. These would be retained in timber harvest units as specified in the timber sale contract. The district fire planner and silviculturist predict a negligible change in the number of large snags from this project. Prescribed burns will create more snags, which may increase suitable snag roosts for fringed myotis and other bat species. Early spring burning may occur when bats are still hibernating and not very able to move to other areas to avoid the smoke. Summer fires would occur when bats can more readily arouse from daily torpor and escape if necessary. Design features implemented during prescribed burning would protect bats from effects of smoke during these operations (PF Doc. WL-58). Design features would retain a certain number of large snags according to the regional snag protocol, providing some potential roost sites for the fringed myotis in the Prichard-Murray Resource Area. No potential roost sites for the Townsend's big-eared bat occur in proposed treatment units.

Cumulative Effects to Townsend's big-eared bat and fringed myotis: No potential roost sites for Townsend's big-eared bat will be affected by proposed vegetation treatments. Prescribed burning should maintain or may increase the number of snags available to fringed myotis for roosting. Removal of understory vegetation would reduce prey availability for both species of bats. Therefore, implementation of either action alternative **may impact individuals or habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species.**

3.J. Boreal Toad

Life History of Boreal Toad

Boreal toads lay their eggs in ponds in the spring, attaching them to submerged vegetation in shallow water usually less than 6" deep (PF Doc. WL-R154, p. 86). Tadpoles are hatched and grow through the summer. Toad tadpoles feed on algae and other small plants. After tadpoles metamorphose into toadlets with legs, they generally leave their natal pond by late summer. Some toads remain close to the pond where they were born, but most toads are terrestrial except during the breeding season. Juvenile toads may disperse over 4 km (2.5 miles) from their natal ponds (PF Doc. WL-R154, p. 86). Toads prey on insects and other invertebrates. They use logs and burrows for cover from predators and severe weather. They winter in burrows, under buildings and other sites where the temperature remains above freezing.

Reference Conditions for Boreal Toad

Boreal toads have been found at three sites on Coeur d'Alene River Ranger District; none of these were in the Prichard-Murray resource area. There are no known ponds in the resource area on national forest lands. Boreal toads have been documented upriver and downriver from the Prichard-Murray Resource Area. Ponds on nearby private property have not been surveyed but may provide breeding sites for boreal toads.

Management Recommendations for Boreal Toad

If a boreal toad breeding site is found in the resource area, it should be monitored annually to determine the status of boreal toad populations in the resource area (PF Doc. WL-R154, p. 89).

Affected Environment for Boreal Toad

No boreal toad surveys have been conducted in the Prichard-Murray Resource Area. The Forest Service and Idaho Conservation Data Center have no records of boreal toads in the resource area. It is possible that some ponds which could be breeding sites for toads occur in the resource area on national forest lands, but outside the activity areas of this project.

Environmental Consequences for Boreal Toad

No Action Alternative: The No Action Alternative would have no effect on the boreal toad or its habitat.

Alternatives 2 and 3: Prescribed burning would greatly reduce the number of logs which provide foraging and cover sites for toads. However, enough logs would remain on burned sites to provide some foraging and

cover opportunities for boreal toads. Prescribed burning will improve winter habitat for toads by burning tree roots, leaving empty burrows which could be used by toads for overwintering where the tree roots had been. For the first few years after thinning or burning, prey availability will be reduced due to loss of understory vegetation. After the forbs, shrubs and tree seedlings grow back, insect availability will return to and possibly exceed pre-treatment levels. Because no ponds have been found in the resource area on national forest lands, the proposed treatments would have no effect on toad breeding habitat.

Cumulative Effects/Determination of Effects to Boreal Toad: Activities under either action alternative **may impact individual boreal toads or their habitat, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.** There would be no cumulative effects to the boreal toad or its habitat. There would be no impact to the boreal toad or its habitat with implementation of the No Action Alternative.

3.K. Harlequin Duck

Life History of harlequin duck

Harlequin ducks nest in the northern Rockies and Cascade Mountains and winter on the Pacific Coast. Harlequin ducks marked in Idaho have been seen wintering on the coasts of Washington and British Columbia. Nesting streams are typically fast running streams with clear water. Harlequin ducks feed on aquatic insects and other aquatic invertebrates. They nest on gravel bars and streambanks, sometimes under logs or stumps, close to the water's edge (PF Doc. WL-155). Pools and eddies are important habitats for brood rearing when harlequin duck chicks are young.

Reference Conditions for harlequin duck

Harlequin duck populations are believed to have declined from historic population levels in the northern Rockies. Harlequin ducks surveys have found this species on several streams in the Idaho Panhandle. Although few surveys have been conducted for this species on the Coeur d'Alene River Ranger District, this species has been observed on the North Fork of the Coeur d'Alene River in the Prichard-Murray resource area in 1993 and at 3 other sites along the North Fork of the Coeur d'Alene River in 1991 and 1992 and the Coeur d'Alene River north of its confluence with Tepee Creek in 2002 (PF Doc. WL-10).

Management Recommendations for harlequin duck

Since this species feeds on aquatic invertebrates, it can be impacted by sediment which fills the interstitial spaces where insects and other aquatic invertebrates live between rocks on the bottom of streams. Clear water is also important so harlequin ducks can see their prey, so sedimentation in streams which provide habitat for harlequin ducks such as the North Fork of the Coeur d'Alene River should be minimized. Traffic on riparian roads and high levels of human activity along streams (i.e. fishermen, boaters, etc.) can displace harlequin ducks from their preferred habitats. Research is needed to determine levels of human disturbance along streams that will not impact harlequin duck behavior, distribution and productivity.

Affected Environment for harlequin duck

Harlequin ducks have been documented on the North Fork of the Coeur d'Alene River. Traffic on riparian roads on both sides of the North Fork of the Coeur d'Alene River and recreation use along the river may currently limit its suitability for harlequin ducks.

Environmental effects to harlequin duck

No Action Alternative: There would be no effect on harlequin ducks or their habitat with the No Action Alternative.

Alternatives 2 and 3: Alternatives 2 and 3 would not affect the harlequin duck or its habitat because neither alternative would introduce sediment to the North Fork of the Coeur d'Alene River. Riparian vegetation would filter sediment and the elevated roadbed of Forest Highway 9 would trap sediment if it occurs (Specialist's Report on Aquatic Resources, p. AQ-33 & 34, PF Doc WL-14), so there would be no effect on

harlequin duck foraging habitat. Prescribed burning along the North Fork of the Coeur d'Alene River would be completed in a day at each site. Most treatment units are not in or near harlequin duck habitat.

Cumulative Effects/Determination of Effects to Harlequin Duck: There would be no cumulative effects to the harlequin duck or its habitat under either action alternative. Activities under either action alternative would have **no effect on harlequin ducks or their habitat.** There would be no impact to the harlequin duck or its habitat with implementation of the No Action Alternative.

3.L. Pygmy Nuthatch

Life History of pygmy nuthatch

Pygmy nuthatches excavate cavities for nesting as early as mid-March in large diameter ponderosa pine snags and dead portions of live ponderosa pine. Pygmy nuthatches are strongly associated with long-needled pines, especially ponderosa pine. This species normally excavates its own nest cavity, but it also uses holes excavated by woodpeckers. Pygmy nuthatches nest in these cavities and depend on cavities in snags as roost sites year-round. This species is a year-round resident in Idaho. Insects make up 60 to 80 percent of the diet during the breeding season; spiders are also eaten. Pine seeds are a major food component during the winter and a smaller part of the diet during the breeding season. Pygmy nuthatches cache seeds year-long for later use (PF Doc. WL-R149). This species appears to be very sedentary; post-breeding adults monitored in California dispersed less than 350 meters from their nests and young birds moved less than 300 meters from their natal territories in South Dakota (PF Doc. WL-R150, p. 33).

Reference Conditions for pygmy nuthatch

Pygmy nuthatch populations occur in a patchy distribution from British Columbia to Baja, California. Breeding Bird Surveys have documented a statistically significant decline (41 percent per year) in pygmy nuthatch populations in Idaho between 1966 and 2004 (PF Doc. WL-R151). Pygmy nuthatches have been documented at two locations on the Coeur d'Alene River Ranger District and other sites in the Coeur d'Alene Basin but off the national forest. No surveys were conducted specifically for this species and no occurrences of pygmy nuthatches are known in the Prichard-Murray Resource Area. Habitat for this species is patchy and limited to mature ponderosa pine stands. FIA data show the Central Coeur d'Alene Basin averages 6.2 snags/acre 14" dbh or larger, and FVS data show 11.5 snags/acre 14" dbh or larger in the Prichard-Murray Resource Area, so there are sufficient snags for nesting habitat for pygmy nuthatches (PF Doc. WL-17).

Management Recommendations for pygmy nuthatch

Wherever possible, large diameter snags should be maintained in pygmy nuthatch habitat to provide nesting and roosting sites and to maintain pygmy nuthatch populations. Three studies have documented significant reductions in the density of pygmy nuthatches after timber harvest. Two studies showed that removal of snags greatly reduced the number of pygmy nuthatches (PF Doc. WL-R150, p.34). The Specialist's Report on Forest Vegetation states that up to 15 percent kill of overstory trees is acceptable in units where prescribed burning occurs. Maintaining at least 85 percent of the current canopy would have minimal effect on foraging habitat for pygmy nuthatches. The Idaho Comprehensive Wildlife Conservation Strategy recommends restoration of ponderosa pine habitats for pygmy nuthatch management (PF Doc. WL-R151).

Affected Environment for pygmy nuthatch

No surveys have been conducted specifically for this species in the Prichard-Murray Resource Area, and the Forest Service and Idaho Conservation Data Center have no records of the pygmy nuthatch in the resource area. This species is closely tied to mature ponderosa pine forests; these habitats are patchy in the resource area and include 522 acres of proposed treatment units under Alternative 2 and 247 acres under Alternative 3. Units in Alternative 2 that provide pygmy nuthatch habitat are: Units 10 (72 acres), 26, 37, 38, 41, 42 and 49. Units in Alternative 3 that provide pygmy nuthatch habitat are: Units 10 (20 acres), 26, 37 and 42.

Environmental effects to pygmy nuthatch

No Action Alternative: There would be no effect on the pygmy nuthatch or its habitat under this alternative.

***Alternatives 2 and 3*:** Thinning 72 acres in Unit 10 and prescribed burning on 522 acres in Units 10, 26, 37, 38, 41, 42 and 49 would reduce the forest canopy in pygmy nuthatch stands by up to one-third. This would reduce foraging habitat for pygmy nuthatches since this species forages on all parts of ponderosa pine trees. However, some of the canopy loss would be species other than ponderosa pine and younger trees which pygmy nuthatches would probably not forage on. If the number of large snags in treated stands is unchanged or increases and overstory canopies are reduced no more than 15 percent as recommended in the Specialist's Report on Forest Vegetation (PF Doc. Veg-29), this would have minimal effect on foraging habitat for the pygmy nuthatch. Alternative 3 would have a similar but less effect on pygmy nuthatches except thinning in Unit 10 would be reduced to 20 acres and prescribed burning would total 247 acres in Units 10, 26, 37 and 42, with no treatments in old growth ponderosa pine, the preferred habitat of pygmy nuthatches.

Based on research on the effects of prescribed fire on ponderosa pine forests at 194 sites in Idaho, Washington, Arizona and New Mexico, the number of large diameter snags in pygmy nuthatch habitat is expected to remain the same or increase with both action alternatives, so there would be no effect or an increase in suitable nesting habitat for pygmy nuthatches. This study found increases in the mean number of snags greater than 9 inches dbh and in the total number of snags after prescribed fires, but the difference between snag densities before and after the fires were not statistically significant (PF Doc. WL-R148, page 481).

Cumulative Effects/Determination of Effects to pygmy nuthatch: Activities under either action alternative **may impact individual pygmy nuthatch or their habitat, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.** There would be no impact to the pygmy nuthatch or its habitat with implementation of the No Action Alternative.

3.M. Pileated Woodpecker (Old growth Management Indicator Species)

Life History of Pileated Woodpeckers

Pileated woodpeckers nest in mature to old growth stands of about 50 to 100 acres with greater than 65 percent canopy closure and greater than 20-inch diameter trees (Bull et al. 1986, PF Doc. WL-R76; McClelland 1977, PF Doc. R37). They prefer stands with snag densities greater than 12 per acre for feeding (Warren 1989; PF Doc. WL-R75).

Nest trees are usually average 30 inches in diameter and 90 feet in height (Aney and McClelland 1985; PF Doc. WL-R2). Pileated woodpeckers can excavate a nest in a live ponderosa pine if heart rot is present (Bull 1975 PF Doc. WL-R5). Western larch and ponderosa pine are preferred nest trees (Bull 1975; PF Doc. WL-R5). They feed mostly on carpenter ants in the northern Rockies (Bull et al. 1986, PF Doc. WL-R76), but also eat other insects and fruits and berries. They usually avoid openings for foraging, and prefer dense canopies with many snags and down logs. Large, continuous habitat blocks are more desirable than more fragmented patches.

Pileated woodpeckers' home ranges are typically 300 to 1,000 acres in size. Many species of birds and mammals which require but do not excavate cavities depend on pileated woodpeckers to create cavities they can use for nesting, roosting and protection from predators and weather.

Figure WL-5. Pileated woodpecker. (Photo Source: www.fs.fed.us/r1/cohesive strategy.)

Reference Conditions for Pileated Woodpeckers

No historic population information is available for pileated woodpeckers. There is some information on historic forest structure in the area from the Geographic Assessment for the Coeur d'Alene River Basin, the Assessment of Ecosystem Components in the Interior Columbia River Basin and in modeling done based on historic records by the Forest Service on the Idaho Panhandle National Forests (PF Doc. WL-R71). These records and models indicate that the current amount of old forests is less than under historical conditions due to timber harvesting in older stands and few older stands remaining following stand-replacing wildfires on the District in the early 1900s.

Despite the lack of old forest, a conservation assessment for the pileated woodpecker in Region 1 found that high levels of intermediate-sized trees and increases in post-fire insect outbreaks are providing increased forage for the pileated woodpecker across the region. However, North Idaho has experienced far fewer fires and acres burned than western Montana in recent years. Because of increases in the extent and connectivity of forested habitat since European settlement, the conservation assessment for the pileated woodpecker in Region 1 found viability will be maintained for the pileated woodpecker for the next 100 years. (PF Doc. WL-67, pages 66-68).

Management Recommendations for Pileated Woodpeckers

Maintaining nesting habitat for pileated woodpeckers is very important because it is a keystone species in the northern Rockies, with many other species dependent on pileated woodpeckers to create cavities that other species can use for nesting and roosting. Adhering to the Region 1 snag management protocol (USDA 2000; PF Doc. WL-R54), and to the snag guidelines developed in association with the Upper Columbia River Basin (Bull et. al. 1997, PF Doc. WL-R66) help to assure snag availability for this species.

Regional snag guidelines recommend maintaining these snag densities on national forest lands in Region 1:

- *Retain 1 to 2 snags per acre greater than 20 inches diameter at breast height (dbh) and in warm, dry ponderosa pine and Douglas-fir forests.*
- *Retain 4 snags per acre greater than 20 inches dbh in cool Douglas-fir, warm grand fir stands on slopes less than 30 percent.*
- *Retain 6 to 12 snags per acre including 2 to 4 snags per acre greater than 20 inches dbh in cool Douglas-fir, warm grand fir stands on slopes greater than 30 percent.*
- *Retain 6 to 12 snags per acre including 2 snags per acre greater than 20 inches dbh in cool, wet and dry spruce, grand fir, hemlock and subalpine fir stands.*

Aney and McClelland (1985; PF Doc. WL-R2) recommend that pileated woodpecker habitat be managed to support at least one pair per 2,500 acres. Shelterwood cuts and small group selection cuts are suitable foraging habitat, but not preferred by pileated woodpeckers (McClelland 1979; PF Doc. WL-R37). Old growth habitats are often found along stream courses in linear patterns. To provide suitable pileated woodpecker habitat, old growth strips should be at least 300 feet in width (McClelland 1979; PF Doc. WL-R37). Habitat components include continuous blocks of 50-100 acres, 65 percent canopy closure and 20-inch diameter or larger trees, high snag density, large down wood, larch and pine preferred, within 1,000-acre home ranges. In forests managed for timber production, high stumps which extend above the winter snow level also are recommended for improving winter foraging opportunities for pileated woodpeckers.

Affected Environment for Pileated Woodpeckers

Pileated woodpeckers are found in the Pacific Northwest and throughout the Northern Rocky Mountains, including Idaho and Montana, as well as Midwest, eastern and southeastern states. This species occurs throughout the Idaho Panhandle National Forests and it has been observed in the Prichard-Murray Resource Area. Pileated woodpeckers often nest in stands of large diameter ponderosa pine and mixed conifer species, and this type of habitat is not very common in the Resource Area. This species also forages in younger stands. Field reviews by the biologist found foraging sign at several locations in the Resource Area. Large-diameter snags are in short supply due to fires in the early 1900 and timber harvest for mining and other uses.

Idaho Panhandle National Forests Scale: Old growth management units (OGMUs) are the land area designated by the Forest Plan to manage old growth across the Idaho Panhandle National Forests to ensure viability of old growth dependent species (Forest Plan, page V-3; PF Doc. CR-53). This will be accomplished by maintaining at least 10 percent of the Forest as old growth, and retaining approximately 5 percent of each Old Growth Management Unit (OGMU) as old growth where it exists (IPNF Forest Plan II-5, PF Doc. WL-33; Forest Plan Monitoring report; PF Doc. WL-R51). The guidelines require that old growth be well distributed across the Forest. If an OGMU has less than 5 percent existing old growth, more can be allocated in another OGMU to meet the guidelines at the Forest or District scale.

Coeur d'Alene River Basin Scale: Table 6 below displays current and historical forest habitats that could be used by the pileated woodpecker in the Coeur d'Alene River Basin. The table indicates the primary change that has occurred in pileated woodpecker habitat, or mature/old stands. Although the amount of mature age classes are similar to historical conditions, the old component of that age class has been significantly reduced. The old component provides most large diameter, long-lived snags, and down wood that are vital to pileated woodpeckers and many other wildlife species. Fragmentation of old and mature habitats has also occurred over time through urban development, road construction and timber harvest.

Table WL-6 Current and Historic Large/Mature Forests in the Coeur d'Alene River Basin

	Percent
Historic Range	23 – 66
Existing in the Coeur d'Alene River Basin	32
Existing in Prichard-Murray Resource Area	38
Desired Future Condition in the Prichard-Murray Resource Area	40 - 55

Watershed Scale: The Prichard-Murray Resource Area contains all or part of OGMUs (Old Growth Management Units) 109, 110, 112, 115, 116, 123 and 127. Some of the old growth is in large patches (up to 2,137 acres of contiguous old growth). Over 16 percent of the Prichard-Murray Resource Area is designated old growth; only one OGMU has less than 8% old growth (OGMU 109 is 4% old growth). Old growth habitats are fairly well distributed across the resource area except there is no old growth in the Trouble Creek Roadless Area. These provide a larger percentage of habitat suitable for pileated woodpeckers than generally occurs on other parts of the Coeur d'Alene River Ranger District. For more discussion on old growth, refer to the Specialist's Report on Forest Vegetation (PF Doc. VEG-29).

Environmental Effects to Pileated Woodpeckers

Pileated woodpecker nesting habitat includes stands with trees at least 20 inches dbh. The snag management objective for this project is to meet the Forest Service's Northern Region Snag Management Protocol by following the guidelines below to provide large snags for the pileated woodpecker and other species which use large diameter snags (USDA Forest Service, Region 1. 2000; PF Doc. WL-R54). These are listed above in the section on Management Recommendations for Pileated Woodpeckers.

These regional standards exceed the snag retention standards in the Forest Plan. Prescribed thinning and prescribed fire prescriptions in this project would maintain 2 large diameter snags per acre and provide nesting opportunities for pileated woodpeckers.

No-Action Alternative: No short-term effects or changes would result from the implementation of the No Action Alternative. Large white pine, western larch, ponderosa pine and Douglas-fir components in the Resource Area would continue to be low. Beetle activity and insects and diseases would continue to provide snag recruitment, although the size of snags would be smaller than trees pileated woodpeckers use for nesting. Some stands would trend toward a mature forest component over the next 50 years, improving habitat for the pileated woodpecker. There is potential for stand-replacing fire as stands mature, which would set back the trend towards suitable habitat for the pileated woodpecker. Under the No Action Alternative, there would be no road construction or reconstruction to decrease habitat quality.

Alternatives 2 and 3: Alternatives 2 and 3 would retain all pileated woodpecker snag habitat in the Prichard-Murray Resource Area (PF Doc. WL-28). Alternative 2 proposes treatments in 438 acres of allocated old growth (Specialist's Report on Forest Vegetation, page 34). This includes 310 acres of prescribed burning

without commercial harvest, 80 of commercial thinning/improvement harvest with prescribed burning and 48 acres of commercial regeneration harvest. After 128 acres of thinning and regeneration harvest, those stands may be unsuitable for pileated woodpecker nesting due to loss of large trees and/or reduction in canopy closure.

Alternative 3 would not treat any old growth stands, so would retain more habitat and larger habitat patches for pileated woodpeckers. More snags would be created with Alternative 2 in prescribed burn units, but probably not any new snags greater than 20 inches dbh which could provide nesting habitat for this species. Most larger diameter ponderosa pine and western larch and would survive the fire. However, Douglas-fir, grand fir and western hemlock may experience some mortality from prescribed fire. The effect of the proposed prescribed burns on pileated woodpecker foraging habitat is uncertain. Research in grand fir and Douglas-fir forests in Oregon found significantly fewer logs, snags and stumps in stands that were prescribed burned in the fall compared to unburned controls (Bull et al. 2005. PF Doc. WL-R141). Spring burning would retain more logs, snags and stumps. Snags may increase after spring prescribed fire that would kill some green trees, possibly creating new foraging or nesting opportunities for pileated woodpeckers. Fire personnel would ensure that sufficient large snags are maintained through prescribed fire activities to meet the regional snag protocol standards. Over the next 50 years thousands of acres of forest in the Prichard-Murray Resource Area would mature into old growth forest; these stands would increase the amount of suitable habitat for pileated woodpeckers.

Cumulative Effects/Determination of Effects to Pileated Woodpeckers: Over time, all alternatives would result in a trend toward more suitable habitat for pileated woodpeckers. The district silviculturist estimates that most of the small – medium size class stands could enter the mature – large size class in the next 20 years. Root disease is common in grand fir and Douglas-fir stands on the district. Over the next 50 years, this endemic disease is projected to result in a loss of canopy in stands affected by root disease, which could result in a reduction of habitat for the pileated woodpecker over the next five decades. (Specialist's Report on Forest Vegetation, page VEG-21). As stands increase in age and are affected by insects and disease, snag numbers would increase. Under the No-Action Alternative, potential stand-replacing fires could set back the trend towards suitable habitat for the pileated woodpecker. This is less likely to occur with implementation of Alternatives 2 or 3, which are both designed to decrease fuels and the probability of spread of large fires. Across the Idaho Panhandle, past timber harvest and stand-replacing fires on the national forests, private land and land managed by the BLM have removed large live and dead trees, and salvage logging has reduced snag numbers compared to historic levels.

Although the action alternatives would implement riparian buffers, riparian habitats are very narrow in this Resource Area and do not provide much habitat for pileated woodpeckers. Old growth would be maintained as required by the Forest Plan. Regional and Forest Plan standards for snag retention would be implemented (USDA Forest Service 2000; PF Doc. WL-R54, WL-53). These actions would also be consistent with National Forest Management Act requirements for population viability (36 CFR 219.19). A conservation assessment for the pileated woodpecker in Region 1 found short-term viability (100 years) is not an issue for the pileated woodpecker at the regional scale (Samson 2005, amended 2006; PF Doc. WL-67). **Activities under either action alternative may impact individual pileated woodpeckers or their habitat, but would not likely contribute towards federal listing or cause a loss of viability to the population or species.** There would be no impact to the pileated woodpecker or its habitat with the implementation of the No Action Alternative.

3.N. Pine Marten (Old Growth Management Indicator Species)

Life History of Pine Marten

Pine marten inhabit late successional coniferous forests, preferring mature and old growth subalpine fir or spruce-fir stands (Koehler and Hornocker 1977 in Warren 1990; PF Doc. WL-R33). Pine marten are used by the Forest Service on the Idaho Panhandle National Forests as management indicators of old growth habitats. An important component for marten is dead trees including snags, stumps, and leaning and down logs. These are used for regulating temperature in the winter, resting, hiding from predators, prey habitat and reproducing, and they are usually in close proximity to cover (Spencer 1981 in Ruggiero et al. 1994, PF Doc. WL-R68; Simon in Ruggiero et al. 1994, PF WL-R68). Pine marten require large snags, stumps and logs for resting sites and natal dens (PF Doc. WL-R33, page 29). Martens prefer spruce-subalpine fir stands with large overstory trees, and many down logs (Witmer et al. 1998; PF doc. WL-R964). Marten prefer habitats with at least 40% canopy closure and also use openings for foraging in the summer and winter (Koehler and Hornocker 1977 in Warren 1990; PF Doc. WL-R33; Spencer 1981 in Ruggiero et al. 1994, PF Doc. WL-R68). Marten prey on small mammals, especially voles, but also squirrels, snowshoe hares, songbirds, insects and occasionally eat berries (Weckwerth and Hawley 1962; PF Doc. WL-R92). In the winter, marten may be limited by access routes to get at prey below deep snow (Koehler and Hornocker 1977 in Warren 1990, page 30; PF Doc. WL-R33). The home range of male marten in Montana averaged about one square mile (640 acres); marten home ranges in other states are larger (Koehler and Hornocker 1977 in Warren 1990; PF Doc. WL-R33, page 30).

Reference Condition for Pine Martens

The marten was selected by many national forests in the Northern Region as a management indicator species to represent species which use mature and old growth habitats. The marten occurs throughout most of northern North America's late successional forests (Patton and Escano in Warren 1990; PF doc. WL-R33). Marten are found throughout the forested regions of Idaho except the driest forest types. In North Idaho, pine marten habitat usually exists above 4,000 feet in elevation, but also occur at lower elevations in suitable habitiat, especially along riparian areas. Several habitat types in the Prichard-Murray resource area are suitable for pine martens (PF Doc. WL-R33, page 35 and PF Doc. WL-32). An analysis of TSMRS data for size classes and habitat types used by marten found 22,540 acres of forest stands which could be suitable habitat for pine martens; this is 32% of the Prichard-Murray resource area.

Management Recommendations for Pine Martens

Witmer et al (1998; PF Doc. WL-R64) describe the three major issues of concern to marten conservation and management in the Columbia River Basin in "Forest Carnivore Conservation and Management in the Interior Columbia Basin: Issues and Environmental Correlates."

- ***Conservation of late successional forest -*** *Over mature stands are found to consistently be preferred habitat for the marten. Martens do not travel far from substantial forest overhead cover. Large-diameter snags, logs, and stumps provide important resting habitat for the marten. Although used as a management indicator species for old growth, in a habitat suitability model developed by Patton and Escano, stands with moist cover types, an average overstory tree size greater than 9 inches in diameter and canopy closure greater than 30 percent provide moderate habitat for the marten (Patton and Escano in Warren 1990; PF doc. WL-R33). In the Prichard-Murray Resource Area stands of this diameter class include some small/medium and most mature/large structural stages.*

- ***Maintenance of links between populations -*** *Martens will not use habitat with minimal canopy cover. Forested travel corridors are essential for maintaining links among individuals and populations. Patton and Escano recommend that suitable pine marten home ranges be provided every 1 to 2 square miles in order to maintain viable populations. Marten rarely venture greater than 150 feet from forest cover, especially in winter (Patton and Escano in Warren 1990; PF doc. WL-R33). To ensure that a viable population of marten is maintained*

across its range, suitable habitat for individual martens should be distributed geographically in a manner that allows interchange of individuals between habitat patches (Patton and Escano in Warren 1990; PF doc. WL-R33).

- ***Trapping pressure and human disturbance*** *- Marten are trapped commercially. Road densities contribute to trapping pressure. Pine marten are very susceptible to trapping; high road densities probably increase vulnerability. They prefer areas with road densities of less than 1 mile per square mile (Patton and Escano in Warren 1990; PF doc. WL-R33).*

Affected Environment for Pine Martens

Pine marten are known to occur on the Coeur d'Alene River Ranger District. Stand-replacing fires in the late 1800s and early 1900s greatly reduced marten habitat. Canopy closure was reduced on thousands of acres of forest as a result of these fires, but has grown back. For a few decades snags and down wood were abundant. Over time these decayed and young forests that grew back after the fires did not provide habitat for martens for several decades. About 6,100 acres of timber harvest occurred in the Prichard-Murray resource area in the last 5 decades, so there is almost continuous forest canopy in the analysis area, facilitating movement of martens. Now 38 percent of the forest in the Resource Area is mature/large size class and increasing. Much of this is suitable habitat for martens, although their preferred habitats in higher elevation cool moist habitats only comprise 1 percent of the resource area. Warm moist forests which they also use make up 74 percent of the resource area. Unless burned or logged, younger stands would continue to trend toward optimal habitat for the marten as forests mature and become more susceptible to diseases and insects. The major ridge on the Idaho/Montana border east of the Prichard-Murray Resource Area provides a movement corridor for pine martens to disperse to other habitats. High road densities in this area provide little protection for martens from trapping. Many roads which are closed to summer traffic are open to snowmobiles in the winter; these can be accessed by trappers.

Environmental Consequences for Pine Martens

No Action Alternative: No change in marten habitat would occur under the No Action Alternative over the short term. The Idaho / Montana Divide east of the Resource Area would continue to provide a dispersal corridor for pine marten. If disturbance does not occur through logging, fire, insects or disease that would greatly decrease canopy cover, thousands of acres of stands which are too young now to provide marten habitat would mature and provide suitable habitat over the next several decades. Stand-replacing fires or logging which removes snags could set back the trend towards suitable marten habitat.

Alternative 2: Prescribed fire and logging would reduce small diameter down wood and understory plants which provide habitat for rodents and other marten prey species. Down wood which is partially suspended above the ground is used extensively by martens in the winter to access prey below the snow; many of these would be removed during logging and prescribed burning, limiting winter foraging opportunities for martens. Timber harvest on 676 acres would increase seral species on 4 percent of the resource area; many of these cover types are not preferred by pine martens, so would not affect pine martens directly but could affect mice and other prey species. Proposed fuel treatments which do not include any timber harvest will generally occur on habitats which are too dry to support pine martens, so won't affect pine marten habitat. Under either action alternative, growth of untreated stands would increase marten habitat at a greater rate than the proposed logging and prescribed burning would reduce it, resulting in a net increase in pine marten habitat in the Prichard-Murray Resource Area. Neither action alternative would affect the large dispersal corridor on the Idaho/Montana border east of the resource area or change the easy snowmobile access for trappers in the Prichard-Murray Resource Area.

Alternative 3: The effects of this alternative would be similar to those under Alternative 3, except timber harvest would occur on 545 acres and increase seral species (not preferred marten habitat) on 3 percent of the resource area.

Cumulative Effects/Determination of Effects to Pine Martens: Under the action alternatives, pine marten habitat would be reduced on no more than 4 percent of the resource area. As untreated forest stands grow, they would increase habitat for martens by several thousand acres over the next several decades. Viability for the marten would be maintained under the Proposed Action because movement corridors are available both inside and outside the analysis area to allow for dispersal; Region 1 snag protocol would be implemented (which exceed the 1987 IPNF Forest Plan standards); and old growth would be maintained at 12.5 percent.

Based on the reasons above, a**ctivities under either action alternative may impact individual pine martens or their habitat, but would not contribute to a trend toward federal listing or cause a loss of viability to the population or species.** There would be no impact to pine martens under the No-Action Alternative.

3.O. Northern Goshawk (Old Growth Management Indicator Species)

Life History of Northern Goshawks

Northern Goshawks occupy coniferous and mixed forests throughout much of the northern hemisphere (Nature Serve website PF Doc. WL-R109). Goshawks prefer to nest in mature and old growth coniferous forests with large trees and canopy coverages of 60 to 80 percent (Hayward et al. 1983; PF Doc. WL-R24)Other characteristics include a stand size greater than 25 acres, gentle to moderate slopes and small, scattered openings (Hayward et al. 1983; PF Doc. WL-R24). North-facing slopes are sometimes preferred for nesting (Hennessey 1978, PF Doc. WL-R25; Reynolds et al 1982, PF Doc. WL-R46), although ridges and benches are also used in the Coeur d'Alene River Basin, probably due to a shortage of gentler slopes.

This species prefers single-storied or multi-storied stands with open understories for hunting (Hayward et al. 1983, PF Doc. WL-R24). Goshawks use snags and live trees for hunting and consuming their prey. Prey species include small mammals, songbirds, and game birds such as grouse and waterfowl (Hayward in Warren 1990; PF Doc. WL-R33). Preferred home ranges are about 5,000 acres of contiguous forest (Warren 1990; PF Doc. WL-R33). Goshawks are sensitive to disturbance, and may leave a nest if prolonged activity occurs nearby.

Reference Conditions for Northern Goshawk

Little historical information is available for goshawks in North Idaho. Urbanization, large fires, road construction and timber harvest have decreased the quality of mature forests and riparian habitat in the Resource Area and across the Idaho Panhandle. Losses of nesting habitat, loss of riparian habitat from road building, timber harvest and human development, and reductions in the variety and abundance of prey availability suggest that goshawks may have historically been more abundant than they are today. In the last fifty years, timber harvest has occurred on about 6,100 acres in the Prichard-Murray Resource Area. Approximately 12.5 percent of the Prichard-Murray analysis area is old growth. Populations appear to be stable in Idaho (Maj, M. and Garton, p. 29 in Idaho Department of Fish and Game et al., PF Doc. WL-R21). A conservation assessment for the goshawk in Region 1 found goshawk habitat to be well-distributed and abundant on the current landscape, and that viability for the species will be maintained for the next 100 years (PF Doc. WL-67). Only one goshawk survey has been conducted in the Prichard-Murray Resource Area, and one goshawk was found in 2006 (PF Doc. WL-10). No nest searches have been conducted there, so it is not known if there are any breeding pairs of goshawks in the analysis area.

Management Recommendations for Northern Goshawks

Goshawks are listed as a sensitive species in Region 1 by the Forest Service. However, recent analysis indicates that goshawk populations appear to be stable and the species is being considered for removal from the sensitive species list in Region 1. The Northern Region of the Forest Service has defined viability for the goshawk as one pair every 10,000 acres (Warren 1990; PF Doc. WL-R33). Recommendations have been established for management of the Northern Goshawk in the Southwestern United States (Reynolds et al. 1992; PF Doc. WL-R46). These recommendations suggest goshawk home ranges are about 5,000 acres in size and consist of a nesting area of 20-25 acres, a post-fledgling family area of 400 acres, and a foraging area

approximately the size of the home range. Recommendations by Reynolds et al. were not used in this analysis because they evaluate the forest habitat in the vicinity of known goshawk nest locations; no goshawk nests have been found in the Prichard-Murray resource area. These guidelines developed for the southwestern United States may not be completely appropriate for managing northern goshawks in the northern Rockies where habitat types are different than habitats in the Southwestern states.

Affected Environment for Northern Goshawks

Northern goshawks occur throughout the western United States and in several northeastern states. Nesting pairs of goshawks have been documented in several areas of the Coeur d'Alene River Basin. A goshawk habitat model which evaluates existing timber stand data identified only 185 acres of suitable goshawk habitat in the Resource Area. Field reviews by wildlife biologists confirmed these habitat queries and found the Prichard-Murray Resource Area has very little suitable habitat for goshawks. This is due to middle aged forest stands dominating the landscape after historic fires and logging, and low canopy closure in some stands. The average canopy closure for all stands in the resource area is 60 percent, which is the low end of suitability for goshawks. Young stands and those with less than 60 percent canopy do not generally provide the structure and composition to provide a variety of prey species for goshawk nesting. Snowshoe hares are an important goshawk prey species in many areas. Snowshoe hares prefer dense forest stands about 25-40 years after fire or timber harvest. Snowshoe hare habitat is rare in the analysis area; about 6,100 acres across the Prichard-Murray Resource Area have been harvested for timber and less than 1,000 acres have burned in the last 5 decades. Some of these harvests and burns would have created habitat for snowshoe hares. Large diameter, live overstory trees are in short supply across the landscape in these drainages. One goshawk calling survey in 2006 found a goshawk. It was not determined if this goshawk had a nest in the area (PF Doc. WL-10).

A goshawk model estimates 185 acres of suitable goshawk nesting habitat occur in the resource area. A total of 3,410 acres in the analysis area are capable goshawk habitat but not currently suitable for goshawk nesting. As forests age, many of these areas may develop into suitable goshawk habitat. Since no goshawk nest locations are known in the resource area, we did not map post-fledgling areas. The analysis area's 12.5 percent old growth is less than the 20 percent recommended for goshawks under the Southwest guidelines (Reynolds et al 1992; PF Doc. WL-R46). The analysis area currently has less than the recommended 10 percent grasslands, forbs and shrubs. There are no natural grasslands in the resource area.

Environmental effects to Northern Goshawks

No Action Alternative: No short-term effects or changes would result from the implementation of the No Action Alternative. Over the long term, natural mortality would result in snag and downed log recruitment. Some mature stands would move towards old growth; however, many mature stands would never achieve old growth qualities due to insects, disease and fire. Compared to the desired future condition determined by the district silviculturist, there would continue to be fewer young aged stands which provide a diversity of habitat for birds and small mammals which are important prey species for goshawks. The Resource Area would continue to provide habitat for one or more nesting pairs of goshawks in the foreseeable future but falls well below the 1 pair per 10,000 acres recommended for maintaining viability of goshawk populations (Warren 1990; PF Doc. WL-R33).

***Alternatives 2 and 3*:** None of the proposed treatment units are in goshawk suitable habitat. Burning activities would increase snags, which could have a long-term beneficial effect for the goshawk and its forage habitat. Shelterwood treatments would increase the amount of young forest, long-lived seral species and understory structure on 95 acres under Alternative 2 and on 47 acres under Alternative 3. These may provide improved foraging habitat for goshawks over time as bird and small mammal populations increase in treated stands. Thinning treatments would also increase the growth on leave trees, which may provide future goshawk nesting habitat in 30 to 50 years. The Resource Area would continue to provide habitat for one or more nesting pairs of goshawks in the foreseeable future but falls well below the 1 pair per 10,000 acres recommended for maintaining viability of goshawk populations (Warren 1990; PF Doc. WL-R33). The protocol for evaluating goshawk viability recommended by Warren is appropriate at the project or Basin scale; the viability analysis used by Samson is appropriate for the scale of the Forest Service's Northern

Region (western Montana, North Idaho and parts of North and South Dakota).

Cumulative Effects to Northern Goshawk: No timber or fuels treatments would occur in suitable goshawk habitat under this project. Timber management on private lands in and adjacent to the resource area will increase the amount of young forest, increasing habitat for many species of birds and mammals which are prey for goshawks. Fuels reduction treatments may protect existing and future goshawk nesting habitat by reducing the intensity and spread of future wildfires in the analysis area. These would have beneficial cumulative effects on goshawks. Goshawk habitat would be maintained or improved based on the following:

1) *No proposed activities would occur in suitable goshawk habitat.*
2) *Regional and forest snag guidelines will be followed*
3) *12.5 percent old growth will be maintained in the old growth management units that are in the analysis area.*
4) *A regional assessment of goshawk viability across Region 1 has determined that viability is assured for the next 100 years (PF Doc. WL-67)*
5) *Timber sale contracts will protect any goshawk nests discovered prior to or during proposed activities.*

Based on the reasons above, **the action alternatives may impact individuals, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or the species.** There would be no impact to goshawks under the No-Action Alternative.

3.P. Rocky Mountain Elk (Big game Management Indicator Species)

Life History of Rocky Mountain Elk

Elk are tolerant of diverse environments and originally had a widespread distribution over much of North America, including the Great Plains. During the fall hunting season, elk in Idaho generally can be found away from open roads and in denser cover which provides some security from hunters. In the spring elk seem to prefer open areas where grasses and forbs provide succulent, nutritious forage.

Reference Conditions for Rocky Mountain Elk

Early records indicate that Rocky Mountain elk occurred throughout most of Idaho; however, large herds were apparently absent from the Idaho Panhandle. Settlement led to exploitation of the species, causing elk to be reduced to a few isolated herds in the state. A translocation program initiated in 1915 and continuing for the next 30 years restocked elk in northern Idaho. Today elk exceed their population level of a century ago. However, high road densities in elk habitat in northern Idaho have increased hunter success and have led to restricted hunting regulations. Compared to the 1960s, elk are younger with fewer experienced old cows and bulls. Winter range for the species has been greatly impacted by urban development and agriculture outside the Resource Area. Development on private lands along the North Fork of the Coeur d'Alene River has displaced elk from some of their historic winter ranges, and noxious weeds have decreased the quality and availability of elk forage in some areas.

Figure WL-6. Rocky Mountain Elk (Photo source: National Image Library; http://images.fws.gov).

Management Recommendations for Rocky Mountain Elk

The Forest Plan directs that forest management for elk should be coordinated with the Idaho Department of Fish and Game. A Forest Plan guideline is to use "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho" (IDFG 1984; PF Doc. WL-R140) to evaluate elk habitat potential. Elk Habitat Units (EHUs) are the land areas recommended for tracking elk habitat potential under the Forest Plan.

EHUs consist of several contiguous timber compartments used for database management of timber stand information. Compartments are groups of stands topographically delineated and used for tracking current condition and land management activities. Road miles, road status, forage, cover, security areas and other factors that could affect elk habitat are considered in the EHU model. A detailed report on the status of each road within the Resource Area is available in the wildlife project files and in the Roads Analysis for this project (PF Doc. WL-43). Information includes miles of each road, whether it is open yearlong, open seasonally or closed, the type and effectiveness of the closure device, and the condition of the road (whether it is brushed in or driveable).

Affected Environment for Rocky Mountain Elk

White-tailed deer, moose and elk inhabit the Prichard-Murray Resource Area. Elk winter ranges occur in several drainages in the analysis area, especially in Prichard Creek, which has the most south-facing, low-elevation habitat. Root rot and historic burning have created some permanent brushfields which provide abundant forage for elk in the Prichard-Murray Resource Area. Steep terrain across much of the EHU may limit elk calving habitat to ridgetops and riparian areas.

Security: Motorized traffic on roads and trails are the biggest impacts to elk security in the Prichard-Murray Resource Area. The resource area includes Elk Habitat Units WEHU3 and WEHU7. The IPNF Forest Plan established a cumulative Elk Habitat Potential goal of 52 for the Wallace portion of the Coeur d'Alene River Range District. This is based on individual Elk Habitat Potential calculations in several watersheds across the Wallace portion of the district. This was based on a cooperative analysis by the Forest Service and Idaho Department of Fish and Game. The Wallace portion of the Coeur d'Alene River Ranger District does not currently meet the goal of 52 for elk habitat security. Large secure areas are important for big game, especially during calving and hunting seasons. These secure areas are used for calving and fawning and rearing of young. The recommended minimum security is 20 percent in an area the size of an EHU (IDFG 1984; PF Doc. WL-R140).

Cover: Cover is not a limiting factor in the Prichard-Murray Resource Area. Past fires, timber harvest and pockets of root disease and Douglas-fir beetle have created some openings in the forest cover. There have been few fires in the Prichard-Murray Resource Area since 1919 (PF Doc. FF-4). This has resulted in dense forest cover throughout most of the Resource Area. Many stands have dense understory vegetation, which provides good hiding cover for elk.

Environmental effects to Rocky Mountain Elk

As directed by the Forest Plan, the methodology in *Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho* (IDFG 1984; PF Doc. WL-R140) was used to evaluate current elk habitat potential. The elk habitat potential model determines a numerical value for habitat suitability using factors such as the length of road, type of road, whether the road is open or closed and the distribution of forage and cover. When all habitat factors are optimal in abundance and distribution, elk potential is 100 percent. The Idaho Fish and Game recommends a minimum value of 50 percent or greater for general elk summer range (IDFG 1984; PF Doc. WL-R140). A decrease in elk habitat potential for an EHU indicates a loss of habitat security. Since no new permanent roads are being constructed, the Elk Habitat Potential will be the same before and after proposed activities.

Table WL-7. Percent Elk Habitat Potential During and After Project Activities.

Elk Habitat Analysis Area	Goal	Existing/No Action Alternative	Alternative 2 After Project	Alternative 3 After Project
WEHU3	65%	57%	57%	57%
WEHU7	33%	53%	53%	53%

No Action Alternative: No short-term vegetative effects or changes would result from implementing the No Action Alternative. There would be a loss of forage habitat over time, as existing immature stands continue to move towards mature forest structure and vigor of shrubs continues to decline. Decades later, as mature stands decline, there would be a reduction in thermal cover. If stand replacing fires occur in the future they could affect elk security, depending on their size and future road management.

Alternatives 2 and 3: The elk habitat potential for the Resource Area would not change during or after proposed activities in Alternative 2 or 3 because less than one-half mile of new road would be built in WEHU3 and in WEHU7. This small increase in roads is not enough to change the Elk Habitat Potential. The road in WEHU 7 would be closed after this project; the new road in WEHU 3 would continue to be used as it is now, as a motorized trail. Big game forage would increase a few years after thinning and prescribed fire activities as shrubs, grasses and forbs sprout and germinate. However, forage availability is not generally considered a limiting factor on the Coeur d'Alene River Ranger District. Temporary road construction would be less than 0.2 miles, which would be too little to measurably affect elk habitat security.

Cumulative Effects to Rocky Mountain Elk: Construction of 0.2 mile of road to access private property in Fancy Gulch will increase access to a small portion of the Prichard-Murray resource area, but the road will be gated and not open to general public access. There are no known or anticipated cumulative effects to elk from this project. Because the Forest Service has no jurisdiction over management of private lands or lands managed by state or other federal agencies, we assume no habitat for elk when modeling and analyzing elk habitat in EHUs which include lands not managed by the Forest Service. Idaho Department of Fish and Game manages elk as a hunted species, monitors elk populations and, through regulating hunting, ensures elk viability.

3.Q. Nongame and Neotropical Migrant Landbirds

Affected Environment for Nongame and Neotropical Migrant Landbirds

Vegetation is the primary component of habitat for neotropical migrant birds and other nongame species. Vegetation in the Prichard-Murray Resource Area and associated habitat for nongame species has changed considerably over the last 100 years as a result of fires during the early 1900s, mining, and increased recreation in the area. Residents of Murray and residents and visitors along the North Fork of the Coeur d'Alene River use the area extensively for a variety of recreational activities. These human uses can interfere with reproductive behavior of nongame species and displace animals from their habitats. Motorized travel results in roadkilled animals of various species. Toads, frogs, lizards, snakes and other slow-moving animals are especially susceptible to being killed by motor vehicles.

Table WL-8. Forest Age Class Distribution

Shrub/Seed/Sapling	Small/Medium Timber	Mature/Large Timber
7	53	38

The table above shows the current percent of different age classes of vegetation in the Resource Area. The mature/large timber category includes 12.5% of the area which is allocated old growth habitat. The majority of forest stands in this area are in small to medium size ranges. Without many fires in the last several decades, the tree density in these stands has greatly increased, resulting in dense stands lacking diverse understory vegetation which is important for many nesting and foraging for many neotropical migrant landbirds. Stands without much understory support fewer species of insects and other invertebrates which are the food for many amphibians, reptiles, small mammals and birds.

Dozens of nongame species, especially neotropical migrant birds, use large snags and down wood for reproduction (nesting, denning or roosting), cover, foraging substrate, or just resting. Large snags preferred by bats, Vaux's swift, pileated woodpecker, Lewis' woodpecker, pygmy nuthatch, brown creeper and some other nongame species are not very abundant in the Resource Area. Logging, fire suppression, firewood cutting, mining and road construction have reduced the number of large logs which would otherwise be present. Root rot, insects and other processes associated with aging forests continue to produce new snags and new down wood which can be used by nongame species.

Riparian habitats, especially cottonwoods and willows, are very important stopovers for neotropical migrant birds during spring and fall migration. Construction of roads and houses in riparian areas has removed a significant amount of riparian habitat in the Resource Area, especially along the North Fork of the Coeur d'Alene River. Placer mining has similarly reduced riparian habitat on private lands in Prichard Creek. Riparian habitats often have abundant herbaceous understory vegetation habitat structures, including the bed and banks of the stream. These can provide optimal habitat for species such as the boreal toad and other amphibians, fisher, jumping mouse, shrews and several species of warblers and vireos. The 1910 fire, subsequent salvage, mining, roads and their associated disruption of riparian habitat, along with easy trapping access have contributed to reductions in nongame species and their habitats.

Environmental effects to Nongame and Neotropical Migrant Landbirds

No Action Alternative: The district silviculturist has determined that canopy closure and the number of large diameter trees will decline over the next few decades. These changes may not be within the natural successional pattern due to a combination of natural processes and management, including fire exclusion. Western white pine and western larch forests and the associated wildlife species would remain below historic levels for the long term. Lack of existing seral species and associated seed sources may preclude these species from returning to historic levels. Root diseases would continue to kill the susceptible firs and hemlock, continually adding to snags and downed log recruitment of smaller sizes. However, snags created by root disease do not stand very long and only provide habitat for species which use snags for a short period of time.

Over time, low canopy conditions will dominate the landscape with many areas remaining stalled in small young (Douglas fir and grand fir), tree structures and multi-storied stands. Although mature/large timber stands may contain large trees and provide some old structural components, openings caused by root diseases and other pathogens and insects may be common (Specialist's Report on Forest Vegetation, page 24). This will result in fewer habitats for the nongame species which depend on mature and old growth forest habitats. The fire risk to nongame wildlife habitat in the Prichard-Murray Resource Area would remain high due to abundant ground and ladder fuels after decades of fire suppression and could set back the trend towards old forest.

Alternatives 2 and 3: It is unknown what effect prescribed burning on 2,401 acres in Alternative 2 or 1,955 acres in Alternative 3 would have on snags in the resource area. The proposed prescribed burning may increase the number of snags, especially if it occurs in the spring. Research in grand fir and Douglas-fir forests in Oregon found significantly fewer logs, snags and stumps in stands that were prescribed burned in the fall compared to unburned controls (Bull et al. 2005. PF Doc. WL-R141). Other research in Idaho, Oregon and Washington found in increase in snags resulting from spring prescribed burns (PF Doc. WL-R148). Our objective with this project is to maintain or increase the number of large diameter (14" dbh or larger) snags. Snags would be retained to meet Region 1 snag protocol guidelines (PF Doc. WL-53). Timber harvest treatments on a small amount of the resource area would remove trees with insects and disease which would have developed into future snags. However, the vast majority of untreated stands would create many more snags over time.

Opening up the forest canopy on logged and burned units would stimulate the growth of shrubs and other understory plants, which would contribute to insect diversity and increased foraging opportunities and cover for a variety of nongame species. New openings would range in size from 3 to 81 acres (average 66 acres) in Alternative 2, and 9 to 171 acres (average 81 acres) for Alternative 3. Some of these patches would be too small to include the home range of many neotropical migrant bird species, so changes to the forest structure

would not provide additional habitat for those species. Reduction of fuels on several sites across the Resource Area would reduce the spread and intensity of fires in the area; this would help protect old growth and other important nongame wildlife habitats in the future.

Some roads that are currently closed to full-sized motorized vehicles would be temporarily opened during this project and then closed, resulting in no net increase in motorized roads in the Resource Area. Snags would continue to be harvested for firewood along open roads.

Proposed brushfield burning would reduce cover and shelter for nongame species for five to ten years. Alternative 3 does not include any burning in old growth stands, but Alternative 2 does. The openings created by timber harvest in both action alternatives would temporarily reduce nongame habitat for those species dependent upon forested habitat. As the understory grows back, the habitat will be more diverse than what is currently available under closed canopy middle-aged stands. Reserve trees within the shelterwood units would provide some stand structure and diversity in the future and provide for future old, large trees. Snags would not be retained in fuelbreaks (Specialist's Report on Forest Vegetation, page 43). Loss of down wood during timber harvest and prescribed burning would decrease habitat quality for numerous nongame species which use down wood for cover, food, reproduction and resting.

Alternatives 2 and 3 would potentially result in the restoration of stands to have characteristics more similar to historical conditions over the long term (100 to 150 years or more), when the regeneration of healthy long-lived seral species like white pine and larch could benefit nongame species. However this will only occur on a small portion of the Resource Area; other stands will continue to mature in dense stands with high canopy closure and relatively few species in their understories. There is a potential for the spread of noxious weeds in timber harvest units and the units proposed for only burning. These weeds could displace native plants, reducing habitat diversity for nongame species. Refer to the specialist's report on weeds for further analysis of noxious weeds. Under either action alternative, reconstructing short segments of road would displace some nongame wildlife during the breeding season, resulting in reduced productivity for those species.

Cumulative Effects to Nongame and Neotropical Migrant Landbirds: Historic fires around the turn of the century have reduced the occurrence of large snags, down wood and old forests. Since that time, fire suppression has cause stands to become more dense, leading to high incidence of insects and disease. Restoration of fire as an ecological process in the Prichard-Murray Resource Area would result in a trend toward historical conditions, and provide additional biodiversity with maintenance of brush fields on south-facing slopes.

Lands under non-federal ownership in the vicinity of Prichard-Murray Resource Area also provide habitat for nongame species, but the Forest Service has no jurisdiction over how these habitats are managed. Noxious weed treatments by Shoshone County would improve nongame habitat over the long term on small patches of land. Efforts to trend stands in the Resource Area towards historic species composition and age structure and to maintain the ecological processes which created these conditions would have mixed results for neotropical migrant landbirds and some other nongame species. Maintaining ponderosa pine, western larch and western white pine may produce more large-diameter trees and snags. Reducing shrubs, young trees and other understory plants will reduce nesting habitat and cover on hundreds of acres for some bird species which nest on or near the ground or in the forest understory.

4. Consistency with Forest Policy and Legal Mandates Related to Wildlife

All three alternatives would be consistent with Forest Plan management direction, goals, objectives, standards and guidelines for the management of wildlife and their habitats as described below.

A. Elk

1. (a) Coordinate with the Idaho Fish and Game Department to allocate the distribution of habitat potential.

Idaho Fish and Game participated in the allocation of Elk Habitat Units and goals during the Forest Planning process, which is consistent with this standard.

1. (b) Identify and delineate existing and potential winter range for each elk habitat unit and establish goals for forage production suitable to support desired population levels, including such tools as designation of permanent forage areas, scheduling of timber harvest, and habitat movement.

The Forest Plan delineated winter range as a Management Area. Forage goals were identified during the development of the elk habitat suitability model. There are some permanent brushfields which provide elk forage areas in this Resource Area.

1. (c) Utilize the "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho" (Wildlife Bulletin No. 11, 1984, Idaho Department of Fish and Game) for evaluation of effects of proposed activities on elk habitat (Appendix Y, Idaho Panhandle National Forests Plan).

These guidelines have been incorporated into the elk habitat potential model.

B. Threatened and Endangered species

2. (a) Management of habitat and security needs for threatened and endangered (T&E) species will be given priority in identified habitat. Results of research regarding habitat of T & E species will be incorporated into management direction as it becomes available.

Habitat conservation strategies and recovery plans for Threatened and Endangered species address the habitat and security needs for these species. These are identified and analyzed in the Biological Assessment. Current and ongoing research information is used in the Biological Assessment.

2. (b) Biological evaluations will be done on any project likely to have an adverse effect on identified habitats or threatened or endangered animals.

A Biological Assessment and Biological Evaluation have been completed for all Threatened, Endangered and Sensitive species for this project and are part of the project file.

2. (c) Current direction for management of threatened and endangered species will be amended or revised to ensure conformance with Species Recovery Plans.

All current management direction for Threatened and Endangered species, including recovery plans and strategies, has been incorporated into the Biological Assessment. The Lynx Conservation Assessment and Strategy is being revised, but is not expected to affect this project since no proposed units are in lynx habitat.

C. Bald Eagle

5. (a) Nesting, feeding and roost areas will be protected in accordance with the Pacific States Bald Eagle Recovery Plan (Appendix W, Idaho Panhandle National Forests Plan).

Adult and immature bald eagles have been seen along the North Fork of the Coeur d'Alene River in the Resource Area. There are no known bald eagle nests, roost areas, or feeding areas within the Resource Area. Thorough surveys have not been conducted to find potential bald eagle roosts or nests in the Resource Area. If any such area were identified in the future, bald eagle nesting territories would be protected from disturbance in compliance with the Pacific States Bald Eagle Recovery Plan. Forest Service employees working in bald eagle habitat along the North Fork of the Coeur d'Alene River will notify the district wildlife biologist if bald eagles are seen in the area. Contract clauses will

also require that people working on timber harvest units in bald eagle habitat contact the sale administrator, who will work with the district wildlife biologist to protect nesting bald eagles.

5. (b) Develop site specific bald eagle nest management plan for each located eagle nest on National Forest land as outlined in the Montana Bald Eagle Management Plan (Appendix II, Idaho Panhandle National Forests Plan).

There are no known nest sites on national forest lands on the Coeur d'Alene River District, or on BLM or non-federal lands in or near the Resource Area. However, if a bald eagle nest is discovered on lands near proposed activities, measures will be taken to protect the eagles during the breeding season and the nest site.

5. (c) Cooperate in research and surveys involving bald eagles on the Forest.

District biologists participate in annual winter surveys for bald eagles. There are no midwinter bald eagle survey routes in the Resource Area.

D. Gray Wolf

6. (a) In areas of reported occurrence, consider maintenance of a high number of prey species (deer, elk) and maintenance of security through road management.

The analysis of the gray wolf was based on maintenance of prey and security. Please refer to the Biological Assessment and wolf analysis earlier in this wildlife specialist's report for further information on the gray wolf.

6. (b) Forward information on reported sightings to the Wolf Recovery Team.

The Forest Service forwards to Idaho Department of Fish and Game (IDFG) all information it receives on possible wolf sightings. IDFG has taken over the management of wolves in Idaho.

6. (c) Cooperate in research and data collection involving wolf and wolf habitat.

District biologists cooperate with all wolf relocation efforts and report all possible wolf sightings to Idaho Department of Fish and Game. No wolf research or data collection on wolves or their habitat is currently underway on the Coeur d'Alene River Ranger District.

E. Other Wildlife

7. (a) Maintain at least minimum viable populations of management indicator species distributed throughout the Forest.

Viability analysis has been done for these species. Viability thresholds have yet to be developed at the Regional Level. For additional discussion, please refer to the analysis of sensitive and management indicator species in this report.

7. (b) Maintain habitat for cavity nesting species and foraging substrates by implementation of the IPNF Snag and Woody Down Timber Guidelines (Appendix X, Idaho Panhandle National Forests Plan).

Snag requirements for this assessment are described in this report in the section on "Design Features to Protect and Manage Wildlife and Their Habitat". Based on these features, snag management would meet or exceed the requirements identified in the Forest Plan and in the Regional Snag Retention Protocol (USDA 2000; PF Doc. WL-R53, WL-R54). No snags are proposed for removal as a result of this project unless they pose a hazard to forest workers. Snags would be monitored after burning to validate that the numbers of large diameter snags required by the regional snag protocol are maintained and available for pileated woodpecker nesting (20" dbh and larger) and foraging, and other species which use large diameter snags.

F. Sensitive species

9. (a) Manage the habitat of species listed in the Region 1 Sensitive species List to prevent further declines in populations, which could lead to Federal listing under the Endangered Species Act.

All alternatives would comply with the Endangered Species Act of 1973 as amended (ESA). Forest Plan standards (Forest Plan, Chapter II, pages II-26 through II-29; PF Doc. WL-R53), in compliance with NFMA (219.20 Ecological sustainability), were incorporated into both action alternatives. These standards addressed elk and elk goals, threatened and endangered species, sensitive species, old growth management indicator species, neotropical migratory landbirds and some other nongame species. Both action alternatives are consistent with Forest Plan standards for allocated old growth. Alternative 2 proposes thinning and/or prescribed burning in some old growth stands. Alternative 3 proposes no treatments in allocated old growth or recruitment old growth.

10. (b) Monitor effects of activities on species which need large snags, especially flammulated owl.

Snags will be monitored after burning in at least 5 stands to determine whether prescribed burning maintained, increased or decreased the number of large diameter snags (14" dbh and larger).

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Wildlife Appendix A – Species Not Analyzed in Detail

Canada Lynx, Grizzly Bear, Woodland Caribou, Peregrine Falcon, Harlequin Duck, Northern bog lemming and Black Swift – None of the proposed treatment units in Alternative 2 or Alternative 3 include any habitat for these species, so this project would have no effect on these species.

Wolverine – This species is a wide-ranging carnivore which is sensitive to disturbance at its den sites, which are typically high elevation cirque basins and avalanche chutes. Although wolverines could occur in the Prichard-Murray resource area, there are no potential wolverine den sites there, so this project would have no effect on this species and it is not analyzed in detail.

Specialist's Report on Recreation in the Prichard-Murray Resource Area

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December 2006

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SPECIALIST'S REPORT ON RECREATION IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework

Idaho Panhandle National Forest Plan: Recreation goals and objectives identified in the Forest Plan (Forest Plan, Chapter II) are to provide for the projected use of developed recreation areas with development of new sites as budget becomes available, to provide for a variety of dispersed recreation opportunities (both motorized and non-motorized), to pursue opportunities to increase and improve the recreation trail system, and to continue to increase cooperative trail programs with organizations, clubs and other public agencies.

The Forest Plan allocated different management prescriptions to Inventoried Roadless Areas. Some areas were allocated to prescriptions that retain unroaded characteristics (Management Areas 10 and 11). Other roadless areas were allocated to prescriptions that retained semi-primitive characteristics that allow timber harvest and road construction.

Roadless Area Conservation Final Rule: On January 12, 2001, the Department issued a final rule accompanied by a FEIS and Record of Decision (published as part of the final rules, 36 CFR 294, Special Areas, Roadless Area Conservation, on January 12, 2001, at 66 FR 3244). On May 10, 2001, the Idaho District Court enjoined the Forest Service from implementing all aspects of the Roadless Area Conservation Rule as well as a section in the Forest Planning Rule that addresses the inventory and evaluation of the roadless areas during Forest Plan revision. On July 10, 2001 the Forest Service issued an advance notice of proposed rulemaking and request for comments in the Federal Register (Volume 66, Number 132).

Interim Directive No. 7710-2001-2: Reserves to the Chief of the Forest Service the authority to approve certain proposed road construction or reconstruction projects in Inventoried Roadless Areas until revision of a land management plan or the adoption of a plan amendment that has considered the protection or other management of Inventoried Roadless Areas as defined in FSM 7712.16a.

Interim Directive No. 2400-2001-3: Reserves to the Chief of the Forest Service the authority to approve or disapprove proposed timber harvest in Inventoried Roadless Areas (FSM 7712.16a), except for those listed in section 2404.15, paragraph 13.

Wilderness Act of 1964: The Wilderness Act defines four requisite attributes of wilderness: natural integrity, apparent naturalness, outstanding opportunities for solitude and opportunities for primitive recreation. These attributes are applied to the conditions inside the boundaries of the wilderness. Although the experience of wilderness visitors might be affected by activities outside the wilderness boundary, the Wilderness Act does not require that adverse effects associated with those activities to be mitigated.

2. Methodology

Determination of the existing conditions for recreation activities, facilities and opportunities is derived from facility inventories, facility maintenance work, observation by recreation specialists and technical personnel, and contact with recreation user groups and individuals. Guidance for management of recreation resources is provided in various National Forest manuals and handbooks, as well as professional publications and documents.

Forest Service Recreation Planners also make use of the Recreation Opportunity Spectrum (ROS) as a framework for understanding recreation facilities, opportunities and settings to meet the visitor's needs for a desired set of outdoor recreation experiences.

The analysis area studied for effects is the individual Inventoried Roadless Area. Effects on Inventoried Roadless Areas only occur within the area. Each Inventoried Roadless Area is described in detail in the Idaho Panhandle National Plan (FEIS, Addendum to Appendix C, Roadless Area Evaluation).

The following seven wilderness-like attributes are the basis for evaluating the effects of the alternatives using proximity and qualitative descriptions.

- ***Natural integrity*** *(the extent to which long term ecological processes are intact and operating)*
- ***Apparent Naturalness*** *(means the environment looks natural to most people)*
- ***Remoteness*** *(perceived condition of being secluded and inaccessible)*
- ***Solitude*** *(personal, subjective value defined as isolation from sights, sounds and human development)*
- ***Special Feature*** *(unique geological, biological, ecological, cultural or scenic features)*
- ***Manageability and boundaries*** *(ability to manage a roadless are to meet minimum size criteria, which is 5,000 acres for wilderness)*
- ***Special Places*** *(what it is about the area that causes one to visit the area?)*

3. Existing Conditions

The Prichard-Murray Resource Area represents a small portion of the Coeur d'Alene River Ranger District. There are no developed campgrounds, picnic areas or other structural recreation developments in the area or in the near vicinity. Facilities maintained for recreation use are represented by trails. The only recreation trail in the resource area is Kings Pass Trail 151. This 8-mile trail begins at Kings Pass on the Coeur d'Alene River Ranger District and goes 8 miles to Sunset Peak, on private lands. Trail 151 is mostly composed of old road surfaces. It serves naturally as an all-terrain-vehicle (ATV) trail and is maintained for that use. ATV's damage the narrow single- track trails and are also present great hazards to riders when the machines are forced onto the fall line of the ridges. ATV's are also being used on old logging and mining roads in the area and this is having some environmental consequences in the form of erosion, stream bank collapse and effects on wildlife habitation.

The number of people that visit the Prichard-Murray Resource Area for recreation is relatively small. Most visitors are local residents, represented by the communities of Murray, Osburn, Silverton, Kellogg, Mullan and Wallace. The population of these communities is approximately 14,000 (based on the year 2000 census data). Of the visitors that come to the area to use trails, approximately 30% use ATV's, 15% use motorcycles, 45% hike and 10% use bicycles (Source: 2003 Idaho Statewide Outdoor Recreation and Tourism Plan). The small hamlet of Murray is in the immediate resource area. The community of Murray is very interested in capitalizing on its status as an old west gold rush center. Efforts are underway to reconstruct the old courthouse and develop interpretive programs for the mining relics scattered around the area.

Roads in the area are used for recreation. Driving for pleasure and sight seeing is an important recreation activity. Roads are also used to facilitate access for hunting and gathering forest products, in particular berries, mushrooms and Christmas trees. The hunt for gold continues in the area, at least as recreational pursuit. There are no trails that are groomed or managed for snowmobile, skiing or snowshoeing in the area.

There is a very strong interest in the communities for continued access to the Prichard-Murray area for motorized vehicles, both on trails and on roads. There are also those that want to preserve a degree of quite and solitude for walking. These divergent views are often held by people that participate in both forms of recreation trail use.

The resource area is located within portions of three Inventoried Resource Areas: Lost Creek, Maple Peak, and Trouble Creek. **Lost Creek Inventoried Roadless Area (#01137):** This Inventoried Roadless Area is the area formed by the hydrologic boundaries of Lost Creek, including Lost Creek, East Fork Lost Creek and Hat Creek. Elevations range from 2,500 feet to 5,200 feet. The 11,606-acre area is heavily forested with some openings in thin soil locations on south facing slopes. A set of shale cliffs is exposed along portions of the valley bottoms. Access to the area is primarily by single track trails which are open to motorcycle use. The trails are difficult and challenging for motor bike riders and are therefore only lightly used by them. Use of the trails by hikers, horseback riders and mountain bike riders is light. The area is surrounded by roads

including Forest Highway 9 along the southwestern boundary of the area. There is opportunity for solitude in the many dissecting canyons. The scenery is relatively common for the Coeur d'Alene Mountain Range with no real distinctive features.

Maple Peak Inventoried Roadless Area (#01141): The Maple Peak Inventoried Roadless Area consists of blocks of unroaded lands that are linked together. There is no distinctive feature that could define the area other than it was formed into a contiguous roadless area of 8,674 acres. From west to east, the elongated roadless area includes Horseshoe Peak, Maple Peak, Beaver Peak and up to the Idaho-Montana boundary. Elevation ranges from 2,600 to 5,700 feet at Maple Peak. The boundaries of the area are ringed by roads. The southern boundary lies adjacent to mining properties on private lands. Mineral exploration in the form of "digs" and pits exist within the Inventoried Roadless Area. The community of Murray lies immediately adjacent to the Inventoried Roadless Area's southern boundary in Butte Gulch. A gold rush in the 1880's in the Prichard Creek country impacted this areas' scenic quality in the form of placer mine tailings and numerous hard rock mining waste heap. No Forest Service system trails exist in this area. Access over old mining trails can be found along the southern boundary. Few people access the area for solitude or primitive recreation experiences. Recreational gold panning is common along the small streams within the area.

Trouble Creek Inventoried Roadless Area (#1138): This 5,950-acre area is formed by the stringing together of unroaded tributary stream drainages of the North Fork of the Coeur d'Alene River. These drainages are, from west to east are, Hopkins Creek, Trouble Creek, Creaky Creek, Short Creek and some minor tributaries of Uranus Creek. Elevation ranges from 2,500 to 4,300 feet. The heavily forested area is nearly all observable from locations along the North Fork Coeur d'Alene River and Forest Highway 9. About 60% of the boundary of this Inventoried Roadless Area is shared with private property that features housing developments and ranch lands. Two miles of the western boundary is occupied by a power line and clearing area managed by Avista. The remaining surrounding lands have been heavily impacted by road construction. Access to this area was served by a trail along Trouble Creek. It is classified as a way trail and infrequently maintained. Few people use the area for solitude or primitive recreation experience. Hunting is the primary recreation pursuit in the Trouble Creek Inventoried Roadless Area.

4. Environmental Consequences to Recreation

Alternative 1

Direct and Indirect Effects under Alternative 1: No immediate action would be taken with the implementation of Alternative 1 in the Prichard Murray Resource Area. The public would continue to use the area for recreation. Field review has shown that a moderate amount of the off-highway vehicle use is occurring in an unregulated manner. An example of unregulated (illegal) activity includes driving ATV's on trails that are not managed to accommodate them; cross-country travel and travel within the confines of creeks and streams. Activity like this is common where facilities have not been provided to meet recreation demand. Unfortunately the provision of facilities is not a total deterrent to illegal operation of motor vehicles. Law enforcement goes hand in hand with facility management.

There would be no appreciable effect on the recreation developments and opportunities in the Prichard-Murray Resource Area if vegetative treatments did not occur. A large fire in the area might have short-term effects on trail access and maintenance due to falling timber and possible erosion of bared soil. The main long-term effect would be on the scenic qualities of trails. Certainly the effects to scenery in the aftermath of a large fire could not help but effect a negative public perception that could affect tourist visitation.

With this alternative, natural integrity, apparent naturalness, distinctive features would not be affected in each of the areas. The Maple Peak Inventoried Roadless Area and the Trouble Creek Inventoried Roadless Area, though, do not have manageable boundaries. A significant portion of the boundaries of these two areas adjoin private property. These properties have and are continuing to grow housing developments, converting from traditional bucolic agricultural use. The Forest Service would have no control over development and use of these properties. To be considered for realistic management as Wilderness Areas the boundaries would have to be resurveyed to allow for a buffer of National Forest managed lands between private property and a wilderness otherwise encroachment and trespass would become a major detriment to the integrity of the areas.

It is probable that adjustment of property boundaries would eliminate the Trouble Creek Inventoried Roadless Area from further consideration as wilderness due to the fact that at 5,950 acres it could fall short of the requirement of 5,000 acres for wilderness consideration.

Remoteness and solitude of the mapped unroaded area rates very low due to roads, development and private property adjacent to them. Only the Lost Creek Inventoried Roadless Area has adequate size and terrain created isolation to engender a feeling of remoteness and solitude.

All of the Inventoried Roadless Areas within the boundaries of the resource area have been classified in the IPNF Forest Plan as having common scenery characteristics, natural appearing and visually pleasing, but lacking special features or distinctive attributes that would set them apart from other similar landscapes in the Coeur d'Alene Mountain Range. This would include lands that would not be eligible for roadless classification.

Motorized travel along designated trails within the Lost Creek and Trouble Creek Inventoried Roadless Areas will probably continue.

Cumulative Effects under Alternative 1: The seven attributes common to roadless and wilderness lands would remain unchanged by management activities within them. Although some parts of these three areas lie within the boundaries of the Prichard Murray Resource Area they are each isolated from the other by human developments and managed forest. Recreation opportunities would remain unchanged. Continued fuel build up along the boundaries of the areas may result in an impact to primitive attributes. Future fire suppression actions unaided by fuel reduction could result in aggressive fire suppression efforts required to protect urban interface locations. These actions might need to take place within the Inventoried Roadless Area's.

Alternatives 2 and 3

Direct and Indirect Effects under Alternatives 2 and 3: The proposed activities are mostly temporary in nature. Fairly large-scale underburning would be of short duration and have only a short-term effect on the recreational setting of the area. The harvest and burning combined would have no effect on the community recreation and tourism plans but could, through the temporary effects of smoke and dust, cause people to avoid the area for a short time. Log haul would increase traffic on roads warranting additional care for travelers during the operational period. There would be no effect on winter season travel.

Kings Pass Trail 151 would be affected directly as it would be actively used as a fuel break and temporary log haul route for Units 10, 11 and 12, south of Prichard Creek. Although the trail is actually an old road it would be important to barrier the trail following management operations to avoid use of the route by full size motor vehicles not intended for trail use. Use of the trail by the public during timber harvest and burning would be temporarily interrupted.

Lost Creek Inventoried Roadless Area: About 477 acres of the Lost Creek Inventoried Roadless Area are within the resource management area. Of this, 181 acres are proposed for prescribed fire. The purpose of the burning is described in detail in the fire fuels analysis section of this report. These activities have practically no effect on natural processes and other attributes of roadless areas. Burning mimics natural processes. Burning on this scale has small effect on forest ecosystems and scenic impacts of burning are short lived. Proscribed burning also reduces the risks of human caused wildfire that are a major risk when the Inventoried Roadless Area is adjacent to private property.

At the request of an adjacent landowner a 4-acre fuel break would be created and maintained (Unit 20). A fuel break simply has the goal of breaking concentrations of vegetation that could threaten homes and buildings located on the private property immediately adjacent to the Inventoried Roadless Area. The proposed fuel break removes some trees with no commercial value, prunes limbs and thins brush to a depth of no more than 200 feet along the property line. No logging or commercial harvest is allowed, no roads constructed and mechanized equipment is not used. Such activities would not compromise the six attributes of wilderness. Also it would be highly likely that if the Inventoried Roadless Area were proposed for wilderness designation in the future that the boundary along developed private lands would be pulled back a few hundred feet to preserve the integrity of the area.

Maple Peak Inventoried Roadless Area: Approximately 267 acres of this area is within the Prichard-Murray Resource Area. No management activities are proposed within the area; therefore there would be no direct or indirect effects to the attributes of the area.

Trouble Creek Inventoried Roadless Area: A total of 4,854 acres of the Trouble Creek Inventoried Roadless Area is within the resource area boundary. Activities proposed within the Inventoried Roadless Area are 725 acres of burning and 16 acres of boundary line fuel break work. Burning is as described in the Lost Creek Inventoried Roadless Area, above. Fire application does not involve ground mechanized vehicles. The land proposed for treatment falls within a one mile distance of the Inventoried Roadless Area boundary. Private lands adjacent to the area feature considerable housing developments which would be at risk if a major fire were to advance from the west or northwest which would be likely given wind patterns in the area. The burning has the objective of reducing fuel concentration while leaving the primary tree composition intact. This type of treatment again mimics natural processes and has transitory effects that do not jeopardize roadless area attributes.

The fuel breaks are being created at the request of some adjacent landowners. The breaks follow property boundaries and intrude into the Inventoried Roadless Area no more than 200 feet. There are substantial home developments along the southern boundary of the Inventoried Roadless Area. The combination of fuel reduction through burning and the creation of fuel breaks by hand will help to create a defensible line that protects private property as well as the Inventoried Roadless Area itself. No commercial logging is involved in this work. No mechanized vehicles are involved in accomplishment of the work. Natural processes and the value integrity of the Inventoried Roadless Area will be retained.

Cumulative Effects under Alternatives 2 and 3

The three inventoried roadless areas total approximately 26,230 acres. Management activities proposed for the action alternatives total 184 acres. All the management is designed to reduce fuel build up near private lands and is by necessity located within a short distance of the interior of the areas. No roads or trails would be constructed. Burning and thinning of fuels will not affect the natural appearance of the areas except for a short period of healing following burning. Healing is simply the new growth of grasses and forbs and when reddened needles and fall to the ground. Remoteness and solitude are retained because the interior of the IRAs are isolated from fuel breaks and no new access would be constructed. The period of actual activity such as burning or clearing of vegetation with chain saws is brief. The project work would be located in sites already subject to the sights and sounds of people, machines and structures. The limited time spent in fuel reduction and the fact that no motorized, wheeled equipment are used would make the introduction of noxious species into the areas via management portals very unlikely.

5. Consistency with Forest Plan and Other Legal Mandates

The Forest Plan identifies specific goals and objectives related to providing a variety of recreation opportunities and settings (Forest Plan, pages II-1 and II-3). The following standards apply to recreation management in the Prichard-Murray Resource Area:

1. The Forest will continue to provide a share of recreation opportunities and diversity in relation to other public and private entities; recreation planning and operations will be coordinated with other federal, state, local and private recreational managers.

All alternatives would continue to provide a diversity of recreation opportunities. Trail density in the inventoried roadless areas is low and would not be changed under any alternative. Coordination with other recreation managers is done on an ongoing basis throughout the Coeur d'Alene River Ranger District. Based on this information, all alternatives would meet this standard.

2. Forest Service recreational programs will be complementary with other public and private programs where possible.

Recreational programs on the Coeur d'Alene River Ranger District are complementary with other recreational programs provided by county, state, and private facilities. The activities proposed under the action alternatives would not change this situation; therefore all alternatives would meet this standard.

3. Consult with recreational users and other recreational suppliers to coordinate public needs.

Consultation occurs with recreational organizations on an ongoing basis, and with the recreating public at large through project scoping. Recreation needs in the Prichard Murray area have been considered and will be provided under all alternatives. Based on this information, all alternatives would meet this standard.

7. Provide a broad spectrum of dispersed and developed recreation opportunities in accord with identified needs and demands. Enhance user experience by on and off-site interpretation.

A broad spectrum of dispersed and developed recreation opportunities are provided in the Prichard Murray Resource Area in response to public needs and demands. The Recreation Opportunity Spectrum (ROS) classification system has identified the area as having a "roaded natural setting." Geography of the Prichard Murray drainage limits development to trail developments and limited dispersed recreation. Trail user education can be provided as necessary. Based on information all alternatives would meet this standard.

8. On proposed developed sties treat and maintain timber stands in a manner compatible with recreation objectives prior to development.

Current recreation objectives would be maintained under all alternatives, and potential for future recreation developments would be unaffected. Based on this information, all alternatives would meet this standard.

9. Trailhead facilities in dispersed areas will be minor and limited to resource protection. Off-site interpretation is encouraged.

At this time, no expansion of trailheads in the area is warranted. It is expected that this will change over time due to the trend of increasing ATV use. At that time, trailheads would be improved to protect natural resources. Improvements normally include informational signing. This trend and the resulting improvements would occur under any alternative; all alternatives would be consistent with this standard.

10. Trails will be managed in accordance with management area requirements as identified in a more site-specific analysis of needs.

The No-Action Alternative would not have any affect on area trails. Under either action alternative, standards for trails would be met. Forest Plan management direction for inventoried roadless lands in the Prichard-Murray Resource Area is *semi-primitive, motorized.* This remains unchanged by the proposed activities.

12. Maintain the free flowing characteristics of rivers identified as eligible for consideration as part of the National Wild and Scenic Rivers System pending suitability. Identified rivers will not be modified to the degree that eligibility or classification would be affected.

The North Fork of the Coeur d'Alene River beginning at tributary of Rookie Creek and upstream to Lost Creek is within the resource area. The River has been designated as eligible for inclusion in the National River System as a *Recreation River*. The proposed activities would not affect the potential designation of the Coeur d'Alene River as a waterway with the common characteristics required for the designation.

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Specialist's Report on Scenic Resources in the Prichard-Murray Resource Area

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December 2006

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SPECIALIST'S REPORT ON SCENIC RESOURCES IN THE PRICHARD-MURRAY RESOURCE AREA

1. Regulatory Framework and Methodology

Scenery management direction is provided by the Forest Plan and is described in terms of Visual Quality Objectives. The objectives are based on the area seen from sensitive travel corridors and on other features that result in a high visual sensitivity level. The visual management system was revised in 1995, and is now known as the Scenery Management System. The revised guidelines are provided in "Landscape Aesthetics: A Handbook for Scenery Management," (USDA Forest Service, 1995).

2. Existing Conditions

The Prichard Murray area is visible in part from locations identified in the Idaho Panhandle National Forest Plan as having a high to average sensitivity and concern for the scenic quality of the area. The communities of Murray and Prichard are of most concern and then the travel corridor of Forest Highway 9. Only portions of the area can actually be seen from the locations above. There is a separation between the communities and the National Forest Lands of about ¼ mile. This buffer land is in private hands and not subject to the same standards for the maintenance of the scenic conditions as is the National Forest. The following locations are key viewpoints:

Murray is tucked up against the project area and separated from National Forest Lands by less than a ¼ mile of private property. The town is located in the canyon of Prichard Creek. Murray is a town surrounded by steep heavily forested slopes with patches of brushy openings. A great deal of effects of placer mining and deep mining are immediately evident to viewers in the town vicinity.

Prichard is located near a big bend of the North Fork of the Coeur d' Alene River at the confluence of Prichard Creek.

Forest Highway 9 follows the North Fork and turns to travel up Prichard Creek through Murray and ascends to the Stateline at Thompson Pass.

Forest Road 208 continues up river past the junction with Forest Highway 9. It travels within the project area for about four miles.

Visitors will notice that the land has been subject to timber harvest and related road development. Signs of past mining are evident and unmistakable along Prichard Creek. These are forested canyons so the visual range is limited to slopes adjacent to the river courses. Residents in the area are conditioned to the view. When this view changes it is readily noticed and may take some time for the observer to get used to the new look. Change though is not necessarily negative and could actually improve the diversity of the scenery by adding definition to individual features and seasonal color.

Rock piles left by river dredge mining are unsightly and are a dominant visual feature of Prichard Creek. The presence of the dredged rocks in Prichard Creek mars the scenery in many locations. The routes of Forest Highway 9 and Forest Road 208 follow the decidedly more scenic North Fork of the Coeur d' Alene River. Still the views are not pristine as there is a considerable amount of home development and some commercial establishments along the roads. Evidence of past logging is visible in the canyons as is a major power line corridor.

The Idaho National Forest Plan standards for visual quality in the project area are: *partial retention* (ground seen from the key points identified in the description above as fore ground or middle ground. *Modification;* standards are applied to land adjacent to grounds classified as partial retention and as lands observed as back ground and middle ground. *Maximum modification;* visual standard is applied to all other ground obscured from observation by terrain, from the key points described above.

3. Environmental Consequences

Alternative 1

With no harvest action there would be no short-term effects to the scenic condition of the area. Old harvest units would continue to recover tree growth slowly muting unnatural appearing visual effects. Thinning of trees do to insect blights and disease can be expected. Long term, the increasing vulnerability to wildfire of the area may bring change to the scenic conditions. Mine tailings and dredged rock will be present for decades.

Alternatives 2 and 3

Scenic effects on Murray: In any action alternative the scenery effects upon Murray would be slight. The nearest units of concern would be number 5 and units' 60 through 70. Unit 5 is proposed for thinning of the trees to about 50% stand removal. Units 60-70 are a combination of shelterwood harvest and thinning. The units are blocked from view by residents of Murray by the ridge west of Tiger Gulch. They might be observed, edge on, from the west most residents but only partially noticeable in the worst case. The Forest Plan goals of *partial retention and modification* will be attained.

Scenic effects on Prichard: The effects on the scenery of prescribed burning for the residences in and around Prichard will be slight. The under burning effects are mostly short term. Some vegetation will be blackened and some tree crowns reddened. These effects usually vanish into the remaining vegetative cover within two growth seasons following the burns. Many of the residents will not be able to see some slopes due to intervening trees that block the view. Several fuel breaks will run immediately adjacent to some residences. This is being done at the request of the affected individuals. These fuel breaks will appear in the fore ground views and might very well be considered as an improvement in the scenery. The open forest appearance of fuel breaks are often seen favorably by observers. The goal of *partial retention and modification* will be attained.

Scenic Effects on Forest Highway 9: Beginning on Forest Highway 9 at Rookie Creek there is a line of thinning and shelter wood units 1, 2, 3 and 7 along the ridge dividing Rookie Creek and Hopkins Creek. These units face to the east. There is also a major power line corridor on the same ridge. Portions of units 1, 2, 3 and 7 may be briefly visible to travelers heading up the highway. The exposure to view for travelers would only be measured in a few seconds. The power line also occupies the view so the concern for scenery at this spot is low. The Visual Quality direction is *partial retention*. The goal is met.

Burning units along the corridor between Rookie Creek and Prichard Creek will have very limited temporary impact on scenery. The next area of visual concern would be the cluster of thinning unit's numbers 13, 14, and 15, west of Eagle Creek. The visual quality standard for the units is *modification*. These units can be observed in part from Highway 9 and from a cluster of residences near the confluence of Eagle Creek and Prichard Creek. The units are thinning with approximately 50% crown removal. The effect will be noticed but will blend in well with the surrounding landscape. Burns in this area will have transient effects only. The standard of modification will be met here.

Units 10 – 12 are next in line and will be visible from the highway. As thinning treatments with 50% crown removal they would be barely noticed by travelers on the highway and more noticeable to some residents on the west side of Murray. The visual effect of tree thinning is not much of a detriment to the scenery and actually can be an improvement if the thinning allows for larger tree to grow and species that add color, such as Western Larch to emerge from the crowd. *Modification* standards will be achieved.

Scenic Effects along Forest Road 208: Burn units along Forest Road 208 to Clee Creek will have transient visual effects and meet the VQO standard of *Partial Retention.*

4. Consistency with the Forest Plan

Idaho Panhandle National Forest Plan Directions for Visual Quality Objectives

1. *Meet adopted visual quality objectives (VQO's). Exceptions occur in unusual situations: these will be identified through the project planning process involving an interdisciplinary team…Mitigation measures should be developed for areas when VQO's are not met.*

Activities proposed will meet adopted visual quality objectives. The proposed actions meet visual quality objectives of *partial retention* established for the roadless areas within the resource area. Burning for fuel reduction and thinning have short term effects on scenic quality and meet *VQO* requirements for Management Area 10.

2. The visual resource has been evaluated based on visual sensitivity levels assigned to travel routes, use areas, and water bodies in and adjacent to the IPNF. Adjustments in VQO boundaries based on project level analysis will conform to principles in FSM 2380.

There would be no adjustments to VQO boundaries under any alternative; therefore all alternatives would be consistent with this standard.

Report on Finances Related to the Proposed Prichard-Murray Resource Area Project

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November 2006

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SPECIALIST'S REPORT ON FINANCES IN THE PRICHARD-MURRAY RESOURCE AREA

1. Introduction

The management of the Idaho Panhandle National Forest (IPNF) has the potential to affect local economies. People are an important part of the ecosystem. Use of resources and recreational visitation to the Forest generate employment and income in the surrounding communities and counties and generate revenues that are returned to the federal treasury.

This section presents concepts used to delineate an affected area and methods used to analyze the economic effects of the project, including the project feasibility, financial efficiency, and economic impacts.

2. Regulatory Framework Related to Finances

NEPA requires that consequences to the human environment be analyzed and disclosed, based on issues. NEPA does not require a monetary benefit-cost analysis. If an agency prepares an economic efficiency analysis, then one must be prepared and displayed for all alternatives [40 CFR 1502.23]. The preparation of NEPA documents is also guided by CEQ regulations for implementing NEPA [40 CFR 1500-1508].

The development of timber sale programs and individual timber sales is guided by agency direction found in Forest Service Manual (FSM) 2430. Forest Service Handbook (FSH) 2409.18 guides the financial and, if applicable, economic efficiency analysis for timber sale. The level of timber harvest is important not only in providing jobs in the timber industry, but also through indirect and induced impacts on other business sectors as well (Forest Plan, page IV-47). One of the seven major issues for the Forest Plan was community stability (Forest Plan, pages 1-8).

3. Affected Environment

The combination of small towns and rural settings, larger towns such as Coeur d'Alene, Idaho, and the urban area of Spokane, Washington create a diverse social environment for the geographical region around the Idaho Panhandle National Forest. Local residents pursue a wide variety of life-styles, but many share a common theme, an orientation to the outdoors and natural resources, especially within the smaller communities. This is evident in both vocational and recreational pursuits including employment in logging and milling operations, outfitter and guide businesses, hiking, hunting, fishing, camping and many other recreational activities.

Timber, tourism and agricultural industries are important to the economy of local areas. Despite the common concern for, and dependence on, natural resources within the local communities, social attitudes vary widely with respect to their management. Local residents hold a broad spectrum of perspectives and preferences ranging from complete preservation to maximum development and utilization of natural resources.

Timber management activities within the project area have the potential to impact the economic conditions of local communities and counties. To estimate the potential effect on jobs and income, a zone of influence (or impact area) was delineated. Counties were selected based on commuting data suggesting a functioning economy and where the timber is likely to be processed (log flows). Recent data on log flows from the IPNF was provided by the University of Montana's Bureau of Business and Economic Research. The zone of influence for this project is comprised of Boundary, Bonner, Kootenai, Benewah, and Shoshone counties in Idaho.

A comprehensive socio-economic analysis and social assessment was completed during the revision of the forest plan. See the social and economics section of Chapter 2 of the Analysis of the Management Situation for the revised Forest Plan (March 2003) and the Social Assessment for the Idaho Panhandle National Forests (Parker et al, 2002) for a description of the employment, income and social composition of the counties

comprising the analysis area and the impact on each county from management of the IPNF. These assessments indicate the counties within the analysis area are affected by timber management on the forest.

4. Methodology Used in the Financial Analysis

Project salability: Different revenues and costs are associated with the management activities under each action alternative. To arrive at the expected stumpages a computer program was used to determine the potential stumpage (i.e. gross bid values) of timber harvested. The program runs a regression equation called the Transactions Evidence (TE) appraisal model, used for appraising actual timber sales. The TE appraisal method predicts the value of timber (referred to as stumpage) through the use of several independent variables developed from recent similar sales within Region 1 of the Forest Service (northern Idaho and western Montana). Since the information used is from actual bidding, current local market conditions and production costs for logging and milling are reflected in the predicted rate.

Actual District costs were used for fuel reduction, site preparation, planting, temporary road construction, reconstruction, maintenance and erosion control. (See project file, Finances, for all unit information, logging systems and costs.) These direct costs are deducted from the expected stumpage value. If the feasibility analysis indicates the estimated stumpage value is less than the base rates, the project may need to be supplemented with contributed funds if actual bids do not exceed base rates.

Financial efficiency considers anticipated costs and revenues that are part of Forest Service monetary transactions. The financial efficiency of a timber sale is considered separate from other costs associated with NEPA analysis, sale preparation, sale administration and activities outside of the timber sale.

Economic efficiency uses the cost and revenue estimates included in the financial analysis and adds other economic costs and benefits that are not part of Forest Service monetary transactions. This analysis considers the quantifiable market and non-market benefits and costs associated with implementing each alternative. An example of a non-market benefit or cost is an increase or decrease in recreation. A value for recreation visitor use would be derived from local or regional studies. An economic efficiency analysis is not required (FSH 2409.18, 30), and would only be included in this analysis it if was a public issue and there are predicted changes to quantifiable non-market benefits or costs from the project.

Many of the costs and benefits associated with a project are not quantifiable. For example, the benefit to wildlife from habitat improvement or the cost associated with the degradation of visual quality from a project is not quantifiable. These costs and benefits may be described qualitatively, in the individual resource sections of this document. Title 40 Code of Federal Regulations for NEPA (CFR 1502.23) indicates "For purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations." Management of the forest is expected to yield positive benefits, but not necessarily financial benefits.

5. Financial Consequences

Direct and Indirect Effects

Under the no action alternative, there would be no timber harvest, road reconstruction, site preparation or planting, fuelbreaks created, or natural fuels underburned. There would be no monetary costs or revenues associated with this alternative outside of preparation of the NEPA document.

Table 1 provides a summary of the financial appraisal from the action alternatives. The predicted high bid uses the stumpage value of timber removed (based on size, species and volume, planned yarding methods such as helicopter, skyline, tractor, and hauling distance), then deducts the contractual costs (fuel treatment, road costs, erosion control) from the value of the timber. The minimum bid is then determined by adding the cost of stand regeneration as well as the roll-back factor used to adjust the TE equation to better reflect current bid prices. As shown in Table 1, under the current indices the minimum bid must be raised to cover the costs of regeneration and the roll-back factor. (The roll-back factor lowers the predicted bid by the standard error calculated by the regression equation.)

Table FIN-1. Predicted high bids, value and timber volume.

	No Action	Alternative 2	Alternative 3
Total estimated CCF	$0	14,056	11,550
Predicted High Bid ($/CCF)	$0	$27.09	$31.61
Advertised rate after roll back	$0	$-4.61	$-0.09
Minimum Bid	$0	$6.12	$6.12
Minimum advertised value	$0	$86,024	$70,688

Table FIN-2. Projects Funded by Other than a Timber Sale

Projects	No Action	Alternative 2	Alternative 3
Ecosystem burning	$0	$147,900	$120,150
Fuelbreak along private land	$0	$27,192	$27,192
Road decommissioning	$0	$18,000	$18,000

Costs associated with the ecosystem burning and fuelbreak are estimated at $150/acre (helicopter) and $1,236 respectively. These dollars would not be tied to the timber sale, but would use appropriated hazardous fuels reduction dollars that are available to the District every year.

The funding for road decommissioning would come from appropriated watershed dollars that are prioritized at the District level.

Cumulative Effects

Many factors influence and affect the local economies, including changes to industry technologies, economic growth, international trade, and the economic diversity and dependency of the counties. This analysis focuses on the direct and indirect effects of proposed activities. Past, present and reasonably foreseeable activities on National Forest, Bureau of Land Management and other lands within the project area (EA, Appendix B) would not have an effect on the economics issues for these alternatives. This project is not expected to add to any existing cumulative effect. However, the jobs and income associated with the action alternatives may bring the local economy some increased relative stability during the life of the project.

6. Consistency with Forest Policy and Legal Mandates for Finances

Forest-wide goals, objectives and standards for finances are not specifically addressed in the Forest Plan. This issue was addressed indirectly in the discussion of community stability. Chapter II of the Forest Plan states, "management activities will continue to contribute to local employment, income, and lifestyles. The Forest will be managed to contribute to the increasing demand for recreation and resource protection while at the same time continuing to provide traditional employment opportunities in the wood products industry." (Forest Plan, p. II-11.) The action alternatives would meet this direction.