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Appendix A -- Other Resource Concerns

Certain resources are discussed in this appendix because potential effects were reduced or eliminated through design of the proposed action and alternatives, and did not warrant development of other alternatives.

A.1 Biodiversity

a. Risk of Noxious Weeds

Increased travel from both timber harvest activities and recreation use can introduce and distribute the seeds of noxious weeds. Ground disturbed areas, such as landings and especially road shoulders, provide suitable habitat for many weed species. Most of the noxious weeds are very aggressive and tend to dominate over natural vegetation for use of the habitat. A weed monitoring and control program would be implemented under the KV plan if funding is available. If this becomes a priority treatment area for noxious weeds the District will seek appropriated funds. Timber sale contract provisions would be used to guarantee treatment of haul routes and landings in the project area for noxious weeds. To prevent further infestation, only certified weed free seed would be used to seed road shoulders, temporary roads, skid trails, and landings. Identified existing weed infestations within the project area would be treated according to guidelines established in the Bonners Ferry Weed Control Projects EIS (USDA 1995). Monitoring and the environmental effects of weed control are also covered in the EIS.

No significant direct, indirect, or cumulative effects from noxious weeds are expected from implementation of any alternative.

b. Native Plant Species

In an effort to implement ecosystem management, the Regional Office has issued direction on the use of native plant species for revegetation projects. The basic policy requires the use of native plant seed in erosion control, fire rehabilitation, riparian restoration, forage enhancement, and other vegetation projects, to the extent practicable. The purpose of this direction was to emphasize the importance of biodiversity, and to recognize the intrinsic value of native plant vegetation as a component of natural forest and rangeland ecosystems. This information is contained in a letter, dated June 8, 1993, written to the Region 1 Forest Supervisors by the Regional Forester. A copy of this letter may be found in the project file.

c. Range

There are no federally permitted range allotments within the analysis area. For these reasons, there would be no measurable direct, indirect, or cumulative effects on these range allotments.

A.2 Social/Economic Factors

a. Cultural Resources

Cultural resource surveys of the project area have been completed as directed by the Cultural Resources Management Practices (Forest Plan, Appendix FF). The cultural resource inventories are on file for selective review at the Bonners Ferry Ranger Station. Numerous sites have been recorded, and a determination made to the extent of protection required. These sites would be protected under all alternatives. Any future discovery of cultural resource sites would be inventoried and protected if found to be of cultural significance. A decision would be made to avoid, protect, or mitigate the impact to these sites in accordance with the National Historic Preservation Act of 1966. Currently, there are no known districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places that would be affected by the proposed actions. As such, the actions should not cause the loss or destruction of significant scientific, cultural, or historic resources.

b. Economics / Community Stability

People are an important part of the ecosystem and the management of the Idaho Panhandle National Forests (IPNF) has the potential to affect local economies, as well as natural resources. Use of resources and recreational visitation to the Forest generate employment and income in the surrounding communities and counties, and can generate revenues that are returned to the federal treasury. The National Enviromental Policy Act (NEPA) does not require a monetary benefit-cost analysis. The development of timber sale programs and individual timber sales is guided by agency direction found in Forest Service Manual

(FSM) 2430. The financial and, if applicable, economic efficiency analysis for timber sales is guided by Forest Service Handbook (FSH) 2409.18.

The proposed sale(s) would be on productive forestland and could be offered with minimal investment. Alternatives 2 and 5 would both be financially efficient for timber sales. Estimated timber volume removed under Alternative 2 would be about 20,870 CCF. The timber sale appraisal conducted for this volume of timber estimated that the predicted high bid for the sale of timber would be about $72 per hundred cubic fee (CCF). The direct and cumulative effects of each alternative would be related to the costs and revenues generated by each.

The No Action Alternative has no costs nor revenues associated with it. Alternatives 2 and 5 would generate revenues to the Federal Treasury and to Forest Service Trust Funds (KV and BD), which could be used to offset the costs of reforestation and fuels reduction. These Alternatives would also provide local employment opportunities for loggers, mill workers, equipment operators, and reforestation crews.

Table A-1. Project Feasibility and Financial Efficiency Summary

	Alt 1	Alt 2	Alt 5
Acres of Fuels Reduction Treatments	0	2086	865
Estimated Volume Removed (CCF)#	0	20,870	8,650
Base Rate per CCF*	-	$43.60	$39.87
Predicted High Bid ($/CCF)	-	$72.21	$62.24
Total Revenue	$0	$1,367,600	$498,000
Present Net Value	$0	$187,700	$124,500

The Forest Service timber sale appraisal program uses a measure of Hundred Cubic Feet (CCF) rather than the Thousand Board Feet (MBF) measurement that used to be in place. A general (average) conversion factor is 0.5 MBF = 1 CCF.
* Base Rate is the lowest rate at which timber could be advertised. For the Northern Region, Base Rate is calculated as the minimum deposit to the National Forest Fund ($0.25 per CCF), plus the cost of regeneration, if necessary.
All acreages and volumes are approximate.

The indirect effects of each alternative would be related to future costs of maintaining healthy forest conditions in the project area. Forests that are managed are generally more sustainable, resilient to disturbance and therefore less costly to maintain. Under Alternative 1, the risk of severe fire would increase over time, which could lead to increased fire suppression costs, and restoration costs related to restoring ecosystem functions. Alternative 2 would reduce the risk of severe fire in both the short and long-term thereby reducing the potential suppression and restoration costs. Alternative 5 would also reduce the risk and potential suppression and restoration costs, but to a lesser degree than Alternative 2.

Documentation of the analysis and considerations for community stability is contained in the Final Environmental Impact Statement for the IPNF Forest Plan. Given the potential employment opportunities projected under Alternatives 2 and 5, it is beyond the scope of this document to assess potential impacts to community stability in detail. However, a general assessment could be made that Alternative 2, and to a lesser degree Alternative 5, would provide a number of employment opportunities, and a diversity of employment opportunities, within Boundary County. Alternative 1 would provide none of the employment opportunities to help sustain community stability provided by the action alternatives.

c. Visual Quality
Through the scoping process it was determined that scenery management was not a significant issue that would drive alternative development. However, maintaining or improving the scenic integrity would be prudent for that portion of the project area that can be viewed from adjacent residences as well as by recreationists and other casual forest observers in the Snow and Myrtle areas. All of these units will meet the Forest Plan Visual Quality Objectives or the newly adopted Scenic Integrity Objectives. The Myrtle HFRA Visual Analysis Report is located in the project file.

d. Minerals
There are no mines or plans to mine in the project area.

e. Public Health and Safety
Many of the items described in “Common Featurs, Required Design Criteria and Estimated Effectiveness” for all Action Alternatives (Chapter 2), ensure consideration of public health and safety.

f. Effects on Minority Populations or Low-income Populations
The Kootenai Tribe of Idaho is being consulted concerning sensitive or culturally important areas that may be in the project area. The tribe is also a member of the Kootenai Valley Resource Initiative (see Chapters 1 and 2 for more information about their role in project development.)

See Chapter 2 for a summary and comparison of the effects to the natural resources by alternative .

g. Water Resources and Aquatics

Microbial Contaminants
Wildlife populations and their use of the riparian areas are not expected to appreciably increase as a result of implementing any of the alternatives. The Best Management Practice (BMP) promoting appropriate disposal of human waste, the goals of reducing sediment production and delivery, and protection of the Riparian Habitat Conservation Areas (RHCAs) are all consistent with preventing delivery of microbial contaminants to the stream network. Consequently, there will be no direct, indirect, or cumulative effects from microbial contaminants

Inorganic Contaminants
Water quality can be reduced by contaminants such as salts or metals. These elements can be naturally occurring or can be delivered from roads that are treated with magnesium chloride or calcium chloride, which is used for dust abatement on forest roads.

The prescriptions for reducing stream crossing and wildfire risk, and sediment production and delivery are consistent with preventing delivery of inorganic contaminants if any natural sources are present. When the "Required Design Criteria for All Action Alternatives" are applied, then magnesium chloride or calcium chloride, which is often used for dust abatement, would not create water quality concerns. Dust abatement would not be needed under the No Action alternative. Consequently, there will be no direct, indirect, or cumulative effects from inorganic contaminants.

Organic Chemical Contaminants
Water quality can be reduced by contaminants such as industrial solvents and petroleum products. The equipment that would be used for timber harvesting, and road construction, reconstruction, and obliteration uses the largest quantities of these products and pose the greatest risk.

The "Required Design Criteria For All Action Alternatives" would reduce the risk of spilling and delivering these contaminants to the stream network to acceptable levels. Under the No Action alternative, the potential for spilling organic chemical contaminants would not change from the existing conditions, which are at a low level of risk. Consequently, there will be no direct, indirect, or cumulative effects from organic chemical contaminants.

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Appendix B -- Wildlife and Fisheries Resources

B.1 - Introduction

This appendix discusses the regulatory framework and existing conditions for wildlife and fisheries in the Myrtle Creek HFRA project area, and discloses the probable effect of the alternatives, including the No Action Alternative.

Wildlife is discussed first, followed by fisheries. Supporting documentation is located in the project file.

B.1 - WILDLIFE

B.1-A REGULATORY FRAMEWORK

Regulatory direction applicable to the management of wildlife resources on the Idaho Panhandle National Forests (IPNF) includes:

- The Endangered Species Act of 1973 (ESA), as amended
- Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA)
- National Forest Management Act of 1976 (NFMA)
- The Migratory Bird Treaty Act of 1918
- IPNF Forest Plan (USDA 1987), as amended
- Forest Service Manual (FSM) and Handbook (FSH) direction

Following is a summary of regulatory guidance and its relation to the management of wildlife species and habitats in the Idaho Panhandle National Forests.

B.1-A.1 Threatened, Endangered, and Proposed Species

The National Forest Management Act (NFMA) requires the Forest Service to "*provide for a diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives*" (NFMA Sec. 6(g)(3)(B)). Additional guidance is found in Forest Service Manual direction that states: "*identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened and proposed species*" (FSM 2670.31 [6]). The IPNF Forest Plan provides additional direction to "*manage vertebrate wildlife habitat to maintain viable populations*" of wildlife and "*to contribute to the conservation and recovery of listed species*", in accordance with species recovery or management plans (USDA 1987).

The ESA requires the Forest to assist in recovery of threatened, endangered, and proposed (TEP) species and the ecosystems upon which they depend. The Forest is required to consult with the US Fish and Wildlife Service if a proposed activity may affect the population or habitat of a listed species. The direction requires the Forest Service to complete biological assessments to document whether projects would likely have adverse effects on identified habitats or populations of threatened or endangered animals.

On January 22, 2007 the U.S. Fish and Wildlife Service provided the Bonners Ferry Ranger District with an updated listing of threatened and endangered species that may be present in Boundary County, Idaho. These species include gray wolf (*Canis lupus*), woodland caribou (*Rangifer tarandus caribou*), bald eagle (*Haliaeetus leucocephalus*), Canada lynx (*Lynx canadensis*) and grizzly bear (*Ursus arctos*). There were no changes from the previous list (March 1, 2006).

B.1-A.2 Sensitive Species

The Forest Service Manual also directs the Regional Forester to identify sensitive species for each National Forest where species viability may be a concern. The direction requires the Forest Service to manage the habitat of the 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.

On October 28, 2004 the Regional Forester updated the sensitive species list for the Northern Region. Changes from the previous (1999) list include the addition of black swift (*Cypseloides niger*), pygmy nuthatch (*Sitta pygmaea*), and fringed myotis (*Myotis thysanodes*); and removal of black-backed woodpecker (*Picoides arcticus*), northern goshawk (*Accipiter gentilis*), white-headed woodpecker (*Picoides albolarvatus*), and northern leopard frog (*Rana pipiens*). However, in a letter dated March 31, 2005 the Regional Forester placed black-backed woodpecker and northern goshawk back on the list while further data collection and evaluation were ongoing.

B.1-A.3 Management Indicator Species and Other Wildlife

Management Indicator Species (MIS) are identified in the planning process and used to monitor effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important. MIS relevant to the project area and the Bonners Ferry Ranger District are American marten, pileated woodpecker, northern goshawk, and white-tailed deer. Snag habitat is considered an important habitat component for several MIS.

B.1-B ANALYSIS METHODS

B.1-B.1 Analysis Area

The analysis area for each species can differ due to habitat requirements and extent of effects. The cumulative effects analysis area is described for each species in the Cumulative Effects section.

B.1-B.2 Species Not Analyzed in Detail

A preliminary analysis was conducted for each potentially affected wildlife species and their habitat to determine the scope of analysis. The species listed in the following table would not likely be affected by proposed activities because: 1) they do not have suitable habitat or are not regularly present or expected to be in or near the project area; or 2) they are affected at a level that does not increase risk to the species or effects can be adequately mitigated by altering the design of the project. For these reasons, these species were not analyzed in detail. Preliminary analysis information for species not analyzed in detail is located in the Wildlife section of the project file (*X_species.doc*).

Table B.1 Species Not Analyzed in Detail

Species	Rationale for Elimination from Detailed Analysis	Preferred Habitat
Threatened and Endangered Species		
Northern Gray Wolf (*Canis lupus*)	No wolf pack activity documented within or near the project area.	Wide variety of habitats that are generally remote and isolated from human development. Adequate populations of prey species, often wintering concentrations of deer or elk.
Woodland Caribou (*Rangifer tarandus caribou*)	No impacts to currently suitable caribou habitat. No recent sightings of caribou near proposed activity areas.	Above 4,000 ft. in Engelmann spruce/subalpine fir and western red cedar/western hemlock forests.
Bald Eagle (*Haliaeetus leucocephalus*)	No known nests or winter roosts within one mile of the project area.	Normally nest and forage near large bodies of water. Winter visitors and yearlong residents of northern Idaho.
Sensitive Species		
American Peregrine Falcon *(Falco peregrinus anatum)*	No suitable habitat exists in the project area for this species.	Open habitats near cliffs and mountains. Nesting cliffs near an adequate prey base.
Black Swift *(Cypseloides niger)*	No impacts to suitable nesting habitat, stream flows or vegetative diversity.	Builds nest behind or next to waterfalls and wet cliffs.
Common Loon *(Gavia immmer)*	No suitable habitat exists in the project area for this species.	Large, clear lakes below 5,000 ft. in elevation with at least a partially forested shoreline.
Fringed Myotis *(Myotis thysanodes)*	Suitable habitat is present in the project area for this species. Treated as a guild with flammulated owl.	Caves, mines, and abandoned buildings, large snag habitat.

Species	Rationale for Elimination from Detailed Analysis	Preferred Habitat
Harlequin Duck *(Histrionicus histrionicus)*	Suitable nesting habitat potentially present within the project area, but activity areas spatially buffered.	Shallow, swift streams in forested areas.
Pygmy Nuthatch *(Sitta pygmaea)*	Suitable habitat is present in the project area for this species. Treated as a guild with flammulated owl.	Ponderosa pine habitat, especially mature-old growth stands.
North American Wolverine *(Gulo gulo)*	No suitable denning habitat within five miles of activity areas. No decrease in prey densities or increased access to remote areas.	Far-ranging omnivorous habitat generalist.
Northern Bog Lemming *(Synaptomys borealis)*	No suitable habitat exists in the project area for this species.	Bogs, fens and, wet alpine and sub-alpine meadows.
Townsend's Big-eared Bat *(Corynorhinus townsendii)*	No suitable habitat (e.g. roosting, maternity, hibernation) is present within the project area for this species.	Caves, mines, and abandoned buildings.
Coeur d'Alene Salamander *(Plethodon vandykei idahoensis)*	No suitable habitat exists in the project area for this species.	Springs, seeps, spray zones.
Western Toad *(Bufo boreas)*	Breeding habitat not present within the project area.	Adults occur in a variety of uplands. Breed in shallow ponds, lakes, or slow moving streams.
Management Indicator Species		
American Marten *(Martes americana)*	Suitable habitat is present in the project area for this species. Treated as a guild with fisher.	Variable mature confer stands with canopy closures greater than 40 percent with abundant large, down woody debris.
White-tailed deer *(Odocoileus virginianus)*	No increased access or reduction in critical winter range.	Mosaic of habitat types that provide open parks for foraging and forested areas for thermal and security cover.

Table B.1 (continued above) Species Not Analyzed in Detail

B.1-C AFFECTED ENVIRONMENT

Introduction

Ecological disturbances (e.g. landslides, fire, insect and disease outbreaks) lay the foundation for landscape patterns and strongly influence wildlife populations. Disturbances that arise from natural processes or human actions can alter these landscape patterns and wildlife habitat, directing wildlife abundance and composition. Wildlife species will occupy their preferred niche on the landscape, and move from place to place as forest structures change and different habitat conditions develop (Clark and Sampson 1995). Consequently, wildlife species will not necessarily persist indefinitely in areas where they are found today because of the dynamic and shifting environments in which they live.

In the absence of disturbance, vegetation follows a gradual and more predictable sequence of change called succession. As vegetation moves through each stage of succession, the composition of wildlife species shifts accordingly. Wildlife species have distinctive successional strategies. Some species are more suited to the early stages of forest succession where grasses, forbs and shrubs dominate the site, while others are better suited for the later stages of forest development (e.g. old growth). Other species are habitat generalists and have adapted to a wide array of vegetation patterns.

B.1-C.1 Characterization of Habitats

The distribution and abundance of wildlife is primarily a function of habitat conditions (i.e., vegetation type and successional stage). These conditions reflect inherent fixed attributes (as depicted in the description of capable habitat below) as well as disturbance (i.e., fire, windthrow, landslide, and insect outbreaks) types and frequencies. In addition to altering habitat due to direct impacts (i.e., timber harvest), humans can alter habitat indirectly by influencing natural disturbance patterns. For example, fire suppression results in changes in vegetation composition and structure and subsequent susceptibility to various natural disturbances.

The Myrtle HFRA project area is located in the Selkirk Mountains on the west side of the Bonners Ferry Ranger District. The extent of management activities on USFS lands has been reduced from historic levels in recent years, in large part because most of this area is in a recovery zone for the Federally listed grizzly bear. As a result, the Selkirks generally have lower road densities than the remainder of the District.

As discussed in the Vegetation Section (Chapter 3), wildfire along with tree harvesting and associated road construction have been the major disturbances shaping the forest vegetation in the Myrtle HFRA project area. Since the last major fire in the drainage in 1926, a majority of the forested landscape has progressed into mature size classes. Past forest harvesting has altered the spatial pattern of the landscape, reverting some areas to the early succession (seedling/sapling) phase of forest development. The Myrtle fire in 2003 caused considerable tree mortality in the lower portion of the drainage, particularly on the drier south-facing slopes north of Myrtle Creek. While this fire may have provided a temporary flush of high quality habitat for snag-associated species and big game populations, it also reduced by several hundred acres the amount of large-diameter, open grown dry-site forests that were already much less prevalent on the local landscape than they had been historically.

Timber harvest, blister rust, and fire exclusion have changed the species composition of stands within the project area. Today's landscape contains only remnants of white pine, ponderosa pine and western larch. Subalpine fir, Engelmann spruce, Douglas-fir and grand fir have replaced much of the growing space once occupied by these species, effectively crowding them out. This change in species composition has altered ecosystem biodiversity, increasing the risk of ecological stress. The dominance of subalpine fir at higher elevations and Douglas-fir at lower elevations has increased the forest's vulnerability to drought stress, insect and disease infestations, and large catastrophic wildfires.

Given the often-conflicting habitat requirements of many species, a sound strategy for management is to maintain a complex pattern of forest types and age classes across the landscape that encourages biodiversity and emulates the historic patterns.

B.1-C.2 Methodology

The Council on Environmental Quality (40 CFR 1502.2) directs that impacts be discussed in proportion to their significance. Some wildlife require a detailed analysis/discussion to determine effects on a particular species. Others may not be impacted, impacted at a level that is inconsequential, or adequately mitigated through the design of the project. Generally, these elements do not require a detailed discussion and analysis.

The appropriate methodology and level of analysis needed to determine potential effects are influenced by a number of variables including presence of species or habitat, the scope and nature of the activities associated with the proposed action and alternatives, and risk factors that could ultimately result in a meaningful adverse or favorable effect. The screening process tiered to the following documents and used a variety of information including scientific literature, resource inventories, and sighting records:

- Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin
- Idaho Panhandle National Forests Land and Resource Management Plan
- Available Conservation Assessments and Strategies for wildlife species

B.1-C.3 Species Habitats and Requirements

This section describes the status and distribution of wildlife species analyzed in detail that have been identified as species of concern within the project area and could potentially be affected by proposed activities. It also describes the environmental baseline and relevant habitat components that may or may not be affected by the alternatives. Information presented in this section is based on scientific literature, wildlife databases, professional judgment, recent field surveys, and habitat evaluations.

The resource information provided, especially as it relates to habitat analysis, includes past actions (timber harvest and road building) that have influenced vegetative changes to what is now part of the existing or baseline condition. For example, the

characterization of forest structure from a past regeneration harvest would acknowledge changes that have occurred over the past 25 years, from stand initiation to a mid-seral stage of succession.

An important concept in the existing condition descriptions and analysis is the difference between *capable* habitat and *suitable* habitat. The following definitions are helpful in distinguishing between these two terms and the concepts they are based on:

> *Capable* habitat refers to the inherent potential of a site to produce essential habitat requirements of a species. The vegetative structure and composition on the site may not currently provide the necessary attributes to support a species such as stand age, cover type or stand density, but it has the fixed attributes that would enable it to provide those variables under appropriate conditions. Some examples of fixed attributes are slope, aspect, soil or elevation.
>
> *Suitable* habitat refers to wildlife habitat that currently has both the fixed and variable stand attributes for a given species' habitat requirements. Variable attributes change over time and may include stand age, cover type, stand density, tree size, or canopy cover.

The IPNF has developed Forest-wide wildlife habitat capability/suitability models, which utilize Timber Stand Management Record System (TSMRS) data, for five Threatened, Sensitive, and MIS wildlife species or species guilds (Canada lynx, flammulated owl/pygmy nuthatch/fringed myotis, fisher/American marten, northern goshawk, and white-tailed deer critical mid-winter range). In order to validate these models, USFS personnel conducted site visits of representative capable habitat for these species, with emphasis placed on stands modeled as "currently suitable." Any proposed treatment areas that potentially include suitable habitat for one or more species addressed in the model were visited by the wildlife biologist or wildlife technician. Capable habitat is determined by habitat type and topographic factors. Since these do not change over time, TSMRS data presumably offer reliable information on habitat capability.

B.1-D Species Analyzed in Detail

B.1-D.1 Threatened and Endangered Species

The following table summarizes Threatened and Endangered wildlife species analyzed in detail, the rationale for analysis, and a description of their habitats.

Table B.2 Threatened and Endangered Species Analyzed in Detail

Species	Rationale for Detailed Analysis	Preferred Habitat
Canada Lynx (*Lynx Canadensis*)	Most of project area lies within established Lynx Analysis Units. Suitable habitat affected.	Higher elevation lodgepole pine and spruce/ fir forests with adequate prey base of snowshoe hares, its primary food.
Grizzly Bear (*Ursus arctos horribilis*)	Documented recent use within the project area. Most of the project area within designated Recovery Zone, portion of remainder in a recurring use area.	Habitat generalist. Denning areas isolated and remote from human development.

a. Canada Lynx

Canada lynx is one of the three species of wild cats that occur in the temperate forests of North America. They occur in boreal, sub-boreal and western montane forests and are uncommon or absent from the wet coastal forests of North America. Distribution of lynx is nearly coincident with that of the snowshoe hare, its primary prey. Both snow conditions and vegetation types are important factors to consider in defining lynx habitat. Lynx habitat quality is believed to be lower in the southern periphery of its range because landscapes are more heterogeneous in terms of topography, climate, and vegetation (Ruediger et al. 2000).

Lynx habitat consists primarily of two structurally different forest types occurring at opposite ends of the stand age gradient, although they also use other habitats. Lynx require early successional forests that contain high numbers of prey (especially snowshoe hare) for foraging and late-successional forests that contain cover (especially deadfalls) for kittens and for denning (Koehler and Aubrey 1994). The highest use occurs when these are in close proximity. Like most wild cats, lynx require cover for security and stalking prey and avoid large open areas. Although lynx may cross openings less than 100 meters in width, they generally do not hunt in these areas (Koehler and Aubrey 1994). In north-central Washington, lynx used areas with gentle slopes (less than 10%) in winter (McKelvey et al. 2000); and moderate to gentle slopes (less than 40%) were used in the

southern Rocky Mountains (Apps 2000). In northern Idaho and northwestern Montana, lynx generally occur in moist, cold habitat types above 4,000 feet elevation.

Reference Condition

The Canada lynx was listed as Threatened on March 21, 2000. Lynx populations in Alaska and most of Canada are generally considered stable to slightly dropping. The conservation of lynx populations is the greatest concern in the western mountains of the United States because of the peninsular and disjunct distribution of suitable habitat at the southern periphery of the species' range. Both historic and recent lynx records are scarce, which makes identifying range reductions and determining the historical distribution of stable populations difficult (Koehler and Aubrey 1994).

Important risk factors that can impact lynx populations include alteration of forest habitats, expansion of the range of competitors, and increased levels of human access into lynx habitat. The Canada Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000) includes five general guidelines (indicators) typically tracked for habitat management assessment: 1) if more than 30 percent of lynx habitat within a LAU is currently in unsuitable condition, no further reduction of suitable conditions shall occur as a result of vegetation management activities by federal agencies; 2) maintain denning habitat comprising at least 10% of the lynx habitat within an LAU (denning habitat should be well distributed and in patches larger than 5 acres); 3) management activities should not convert more than 15% of lynx habitat within a LAU to an unsuitable condition within a 10-year period; 4) maintain vegetative structure that facilitates movement of lynx along important connectivity corridors such as riparian areas, saddles and ridges; and 5) manage for no net increase in groomed or designated over-the-snow routes and snowmobile play areas (Ruediger et al. 2000).

Existing Condition

The LCAS directs agencies to delineate LAUs to evaluate and analyze effects of planned and on-going projects on lynx and their habitat, and provide guidance for addressing these risk factors. Both snow conditions (influenced by elevation and aspect) and vegetation types are important factors to consider in defining lynx habitat.

The Myrtle HFRA project includes portions of the Myrtle-Cascade and Snow LAUs. LAUs are intended to provide the fundamental unit for evaluating and monitoring the effects of management activities on lynx habitat. The IPNF has completed an initial habitat suitability model to predict the amount of lynx habitat present in the project area. As this model was refined and the output verified through aerial photo inspection and field reviews, the acreages were changed to better reflect known conditions. The adjusted habitat composition totals for these LAUs are given in the following table.

Table B.3 Current condition of the LAUs incorporated in the Myrtle HFRA project area.

Lynx Analysis Unit	Total LAU Size / Capable Lynx Habitat (Acres)	Currently Suitable Denning Acres / (%)	Currently Unsuitable Acres / (%)	Change in Last Decade Acres / (%)
Myrtle-Cascade	27,915 / 20,626	4,743 / (23.0)	755 / (3.7)	6 / (<0.1)
Snow	11,498 / 7,483	783 / (10.5)	520 / (6.9)	38 / (0.5)

Most of the proposed treatments of lynx habitat are within the Myrtle-Cascade LAU. This LAU contains about seven square miles of private (Forest Capital Partners, LTD {FCP}) lands, as well as several thousand acres of bare rocky terrain and dry site forests near the headwaters of Myrtle Creek and the eastern Selkirk Mountains front, respectively. Denning habitat is quite well distributed throughout the LAU, and is generally in close proximity to high quality foraging habitat. An exception to this is along the eastern portion of the Myrtle/Snow Creek divide, where recently created openings (from the Myrtle fire and the Salt Lick timber sale) have not yet developed into winter snowshoe hare habitat.

A smaller portion of proposed treatment areas are within the Snow LAU. These areas are confined to the dry south-facing slopes above Snow Creek, and thus impact only a small amount of capable lynx habitat. This LAU contains about 4.5 square miles of property belonging to FCP, as well as a relatively large amount of bare, rocky ground near the headwaters of Snow Creek. Denning habitat in this LAU is not as well distributed as in Myrtle-Cascade LAU, particularly near the headwater area where many of the acres capable of producing forest habitat have not recovered from the effects of the Sundance Fire of 1967.

In addition, a number of acres of currently unsuitable habitat in this LAU are harvest units that are approaching 20 years old, and should move into high quality winter hare habitat over the next several years.

Lynx presence has been historically documented throughout the Idaho Panhandle. Unverified lynx sightings have been reported from several locations on the Bonners Ferry Ranger District; including relatively recent sightings in the Boundary, Grass, Trout Creek and Moyie River drainages; and historical accounts from the Blue Joe, Canuck, and Deer Creek and Kootenai River drainages.

b. Grizzly Bear

Populations of grizzly bears persist in those areas where large expanses of relatively secure habitat exist and where human-caused mortality is low. Grizzly bears are considered habitat generalists, using a broad spectrum of habitats. Use patterns are usually dictated by food distribution and availability combined with a secure environment. Grizzlies commonly choose low elevation riparian areas and wet meadows during the spring and generally are found at higher elevation meadows, ridges, and open brush fields during the summer (Volsen 1994).

Reference Condition

The grizzly bear was listed as Threatened in 1975. It was originally distributed in various habitats throughout western North America. Today, it is confined to less than two percent of its original range and represented in five or six population centers south of Canada, including the Cabinet-Yaak and Selkirk Ecosystems that are located in northeastern Washington, northern Idaho and northwestern Montana. Habitat loss and direct and indirect human-caused mortality are related to its decline (USDI 1993).

The U.S. portion of the Selkirk and Cabinet-Yaak Ecosystems is divided into grizzly bear management units (BMUs) ranging in size from ~30-160 square miles. The Idaho Panhandle, Kootenai and Colville National Forests, and the Idaho Department of Lands administer these BMUs. BMUs are designed to approximate the average home range of a female grizzly bear (~100 mi^2), facilitate documentation of bear numbers and distribution, and track cumulative effects within the ecosystem (Christensen and Madel 1982).

The Grizzly Bear Recovery Plan (USDI 1993) indicates that the most important element in grizzly bear recovery is securing adequate effective habitat. This is a reflection of an area's ability to support grizzly bears based on the quality of the habitat and the type/amount of human disturbance imposed on the area. Controlling and directing motorized access is one of the most important tools in achieving habitat effectiveness and managing grizzly bear recovery (USDI 1993). By controlling motorized access, certain objectives can be achieved including minimizing human interactions and potential grizzly bear mortality, reducing displacement from important habitats, and minimizing habituation to humans. This strategy involves achieving specified levels of "core" habitat and road densities.

Existing Condition

The Myrtle HFRA project is partially within the Myrtle BMU. This BMU currently meets the guidelines for core habitat, Open Motorized Route Density >1 mi/mi^2 (OMRD), and Total Motorized Route Density >2 mi/mi^2 (TMRD) defined in the 2004 Biological Opinion (BO) on the *Proposed Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones for the Kootenai, Idaho Panhandle, and Lolo National Forests* (USDI 2004) (see below).

Table B.4 Myrtle BMU existing condition and proposed guidelines

	Core Habitat[1]	OMRD[2]	TMRD[3]
Existing (2006) condition	58 %	31 %	21 %
Proposed guideline	56 %	33 %	24 %

[1]Percent of BMU >500 m from *drivable* motorized routes.
[2]Open Motorized Route Density >1 mile/square mile (shown as percent of BMU)
[3]Total Motorized Route Density >2 miles/square mile (shown as percent of BMU)

During 2006, the Sandpoint Ranger District replaced bridges along the Chimney Rock Trail (Trail 256) with pedestrian bridges across the Pack River and Thor Creek, and converted approximately two miles of trail that were open to motorized access to a

yearlong, non-motorized trail. The conversion of this portion of trail will increase core habitat in the Myrtle BMU by one percent (58% to 59%), and reduce OMRD from 31% to 30% and TMRD from 21% to 20%. These improvements to the environmental baseline will be fully realized before activities for the Myrtle HFRA project begin (2007 bear year).

The 2004 Forest Plan Amendment BO also identified areas of recurring grizzly bear use outside designated recovery zones. The Myrtle HFRA project includes a portion of the Pack River Occupied Area (PROA) to the southeast of the Myrtle BMU. This area is approximately 103 square miles, 40 square miles of which are under USFS management. The PROA currently has a linear open road density of 1.7 miles/square mile, and a linear total road density of 1.8 miles/square mile. On lands administered by the USFS, the linear open and total road densities are 0.9 miles/square mile and 1.0 miles/square mile, respectively. Guidelines for road densities contained in the 2004 BO specify no net increase in linear total road densities on Federal lands, and no permanent increase in linear open road densities.

Mortality is a continuing concern for the recovery of the grizzly bear. One of the advantages of access management is to decrease the opportunity for illegal mortality. The Myrtle BMU contains the Myrtle Creek Game Preserve where hunting is not permitted. Some illegal hunting may occur in the Game Preserve, although in small numbers. However, those people who do hunt the area are already in violation of the law, so there may be a slightly greater propensity to illegally take a grizzly bear. The project area includes a portion of the lower Snow Creek drainage not enclosed by the Myrtle Creek Game Preserve. Much of this area is adjacent to currently open roads, some of which is outside of the Myrtle BMU.

Habitat quality is not quantitatively considered in any of the IPNF guidelines for bear management. The Selkirk Ecosystem has an abundance of high quality bear habitat because of the amount of mesic habitat types that produce abundant bear forage plants. Huckleberries are the most important plant food for grizzly and black bears in the Selkirks, and are generally abundant. The large Sundance Burn occupies about a third of the Myrtle BMU, and provides huckleberries as well as other preferred species such as mountain ash. The burn has high quality forage, and is increasing in available cover as vegetation grows. Spring habitat is present within and adjacent to the BMU because of the presence of the Kootenai National Wildlife Refuge at the base of Myrtle Creek, as well as many acres of steep, low elevation southerly and easterly aspect slopes that provide greenup early in the year.

Grizzly bear numbers in the Selkirk Ecosystem are currently estimated at 46 animals (USDI 2004). Local biologists consider the population to be on the increase based on reported bear sightings, number of sows with twins or triplets, and sightings in areas not previously known to be used by grizzly bears (Wakkinen, pers. comm., 2003). However, since this population is still quite small, gains in recovery can quickly be reversed.

There have been several confirmed sightings of grizzly bears in the Myrtle and Snow Creek drainages, as well as on the Kootenai National Wildlife Refuge at the base of Myrtle Creek. In the Autumn of 2004, a grizzly sow and three cubs were spotted at two different locations along the Myrtle Creek road by District employees.

B.1-D.2 Sensitive Species

The following table summarizes sensitive wildlife species analyzed in detail, the rationale for analysis, and a description of their habitats.

Table B.5 Sensitive Species Analyzed in Detail

Species	Rationale for Detailed Analysis	Preferred Habitat
Black-backed woodpecker (*Picoides arcticus*)	Suitable habitat is present and potentially impacted in the project area.	Early post-fire forest stands. High densities of small-diameter snags.
Flammulated Owl *(Otus flammeolus)*	Suitable habitat is present and potentially impacted in the project area.	Mature or old growth ponderosa pine, Douglas-fir forest.
Northern Goshawk *(Accipiter gentilis)*	Suitable habitat for goshawk nesting or foraging is present and potentially impacted within the project area.	Mature to old growth forest with relatively closed canopies.
Fisher *(Martes pennanti)*	Suitable denning and foraging habitat in the project area and potentially affected.	Mesic forested habitats

a. Black-backed Woodpecker

This woodpecker nests in a variety of forest types, especially lodgepole pine and western larch. It excavates a nest cavity in a live or dead tree. Nest trees typically have heart rot or other decay. Unlike most other woodpeckers, this species uses relatively small, hard snags (Saab and Dudley 1997). Nest trees can be as small as 5" dbh. Furthermore, nest selection does not appear to be limited by overstory canopy closure.

Black-backed woodpeckers tend to flourish in early post-fire (3-5 years) habitat (Hutto 1995). They are uncommon residents of coniferous forests year-round - naturally occurring at low population levels. Following fire or insect and disease outbreaks that increase populations of wood-boring insects, they experience local population increases and temporary range extensions. The availability of habitat for this species is negatively affected by the prevention of fires and post-fire salvage harvesting (Hutto 1995).

Research in Oregon found that black-backed woodpeckers' nest sites were located in habitats with more snags per acre than other woodpecker species (Bull et al. 1986). It is possible that this species requires higher snag densities than other woodpeckers.

Reference Condition

Historically, ecosystems in north Idaho were shaped by disturbance patterns that altered the size and distribution of forest structures across the landscape. Wildfire, wind damage, insects, and disease, and forest succession created snags in areas that ranged in size from individual trees or small patches, to entire drainages (1,000 acres or larger). Consequently, snag densities would vary across the landscape, from areas with low levels of snags to other areas with abundant snags. In the latter case, densities of black-backed woodpeckers temporarily increased in response to an enhanced foraging and nesting opportunities.

During the last century, fire suppression and timber harvest have altered the temporal and spatial distribution of prime black-backed woodpecker habitat. Large wildfires are less frequent and timber harvest often removes trees which are dead, dying or infected with insects. In addition, firewood cutting along unrestricted roads has resulted in a lack of appreciable densities of snags along these corridors. Conversely, fire suppression has resulted in a sharp increase of smaller diameter trees and snag recruitment.

Existing Condition

Suitable black-backed woodpecker habitat likely existed within the project area prior to the 2003 wildfire as a result a small-scale insect infestations and other tree mortality. However, the fire itself almost certainly produced a temporary flush of high quality nesting and foraging habitat for this species. Even when recent (pre-fire) timber harvest and post-fire salvage harvest on all ownerships is considered, suitable nesting habitat is conservatively estimated to have increased by approximately 1,455 acres, and foraging habitat increased by as much as 3,440 acres within the burned area. Most of this additional habitat is found south of Myrtle Creek; on the relatively moist, steep, north-facing slopes dominated by dense stands of small-diameter, shade-tolerant tree species that sustained large areas of medium and high severity burn.

While surveys for black-backed woodpeckers have not been conducted within the project area, they are assumed to be present in response to the relatively large patch of high-quality habitat that was created. In addition, there are incidental sightings of this species in the project area in recent years, both within the 2003 fire perimeter (Burton Ridge) and outside (lower Snow Creek drainage).

b. Flammulated Owl

Flammulated owls are seasonal migrants to northern latitudes during the spring and summer. Primary nesting habitat is comprised of the older forests dominated by ponderosa pine and Douglas-fir with 35-65% overstory canopy closure(Goggans 1986, Howie and Ritcey 1987, Reynolds and Linkhart 1992). Reynolds and Linkhart (1992) reported that all published North American records of nesting, except one, came from forests in which ponderosa pine trees were at least present, if not dominant, in the stand. Flammulated owls depend on pileated woodpeckers and flickers to excavate the cavities in which they nest. Their nest trees are at least 14" in diameter (McCallum 1994). Although nesting habitat is thought to be more limiting on the landscape, the flammulated owl's preference for the ponderosa pine/Douglas-fir cover type can also be linked to food availability. Reynolds and Linkhart (1992) noted a stronger correlation between prey availability and this cover type than with other common western conifer cover types.

Flammulated owls appear tolerant of some human disturbances (Hayward and Verner 1994). This species has been known to nest in campgrounds and other areas of human activity with no apparent adverse effects.

Reference Condition
Based on vegetation estimates, ponderosa pine once comprised 9.1% of the National Forest lands within the Kootenai sub-basin, where the Myrtle HFRA project is located. Today, only 1.5% of the Kootenai sub-basin consists of sites that are predominately ponderosa pine (NZ Geographic Assessment, in prep.). This is an 84% decrease from an earlier point in history.

Primary factors that have contributed to the loss of older ponderosa pine/Douglas-fir forests include fire suppression and intense forest management. Fire suppression has led to the advancing succession of species such as Douglas-fir and grand fir that crowd out ponderosa pine. In addition, dry, open-grown forests of ponderosa pine and Douglas-fir were common at lower elevations in areas suitable for human settlement. These areas experienced intensive timber harvest, and the resulting access increased harvest of large snags by firewood cutters.

Existing Condition

The IPNF has completed a habitat suitability model to predict the amount of flammulated owl nesting habitat present within the Myrtle HFRA project area. National Forest lands within the analysis area encompass approximately 22,050 acres. Of these, 3,105 acres are classified as capable habitat for the flammulated owl, of which 347 acres were modeled as suitable.

Within the Myrtle Creek drainage, most suitable habitat was eliminated by the 2003 Myrtle fire. One purpose of the 2000 Myrtle-Cascade project was to favor the development of large diameter ponderosa pine and western larch on dry forest types. This management might have benefited flammulated owls by creating open stands of large ponderosa pine individuals that would have satisfied habitat requirements for these species. However, the 2003 fire nullified these gains by diminishing the understory that supported flammulated owl prey species (arthropods) and reducing stand overstory canopy cover below what this species prefers. As a result, treated stands now contain a high density of large snags and very little else.

In the lower Snow Creek drainage, the lack of suitable habitat is due to the combination of relatively young stands, and older stands that have a dense secondary canopy layer that can restrict foraging by flammulated owls.

District records include documentation of a vocalizing flammulated owl in the Myrtle Creek drainage. However, this site was heavily impacted by wildfire in 2003, and perhaps no longer provides suitable flammulated owl habitat. District personnel conducted surveys of potential habitat in the lower Snow Creek drainage during the summer of 2005, but did not document any flammulated owl responses. Given the limited amount of currently suitable habitat, flammulated owl populations are likely at very low densities within the project area.

1.c. Northern Goshawk

The northern goshawk uses a wide variety of forest age classes, structural conditions, and successional stages, inhabiting mixed coniferous forests in much of the northern hemisphere (Reynolds et al. 1992). Throughout North America, goshawk nest sites have consistently been associated with the later stages of succession (mature and old growth trees) with moderate to high tree densities located near the bottom of hillsides on moderate slopes (Hayward and Escano 1989, Squires and Reynolds 1997, Graham, et al. 1999). Foraging habitat includes a wider range of forest age classes and structures that provide a relatively open forest environment for unimpeded movement or flight through the understory.

Reference Condition

Generally, the Bonners Ferry area once contained a greater proportion of old growth than currently occurs. Mature forest is important for northern goshawks not only for prey species habitat but also for the large trees that provide the substrate for their substantial nest structures.

At least three suitable nest areas should be provided per home range (5,000-6,000 acres) to provide long-term nesting habitat for goshawks on the landscape. The minimal stand size for goshawk nest sites is 30 acres, with all nest sites best located within ½ mile of each other (Reynolds et al. 1992). Post-fledging areas have not been an issue on the IPNF because nesting habitat, not foraging habitat, appears to limit the numbers of goshawks.

Existing Condition

White pine blister rust and fire exclusion have changed the species composition of stands within the project area. Today's landscape contains only remnant examples of white pine, ponderosa pine and western larch. Douglas-fir, grand fir and lodgepole pine have replaced much of the growing space once occupied by these species. This change in dominance has increased the forest's vulnerability to drought stress, insect and disease infestations, and large, stand-replacing fires. This has resulted in unusually high levels of tree mortality, affecting stand structure and subsequent habitat suitability for goshawks.

Over twenty goshawk territories, some with multiple nests, have been recorded on the Bonners Ferry Ranger District since 1979. Canopy cover of 40-90% has been documented within these nest stands. Nest trees are typically found in live, large diameter (≥14") Douglas-fir, western larch, western red cedar, or western hemlock. Live trees are preferred because the overstory canopy protects eggs and nestlings from inclement weather and aerial predators. There have been intensive District-wide surveys for goshawks in 1989, 1995, 1996 and 2002. Of the documented territories on the District, more than two-thirds have experienced some level of successful breeding during the last decade. There is one historical goshawk territory within the project area in lower Snow Creek. This territory was first discovered in 1989, but has not been active since 1991. Potentially suitable nesting habitat in or adjacent to proposed treatment units was surveyed for occupancy in 2004, 2005, or both. No new goshawk nesting territories were discovered in these surveys.

The Myrtle HFRA project area contains 12,950 acres of capable goshawk habitat on USFS-administered lands, 2,728 acres of which are modeled as currently suitable for nesting. Within the project area, capable habitat is concentrated in the lower portions of the Snow and Myrtle creek drainages or on the lower slopes of the upper Myrtle Creek drainage.

c. Fisher

Fishers are low density, forest carnivores, occurring most commonly in landscapes dominated by late-successional forests with high cover, especially in riparian areas. All habitats used disproportionately by fishers have high canopy closure with complex forest structure. They avoid areas with low canopy closure (Ruggiero et al. 1994).

Fisher habitat in the Rocky Mountains generally consists of mature and old-growth conifer forests in summer and young, mature, and old-growth forests in winter (Heinemeyer and Jones 1994). Large-diameter snags and logs are used for denning and foraging. The species prefers forests with high canopy closure (greater than 80 percent) and avoids areas with low canopy closure (less than 50 percent) (Powell 1982). Forests within or adjacent to riparian areas appear to be particularly important to fishers (Heinemeyer and Jones 1994). In his study in north-central Idaho, Jones (1991) found that fishers generally preferred grand fir and spruce forests, and avoided dry ponderosa pine and Douglas-fir habitats. However, in winter, fishers also selected stands with relatively high basal areas of Douglas-fir and lodgepole pine. Changes in human access can affect fishers, as the species is easily trapped and over-trapping can jeopardize fisher populations.

Reference Condition

Fishers historically occupied much of the forested habitats in the northern United States (Heinemeyer and Jones 1994). Populations declined in the early 20th century, probably due to habitat loss from human settlement and logging, over-trapping, and poisoning. In the western United States, fishers have remained at low numbers or absent from their former range (Heinemeyer and Jones 1994). Population trend information for fishers in northern Idaho is unavailable, but based on sighting information, fishers are currently rare.

Existing Condition

In 2003, fishers were documented in the northwestern part of the Bonners Ferry Ranger District, near Saddle and Grass creeks. Through the years, there have also been unconfirmed sightings or accounts of fishers elsewhere on the District, but not in the Myrtle Creek drainage. In the summer of 2005, District work crews reported a reasonably reliable sighting of a fisher in the lower Snow Creek drainage, in the vicinity of proposed Unit G4. It is likely that this fisher was drawn to habitat adjacent to Snow Creek, as areas above the road are dry forest types.

The fisher habitat models indicate that approximately 17,106 acres of capable fisher habitat are present on Federal lands within the project area, approximately 8,650 acres of which were identified as currently suitable. Only a small amount of the suitable habitat is found in the vicinity of proposed treatment areas in the eastern (lower) portion of the project area, due to effects of the Myrtle fire and a preponderance of dry-site vegetation. Alteration of forest structure due to natural and human-caused disturbances (i.e. fire, timber harvest) has negatively impacted habitat for fisher, including some riparian areas. However,

given the relatively low density of fishers in the region and the high percentage of the project area occupied by mature moist forest with relatively high canopy cover and sufficient amounts of coarse woody debris, it is unlikely that habitat limits fisher presence.

B.1-D.3 Management Indicator Species

The following table lists Forest MIS wildlife species analyzed in detail, the rationale for analysis, and a description of habitats.

Table B.6 Management Indicator Species Analyzed in Detail

Species	Rationale for Detailed Analysis	Preferred Habitat
Pileated woodpecker (*Dryocopus pileatus*)	Suitable habitat exists and is potentially impacted within the project area.	Forests with tall, large diameter dead or defective trees for nesting.

1.a. Pileated Woodpecker

Pileated woodpeckers are relatively common in both cut and uncut mid-elevation forests. They appear to do well in a matrix of forest types (Hutto 1995). However, since foraging habitat occurs in a wider ecological range of forest age structures, nesting habitat is considered the most critical and limiting feature for pileated woodpeckers.

The pileated woodpecker was selected as a MIS because its highest densities occur in old-growth forests and because of their need for large snags for nest excavation and dead woody material (standing and down) for foraging (Bull et al. 1990). Specific requirements for nesting include large trees at least 20” diameter in relatively uncut stands, and nest cavities are usually located more than 30’ above the ground. Live or dead western larch, and dead ponderosa pine, aspen, or black cottonwood are preferred nest tree species in the northern region (Warren 1990).

Reference Condition

As discussed in the flammulated owl section, snag habitat in the project area has been strongly influenced by timber harvest, road construction and the increase in access, vegetation succession, and natural fire events.

Existing Condition

The change in species composition, along with past harvest practices and firewood collection, has slowly and methodically replaced such species as ponderosa pine, white pine and western larch, further inhibiting the production and sustainability of large snags. Consequently, snag production is shifting from larger, longer-lived species to smaller, shorter-lived species, which affects the long-term stability and persistence of snag habitat in the Myrtle HFRA project area. As a result, snag habitat within the project area is generally in decline for species associated with large snags, such as the pileated woodpecker.

A number of large-diameter snags were created on the north side of the Myrtle Creek drainage in the medium and high severity portions of the Myrtle fire. However, while these areas may provide foraging habitat, overstory canopy was reduced below what pileated woodpeckers prefer in nest stands.

National Forest lands within the project area contain approximately 5,200 acres of mature forest (sawtimber or old growth) that may be providing pileated woodpecker nesting habitat. This assessment does not include stands dominated by Engelmann spruce or subalpine fir, as pileated woodpeckers have not been observed nesting in these forest types on the District. The project area contains 9 areas of at least 100 acres of contiguous mature/old forest habitat. This habitat is generally concentrated in the eastern portion of the project area in the lower drainages, much of it in areas with the greatest fire risk.

B.1-E WILDLIFE ENVIRONMENTAL CONSEQUENCES

This section displays and discusses the effects on those wildlife species identified in the preceding section that may be affected by the proposed actions and the No Action Alternative. Effects discussions include direct, indirect and cumulative effects, all of which may have positive or negative consequences. Information presented in this section is based on scientific literature, wildlife databases, professional judgment, recent field surveys, and habitat evaluations.

B.1-E.1 Cumulative Effects Analysis

Past actions and other disturbances have laid the foundation for today's forest vegetation and are depicted/accounted for in the baseline condition descriptions. This is especially true for habitat suitability analyses, which characterizes the changes in vegetation (succession) from past disturbances.

Cumulative effects discussions for alternatives include these past actions in combination with other relevant present, ongoing, and reasonably foreseeable actions, regardless of the source (past, present and reasonably foreseeable actions are described in Chapter 1). The appropriate scale or geographic bounds for cumulative effects analysis relates to an area that would be affected by the proposed action or reasonable alternative. This area is referred to as the cumulative effects analysis area and may vary between resources (see table below). Determining this area for wildlife depends upon a species' relative home range size in relation to its available habitat, topographic features that influence how species move and utilize their home range (e.g. watershed boundaries), and boundaries that represent the point of diminishing potential effects.

Table B.7 Project impact zones for species analyzed.

Species Analyzed	Cumulative Effects Area
Canada lynx	Lynx Analysis Unit (Myrtle-Cascade & Snow LAUs)
Grizzly bear	Myrtle BMU Pack River Occupancy Area
Black-backed woodpecker	USFS-managed lands within Project Area boundary
Flammulated owl	USFS-managed lands within Project Area boundary
Northern goshawk	USFS-managed lands within Project Area boundary
Fisher	USFS-managed lands within Project Area boundary
Pileated woodpecker	USFS-managed lands within Project Area boundary

Lynx Analysis Units (LAUs) were delineated following standards outlined within the Lynx Conservation Assessment and Strategy (LCAS) (Ruediger et al. 2000). LAUs were not intended to represent actual lynx home ranges, but their scale approximates the size of area used by an individual lynx. The size of LAUs would generally be from 16,000 to 25,000 acres in contiguous habitat, and likely be larger in less contiguous, poorer quality, or naturally fragmented habitat. While other (state and private) ownerships within LAU boundaries may provide some suitable lynx habitat, the LCAS directs that lynx habitat parameters and changes to them are calculated as a percentage of capable lynx habitat under Federal ownership within individual LAUs. The LCAS has determined that the LAU is a suitable cumulative effects analysis area for lynx.

To facilitate management and effects analysis, the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones are divided into Bear Management Units (BMUs), each of which is roughly the home range size of an adult female grizzly bear. Based on research, the average home range was determined to be approximately 100 square miles in size. Each BMU was assumed to represent a viable home range that would spatially meet the seasonal needs of a resident female grizzly bear. BMUs are not intended to be the actual home range of known adult female grizzly bears, but are used to analyze cumulative effects. By maintaining sufficient suitable habitat quality in each BMU, then the entire recovery area would remain as viable habitat. Additionally, the USFWS and the USFS have identified areas outside recovery zone boundaries known to be currently occupied by grizzly bears. The Biological Opinion (BO) on the *Proposed Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones for the Kootenai, Idaho Panhandle, and Lolo National Forests* (USDI 2004) recognizes the occupied area in the southwestern portion of the Bonners Ferry Ranger District (referred to in the BO as the "Pack River Occupancy Area"). USFWS has identified the Pack River Occupancy Area (PROA)

as a suitable cumulative effects analysis area for grizzly bears – akin to BMUs within Recovery Zones (Bryon Holt, pers. comm. 2004).

The Myrtle HFRA project lies within the Selkirk Mountains of the Bonners Ferry Ranger District and includes a checkerboard of private ownership in both the Myrtle and Snow Creek drainages. For the remainder of the species analyzed, the cumulative effects analysis area is defined as the portion of the project area under USFS management. This area totals approximately 28,000 acres, is the size of multiple home ranges for even highly mobile species such as goshawks, and provides adequate habitat to sustain the complete life cycle of non-migratory wildlife as well as breeding/nesting habitat for migrants. The project area is defined in the north, west and southwest by the Myrtle Creek watershed boundary. The eastern extent is represented by the IPNF boundary, but is also demarcated by the area where the steep eastern face of the Selkirk Mountains meets the broad, flat Kootenai Valley. The project area is extended in the southeast to include a relatively dry, south-facing portion of the Snow Creek watershed immediately adjacent to the lower Myrtle Creek watershed.

The eastern end of the project area contains lands managed by the Bureau of Land Management (BLM), US Fish & Wildlife Service (Kootenai National Wildlife Refuge {KNWR}), Idaho Department of Lands (IDL) and various private landowners. The project area also contains several thousand acres of privately-owned lands within the IPNF Administrative Boundary in the Myrtle and Snow creek drainages, including approximately seven square miles belonging to Forest Capital Partners, Ltd. (FCP). These non-Federal ownerships are generally managed for the primary purpose of resource (timber) extraction. Since these timber stands are on relatively short rotations, they are usually precluded from reaching suitable habitat conditions for species that require mature forest structure. As a result, these ownerships are highly susceptible to adverse habitat modifications, and the presence of suitable habitat cannot be relied upon over time. Through aerial photograph interpretation, the District can determine how many acres are currently forested, and roughly estimate overstory canopy cover on these properties. However, determining habitat suitability for species analyzed using this incomplete information would be of limited value. Important structural habitat components such as tree diameter, number of canopy layers, and presence of snags and down woody material would not be discernable from aerial photos. The cost of obtaining this information through field reviews of these properties would be exorbitant and of little value, given their propensity toward irretrievable habitat alterations. Therefore, while adjacent private lands both outside of and within the IPNF Administrative Boundary may provide suitable habitat for species analyzed, we lack data to adequately assess these areas, and assume that they are providing no habitat for these species.

B.1-E.2 Analysis Indicators for Selected Species

The table below displays the indicators that will be used to measure effects on wildlife species. Indicators for each species vary and are based on those factors that could result in a measurable adverse or beneficial effect. For most species being analyzed, appropriate habitat parameters were measured to distinguish suitable habitat (specific parameters for individual species are located in the project file). A discussion of the changes in suitable habitat for each relevant species and the effects on species are disclosed in the following discussions.

Table B.8 Issue indicators used to measure effects.

Species	Indicator
Canada lynx	Impacts to denning habitat and conversion of lynx habitat to unsuitable condition within 15-year time period, by LAU
Grizzly bear	Changes in Forest Plan security, core and road densities by BMU: changes in linear road densities in Priest River Occupancy Area (PROA)
Black-backed woodpecker	Changes in distribution and quality of snag habitat
Flammulated owl	Changes to large snag habitat and trend toward suitable habitat conditions
Northern goshawk	Trends in suitable nesting habitat
Fisher	Changes to suitable denning habitat
Pileated woodpecker	Changes to large snag habitat and old growth habitat

B.1-F Threatened and Endangered Species

a. Canada Lynx

Methodology

Lynx habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS), with corrections from field sampling and aerial photo interpretation. The habitat components identified by the model are based upon recommendations from an interagency review of published lynx literature (Ruggiero et al. 2000). Modeling rules and assumptions can also be found in the project file. While surrounding private lands may make contributions to lynx habitat, the LCAS directs that habitat percentages be calculated only for the Federal land base within LAUs.

Based upon research findings, capable lynx habitat is grouped in the following broad categories:

- *Unsuitable:* capable lynx habitat that has, through natural or artificial processes, lost vegetation of sufficient height to provide forage and cover for snowshoe hare populations through a winter of average snow depth.
- *High Quality Forage:* includes dense stands of regenerating conifers – both with (*late successional forage*) and without (*early successional forage*) the presence of mature overstory canopy – that provide adequate forage and cover to support snowshoe hare populations during a winter of average snow depth.
- *Denning:* mature conifer stands that contain a nearly continuous overstory canopy (>70%) and enough coarse woody debris of structural complexity to provide denning opportunities for a female lynx rearing kittens.
- *Low Quality Forage:* this catch-all category encompasses those stands that do not fit into other categories, but are capable habitat and contain sufficient vegetation to be considered suitable. These stands may supply the occasional denning or foraging opportunity, or merely contribute forested habitat through which lynx can travel with a sense of security.

The Myrtle-Cascade LAU contains 20,626 acres of capable lynx habitat within 457 delineated stands, while the Snow LAU contains 7,483 acres of capable lynx habitat within 198 delineated stands. USFS personnel field verified 154 stands in the Myrtle-Cascade LAU, totaling approximately 6,755 acres (see *lynx.dbf*, project file). Habitat was field validated in all capable stands proposed for treatment in the Snow LAU (approximately 68 acres).

Effects

The potential effects on Canada lynx and its habitat were determined by predicting the change to habitat components that would result from the proposed action. The following table displays the existing condition, and anticipated effects on lynx habitat components for the Myrtle-Cascade and Snow LAUs, which are impacted by this project.

Table B.9 Effects on lynx habitat components by LAU.

Lynx Habitat Component	Myrtle-Cascade LAU (27,915 / 20,626)*			Snow LAU (11,498 / 7,554)*		
	Alt. 1	**Alt. 2**	**Alt. 5**	**Alt. 1**	**Alt. 2**	**Alt. 5**
High quality forage acres						
Early successional	1,882	1,882	1,882	1,050	1,050	1,050
Late successional	4,178	4,178	4,178	623	623	623
Low quality forage acres	9,068	8,467	9,014	4,507	4,460	4,460
Denning acres	4,743	4,642	4,694	783	783	783
(% of capable)	(23.0)	(22.5)	(22.8)	(10.5)	(10.5)	(10.5)
Unsuitable acres	755	1,457	858	520	567	567
(% of capable)	(3.7)	(7.1)	(4.2)	(6.9)	(7.6)	(7.6)
Increase in unsuitable acres in 10-year period	6	708	109	38	85	85
(% of capable)	(<0.1)	(3.4)	(0.5)	(0.5)	(1.1)	(1.1)

*Total LAU acres / Capable lynx habitat acres

Alternative 1

In the absence of mechanical treatments, habitat conditions would continue to change in these LAUs. There would be a continued shift toward more shade tolerant species, and small stem density and understory congestion would continue to build up in most stands. Insects, disease and competition for sunlight and nutrients would hasten tree mortality and trigger increases in down woody material. More lynx denning habitat would be produced, and existing denning habitat would be enhanced. However, existing high quality foraging areas will begin to lose their value as preferred hare habitat.

The scenario described above assumes that there would be no stand-replacing fire in this area. Given the history of active fire suppression, existing high fuel loads in many stands, and increased fuel concentration that lack of management action would provide, it is reasonable to assume that the area will be affected by wildfire at some point in the future. The magnitude of this fire would depend upon area accessibility, available suppression resources, weather and other environmental factors. A mixed-severity fire would not likely alter large portions of available habitat, but a large stand-replacing fire would convert denning stands to unsuitable habitat, which would take 20-30 years to mature to the point where they would support high densities of snowshoe hares.

Alternative 2

Direct and Indirect Effects

Project activities would potentially reduce denning in the Myrtle-Cascade LAU by approximately 101 acres through regeneration harvesting. However, denning habitat is not considered limiting in this LAU, and harvest of these stands would still leave an adequate array of denning habitat in the vicinity. Most (648) of the acres proposed for harvest in this LAU are currently low quality forage. While approximately 601 of these acres will be converted to an unsuitable condition, 47 acres will be group selection / commercially thinned, and will remain as low quality foraging after harvest. The 702 regenerated acres (101 acres denning and 601 acres low quality forage) will result in 3.4% of capable habitat having been converted to unsuitable condition in the last decade.

Only approximately 68 acres of capable habitat will be treated in the Snow LAU, 47 acres of which would be regenerated and converted to unsuitable condition. An additional 21 acres will be treated with a group selection / commercial thinning prescription and will remain as low quality forage. The 47 acres of regeneration harvest will increase the amount of unsuitable habitat created in the last decade to 1.4% of the LAU. The portion of this LAU affected by project activities is probably not highly preferred by lynx because most of the forested stands around treatment areas are in or adjacent to dry (Douglas-fir) habitat types. There is no primary lynx habitat (stands containing significant amounts of subalpine fir) in this part of the Snow LAU.

Alternative 5

Direct and Indirect Effects

Alternative 5 would reduce activities in the Myrtle-Cascade LAU to approximately 103 acres, including regenerating about 101 acres of denning habitat. Within the Snow LAU, long-term impacts on vegetation would be essentially the same as Alternative 2, since the only difference would be a reduction of 15 acres of selective harvest in low quality foraging habitat.

There would be less potential for short-term (during implementation) disturbance to lynx than under Alternative 2. However, stands would continue to trend toward production of denning habitat at the expense of high quality hare habitat, as described under the No Action Alternative. This alternative would also make smaller fuel reductions within these LAUs. As a result, this alternative would pose a somewhat higher risk of stand replacing fire than Alternative 2, which would create a long-term (20-40 years) benefit for lynx at the expense of a short-term (<20 years) habitat loss.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for Canada lynx:

Past Activities and Events – Due to its proximity to Bonners Ferry and accessibility, the Myrtle Creek watershed has experienced substantial timber harvest on both Federal and private lands. Most early-successional hare habitat in the drainage was created by regeneration harvest in unnamed timber sales prior to 1980. This includes large regenerating openings in the Jim and Cooks creek drainages as well as in the main Myrtle Creek drainage above the Jim Creek confluence. More recently, the Adverse Creek, Chef Creek, Curve Creek and Snow-Myrtle timber sales have created smaller openings that are currently

unsuitable, but should move into high quality forage (hare habitat) within the next decade. The road construction associated with older sales increased access for trappers and snowmobilers, potentially causing negative impacts to lynx through increased trapping mortality and snow compaction allowing access to lynx habitat for competing predators. However, motorized use of these roads during summer had a relatively minor impact, since lynx are not normally displaced by human presence. While the Myrtle Fire affected over 3,000 acres in the lower Myrtle Creek drainage, a relatively small segment affected capable lynx habitat. Only portions of a few capable stands were in areas affected by high severity fire. All past activities and events would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Personal use firewood gathering, non-motorized recreation, and standard road maintenance would not significantly impact Canada lynx. Continued fire suppression would keep denning habitat intact, but also has the potential to impede development of early successional hare habitat since fewer acres would be allowed to burn. As a result, continued fire suppression would offset the impacts of this proposal to some degree. Off-road motorized recreation would have minor impacts to lynx during the summer months, since low population densities of lynx and the preference of these recreationists for more open areas make it unlikely ORV use would occur in the same general vicinity as lynx at the same time. Oversnow motorized use has the potential to negatively impact lynx, but the lack of groomed routes and play areas, along with the shallow snowpack in the lower Myrtle and Snow creek drainages, limits snowmobile use within lynx habitat in the project area.

Other Restoration Projects – Treatments of regenerating stands, including white pine pruning, weed and release, and shrub control projects, may be implemented under the restrictions set forth during informal consultation between USFS and USFWS regarding ongoing activities and existing projects within lynx habitat on the IPNF. Since these treatments would have only minor effects on high quality foraging habitat, there would be no significant cumulative effects when considered collectively with the proposed action. Similarly, noxious weed treatments would take place along roads and other disturbed areas, and would cause inconsiderable changes in vegetative structure with respect to snowshoe hare habitat. Future underburning is unlikely to impact Canada lynx since this would take place in low elevation dry forest stands that do not supply lynx habitat. Future road decommissioning may have short-term impacts on lynx through disturbance and temporary loss of a small amount of foraging habitat (brushing currently undrivable roads), but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – The Big Mack timber sale will regenerate 142 acres of low quality lynx foraging habitat. This will increase the amount of unsuitable habitat in the Myrtle-Cascade LAU converted through management activities during the previous ten-year period to 991 acres (4.8% of LAU). For habitat analysis purposes, these 142 acres are already being modeled as "unsuitable preforage."

Activities on other ownerships – Timber harvest or other activities on non-Federal ownerships may provide a source of disturbance or adversely modify habitat that lynx are currently utilizing to some degree. However, the LCAS directs that lynx habitat components be evaluated on the basis of percentages of Federal land capable of providing lynx habitat within a LAU. Since non-Federal ownerships are assumed not to provide lynx habitat, activities on these ownerships would not affect reported percentages of lynx habitat components. As a result, there would be no cumulative effects on Canada lynx as a result of activities on other (non-USFS) ownerships in the project area.

Conclusion – Canada Lynx

Activities covered by this document would be consistent with all standards and guidelines in the LCAS. The action alternatives would have impacts to, including loss of, lynx denning habitat. However, the affected LAUs each contain in excess of 10% of capable habitat in suitable denning condition, both before and after project implementation. Unsuitable habitat will constitute less than 30% of lynx habitat in each LAU, and harvest will not cause more than 15% of lynx habitat in either LAU to be converted to unsuitable condition within a ten-year period. There will be no road-building or increase in motorized winter recreation within LAUs as a result of this proposal. While the Alternative 2 would result in an opening approximately 400 m wide along a potential movement corridor on the Myrtle/Snow divide, it is unlikely that movement would be impeded since this opening would be created near the periphery of both LAUs in an area of less desirable habitat. For these reasons, action alternatives are unlikely to result in adverse impacts to lynx or their habitat.

<u>Consistency with Forest Plan and Other Regulations</u>

There is no specific Forest Plan direction for management of Canada lynx or lynx habitat, since this species had not been listed under the Endangered Species Act at the time the Forest Plan was issued. Until the IPNF Forest Plan is amended or revised to address Canada lynx, this species and its habitat are managed according to guidelines outlined in the LCAS (Ruediger et al.

2000). All action alternatives are consistent with this document, and therefore meet Forest Plan direction to "contribute to the conservation and recovery of the listed species on the Forest" (USDA Forest Service 1987 p. II-6).

b. Grizzly Bear

Methodology

The analysis of effects on grizzly bears focuses on impacts to core habitat and changes in road densities within the Myrtle Grizzly Bear Management Unit (BMU), and on changes in linear road densities within the recognized area of recent grizzly bear occupancy (Pack River Occupancy Area {PROA}). Grizzly bear core habitat consists of areas that are outside of a 0.31 mile (500 m) influence zone of both open and restricted roads, railroads, and motorized trails. Open motorized route density (OMRD) and total motorized route density (TMRD) are calculated using the moving windows analysis described in Wakkinen & Kasworm (1997). OMRD calculations take account of open roads, railroads, motorized trails, and any restricted road segments where the number of administrative trips exceeds allowable limits for any given season during the "bear year" (non-denning period). TMRD calculations take in these same routes as well as roads restricted by gates or guardrail barriers for the duration of the non-denning period. Roads closed by earthen barriers or roads that are physically impassable to motorized vehicles do not figure into road density calculations.

Since the IPNF does not have a vegetation-based grizzly bear habitat suitability model, possible changes to vegetation will be addressed qualitatively. Core habitat is reported as a percent of each BMU. Road densities are reported as the percent of the BMU having an OMRD >1 mile/mile^2 or TMRD >2 miles/mile^2. There is no core habitat requirement for occupied areas outside recovery zones, and road densities in the PROA are reported in linear miles of road per square mile.

Alternative 1

If no action were taken, there would be less disturbance in grizzly bear habitat since there would be no need for helicopter use or other mechanized activities. However, these activities represent an relatively short-term point-source disturbance and low risk of grizzly mortality. Artificial openings that are presently providing forage will close in as forest succession advances. In the absence of fire, grizzly bear habitat would probably decline in this area. Conversely, a large stand-replacing fire would create a temporary flush of high quality foraging habitat, as evidenced by use of the lower Myrtle Creek drainage by grizzly bears in the vicinity of the 2003 burn area.

Effects Common to Action Alternatives

The effects of fuels reduction treatments on grizzly bears can reasonably be categorized as short-term (during implementation) or long-term (post-implementation). Long-term habitat effects include changes in forest structure (reduction of cover and increased foraging habitat) and ongoing disturbance from newly constructed roads. Conversion of stands from cover areas to foraging areas probably improves habitat conditions for grizzly bears, since it is unlikely that forest cover is limiting in the Selkirks. This proposal will not permanently increase motorized route miles, so disturbance effects are limited to the short-term impacts of fuels reduction treatments and subsequent activity fuels (slash) treatment. The level of potential disturbance is influenced by a number of factors including: 1) the intensity and duration of activity, 2) the correlation of the activity with seasonal habitat preferences of bears, 3) the association of activity with quality habitat, and 4) additive impacts from other sources of disturbance.

The roadside/surface maintenance identified for designated haul routes generally involves minor improvements within the road prism (brushing and blading), and will mostly take place on open roads that are currently popular driving routes. Since an ambient level of disturbance is presumed to originate from these roads, it is unlikely that improved surface conditions would result in additional displacement. Improvements to restricted roads will not result in long-term increases in traffic, as use of these roads during project implementation will be limited to the contractors and administrative purposes, and administrative use will not exceed USFWS guidelines in subsequent years.

Alternative 2

Direct and Indirect Effects

Proposed treatments are generally in the lower portions of the Myrtle and Snow Creek drainages, and down canyon from concentrations of large open huckleberry fields. Treatment areas in the Snow Creek drainage ("E", "F" & "G" units) are generally south-facing, dry forest types dominated by Douglas-fir and lodgepole pine, and often with strong representation of ponderosa pine and Western larch. These areas provide succulent forage early in the season and maintain populations of

wintering ungulates. However, potential forage species dry out and lose palatability by early summer, even in shaded areas. Due to the relative unavailability of forage plants, grizzly bear use is likely uncommon outside the spring season. These features, in combination with the fact that treatment areas are geographically situated between spring habitat and higher elevation summer habitat, suggest that the greatest potential for disturbance to grizzly bears by project activities is likely to be during the spring.

By contrast, proposed treatments in the Myrtle Creek watershed ("B" & "D" units) would impact more mesic habitats containing cedar/hemlock- and grand fir-dominated stands with a component of lodgepole pine and occasionally Douglas-fir. However, with the exception of Unit B1, these proposed units generally contain a dense canopy layer of small diameter (<8" dbh) trees that restrict movement and impede the amount of herbaceous vegetation that grows there. These stands may have value to grizzly bears as cover, but are likely limited in their usefulness as forage areas. Conversely, Unit B1 is variable in both tree size and species composition; and has a more open structure, particularly near the upper (north) end. This open canopy results in a denser shrub and herbaceous ground cover, including huckleberries at the upper elevations. Consequently, while spring is still a sensitive time period, this portion of Unit B1 may attract grizzly bears throughout the summer.

Myrtle BMU – Approximately 1,240 of the acres proposed for treatment are in the Myrtle BMU, including about 551 acres of commercial thinning/group selection and 689 acres of shelterwood/seedtree harvest. Some 608 of these acres would be treated by ground-based systems, while approximately 632 acres would be helicopter logged (units B1, B3, B6, G7H & G9). Of the acres to be logged using ground-based systems, approximately 358 acres will be tractor logged in winter. The remaining 250 acres of skyline yarding are within the 500 m influence zone of drivable roads, outside of core habitat.

There will be no permanent core loss or TMRD increases in the Myrtle BMU from the proposed action, since no roads will be constructed or reconstructed within the BMU. Treatment in "D" units would include haul traffic on restricted Forest Road (FR) 1309. Since the number of trips on FR 1309 during this phase of implementation would exceed administrative use guidelines, this road would be modeled as "open" during the bear year(s) (April 1 – November 15) in which these units are active. Use of this road would raise OMRD in the Myrtle BMU by 1%. Similarly, haul traffic on FR 2405, which the contractor may use to access helicopter Unit B6, would also raise OMRD by 1%. Simultaneous use of FR 1309 and FR 2405 as haul routes would not raise OMRD above 33%, but would not be compliant with the Forest Plan 70% security standard (see "myrt_sec.doc" - project file) Since tractor units would be harvested during the grizzly denning period, winter haul routes do not figure into OMRD. However, restricted roads used as haul routes for any portion of the non-denning period are modeled as "open" for road density calculations.

Approximately 280 acres of the area to be helicopter logged are in core habitat. Although no road construction is involved in these areas, repeated high intensity helicopter use over a number of years can affect the utility of core. However, by limiting the timing and duration of helicopter use, impacts to core habitat can be limited to the actual duration of the activities and would not necessitate a long-term (10-year) core reduction. Buffering helicopter units by ½ mile (~800 m) would result in approximately 1,615 acres of core in the Myrtle BMU potentially being influenced by disturbance. Other sources of disturbance to be considered are open and restricted roads (which are already figured into the baseline core condition) and the adjacent ground-based treatment units (discussed above). Effects of treatment in helicopter units that impact grizzly core (B1, B3, B6 & G9) would be partially mitigated by restricting harvest activities during the grizzly "spring" season (April 1 – June 14). Similarly, no helicopter yarding will be allowed during spring in helicopter Unit G7H, and in helicopter Unit G2 in the Pack River Occupancy Area. Harvest of Unit G9 would be completed in two operating seasons, and harvest of units B1, B3 and B6 would be completed over two operating seasons. Harvest activity in helicopter units B1, B3 and B6 would not be allowed during the same bear year as helicopter yarding in Unit G9; and harvest, slashing and piling of all four of these units would be completed in four consecutive calendar years. It is possible to further compress this time frame by allowing helicopter activity in G9 concurrent with helicopter activity in the "B" units; however, this arrangement would be inconsistent with the 1987 Forest Plan Wildlife Standard 4c (see "myrt_sec.doc" - project file).

Treatment would impact two different core blocks within the Selkirk Recovery Zone (SRZ). The core block south of Myrtle Creek, which corresponds to a portion of the Kootenai Peak Roadless Area, contains almost 2,000 acres within the SRZ. This block would effectively be split by treatment in Unit G9, with about 677 acres impacted. However, given the relatively small size of the block (about three square miles) and its location on the landscape (mostly spring habitat), mitigation measures should reduce disturbance to grizzly bears during the period of highest potential use. A second core block north of Myrtle Creek is contained in the Selkirk Roadless Area, and includes more than 75,000 acres. Approximately 940 acres of this core area may be impacted by treatment of units B1, B3 and B6. The portion of this core block east of the proposed harvest units (the ridgeline between Myrtle and Cascade Creeks) is likely most heavily utilized in spring, so harvest timing restrictions should keep this core habitat available during this time period. In addition, the large size of this core block would provide adequate displacement habitat for bears whose use patterns are disrupted by summer logging activity.

Helicopter logging is considered to be more intrusive on wildlife than ground-based harvest systems, as the main source of disturbance is some distance off the ground (making it audible at greater range). However, due to the placement of helicopter units and accessible landings, flight lines will generally be over existing units from this proposal (already disturbed areas). Although there may be as many as three years of helicopter yarding for this project, the "B" and "G" units – though only about 1.5 miles apart – are effectively separated by a major ridge system. As a result, repeated helicopter use in the Myrtle BMU would be limited to two years in duration in each major drainage in the project area (Myrtle Creek and Snow Creek). There may be two additional days of helicopter use in core habitat in Snow Creek to assist with post-harvest fuels treatments (aerial ignition), but this potential disturbance would be relatively minor and of short duration. All "B" units will be grapple piled – an additional ground-based disturbance lasting as much as three weeks per unit. There are no other planned projects in the Myrtle BMU that will require helicopter use.

Fuels reduction treatments may occur intermittently throughout the project area during the life of the contract, depending upon environmental and market conditions. However, in the case of helicopter units, economic considerations usually allow for little "down time" once aircraft are on site. Therefore, helicopter use may be nearly continuous (during daylight hours) for portions of the operating season. As a result, this activity would likely be compressed into relatively short time periods during implementation. Even though units B1, B3 and B6 will be allowed a two year operating season, the impact area would shrink as harvesting is completed.

Given the nature of the Myrtle HFRA project (fuel reduction), an emphasis will be placed on treating slash from fuels reduction treatments in a timely manner. Soil criteria require that slash be left on the ground overwinter for nutrient leaching. In all likelihood, units will be piled/burned the season following harvest (in the case of tractor units, the summer following the winter of harvest). With the exception of Unit B3, all harvest units in the Myrtle Creek drainage ("B" and "D" units) will be grapple piled. Helicopter units B1 and B6 will be piled in the year following harvest.

Units F1, G2, G3, G4, G7S, G7H, G8 and G9 may be underburned during the spring season using aerial (helicopter) ignition methods (portions of these units may be hand-ignited by ground crews). Unit F1 and a portion of Unit G2 are not within the Recovery Zone or Pack River Occupancy Area (PROA). Units G3, G4, G8, and portions of G7S, G7H and G2 are in the PROA. Unit G9 and the remainder of units G7S and G7H are in the Myrtle BMU, but only Unit G9 impacts grizzly bear core habitat. Underburning of Unit G9 will require as many as 2 days of helicopter use in the spring after this unit is harvested. Ignition of the remaining units may total up to 4 additional days of helicopter use spread out over 2 different spring burning periods. However, under optimal burning conditions all underburning of G units could be conducted over a single 1-2 day period. All other units will be grapple (machine) piled in late summer or fall, with piles burned by hand crews in late fall or early winter.

Since helicopter Unit F1 is outside the Myrtle BMU and PROA and is near an open road, no timing restrictions will be placed on timber harvest or slash treatment in this unit. Helicopter units G2 and G7H are at least partially within the BMU or PROA, so no spring helicopter yarding will be allowed in these units. However, since these units do not impact core habitat, there will be no timelines for project activities.

Pack River Occupancy Area – This proposal would reconstruct approximately ½ mile of closed road (FR 402C) within the PROA, temporarily raising the linear total road density by 0.01 mile per square mile. There would be no change in linear open road density, since traffic on this reconstructed road would be limited to the purchaser and administrative personnel. Following implementation and post-harvest activities, this road would be returned to an undrivable condition.

Within the PROA, about 567 acres of treatments are proposed, approximately 127 acres of which are a regeneration prescription and the remaining 440 acres a commercial thin / group selection. Treatment on approximately 265 acres would utilize ground-based systems, and about 302 acres would be helicopter logged. Approximately 205 of the 265 ground-based acres would be tractor logged during winter.

Treatment areas in the PROA are also considered a point-source disturbance. However, with the exception of helicopter Unit G2, these units are within 500 m of open roads that provide an ambient level of disturbance throughout the snow-free season. As discussed earlier, there are no core habitat standards for occupied areas outside recovery zones.

Alternative 5

Direct and Indirect Effects

Alternative 5 would authorize approximately 326 acres of logging in the Myrtle BMU, 67 acres of which would utilize helicopter yarding. There would be no project activities in grizzly bear core habitat. OMRD would increase during the year(s)

FR 1309 is used as a haul route, but this road would likely be opened for fewer seasons since it is used to access only 96 acres of timber harvest. Additionally, this proposal would not require use of FR 2405. As a result, there would be considerably less potential disturbance in the Myrtle BMU from project activities, although the level of actual disturbance may not differ greatly from Alternative 2 with its associated harvest timing restrictions.

Within the PROA, Alternative 5 would look very similar to Alternative 2. Approximately 493 acres would be treated, including 302 acres of helicopter harvest. FR 402C would be utilized for project activities and subsequently closed, and the restriction on spring harvest would remain for Unit G2.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for grizzly bears:

Past Activities and Events – It is unknown to what extent past timber harvest impacted grizzly bears in the short term (during implementation), since it is likely that grizzly bears were at low densities in the US Selkirks at the time of Federal listing in 1975. The longer term effect of some of the more recent regeneration harvests, as well as the large clearcutting done in the late 60s through late 70s, is the reduction of forest cover and increase of foraging habitat. The road construction associated with these harvests likely degraded grizzly habitat effectiveness. These activities would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Personal use firewood gathering, non-motorized recreation, winter motorized recreation and standard road maintenance would not significantly impact grizzly bears since none of these activities would elevate road densities. Continued fire suppression would help retain forest cover, further contributing to reduction of foraging habitat. Off-road motorized recreation can displace bears from preferred habitat, particularly recurrent use in a particular area. However, off-road motorized use (except oversnow travel) is currently illegal within BMUs on the IPNF.

Other Restoration Projects – Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. This activity would originate from open roads, or would not exceed administrative use guidelines on restricted roads. While thinning may cause a minor disturbance to grizzly bears during implementation, there would be no long-term effects. Similarly, noxious weed treatments and underburning would take place along roads and other disturbed areas, and would have a minor disturbance effect on grizzly bears.

There are a number of miles of road decommissioning discussed in this document or previously authorized by the Myrtle-Cascade Record of Decision (signed 3/23/01). Road decommissioning may take place throughout the Myrtle BMU as funding becomes available, according to the priority ratings assigned each segment (Map Appendix – Aquatics Map #5). In many cases, currently undriveable road segments would have to be reopened (vegetation cleared) in order for decommissioning (culvert removal and occasional full slope recontour) to take place. Roads being decommissioned would be buffered by 400 m for Forest Plan Security calculations during the year(s) decommissioning takes place. In addition, segments where traffic exceeds administrative use guidelines, as well as segments that support temporally drawn out decommissioning activities (more than two days of activity per mile of road), will be treated as "open" for OMRD calculations. Proposed road decommissioning will be reviewed at the beginning of each year in concert with other planned activities to assure compliance with the 2004 BO OMRD guidelines and the 1987 Forest Plan Security standard. A few miles of roads proposed for decommissioning are in areas currently counted as "core" habitat. Since these roads would be in an undrivable condition both before and after decommissioning, the effect of implementation would be considered a temporary intrusion into core that results in a short-term (during implementation) impact to, rather than long term reduction of, core. Core impacts would be reported to USFWS at the end of each bear year. The 2004 BO makes special exemptions for core disturbance for the purpose of road decommissioning (USDI 2004 pp. 136-137). Several other road segments proposed for decommissioning are currently drivable. As a result, future road decommissioning may have temporary (during implementation) adverse impacts on grizzly bears, but would be beneficial to bears in the long term (post-implementation).

Currently active USFS timber sales – Contractual requirements of the Big Mack timber sale specify that they be harvested during the grizzly bear denning season (winter), so there may be only a relatively brief disturbance to bears during post-sale fuels treatments (a small amount of grapple piling and subsequent broadcast burning).

Grandmother Mountain Land Exchange – The IPNF and Forest Capital Partners (FCP) have proposed a land exchange of a number of individual parcels, mostly within the proclaimed boundary of the St. Joe National Forest (IPNF "South Zone"). This exchange would also add an approximately 280-acre parcel in the lower Myrtle Creek watershed to the National Forest System. Roughly 220 acres of this parcel are within the Myrtle BMU, with the remainder outside the BMU and PROA. Nearly all of the 220 acres were heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, tree cover is sparse, and this habitat presents no particular attractiveness to grizzly bears except as early-spring foraging areas following green-up. Two

open roads and one restricted road traverse the property. There are no short- or long-term prospects for reducing road densities in the immediate area: one open road is the main Myrtle Creek road and provides access to other FCP inholdings, the other leads to a popular trailhead which accesses a historic lookout at Burton Peak, and the restricted road currently has an easement to provide access to the City of Bonners Ferry's municipal water intake. However, since this parcel is situated between potential spring habitat in the KNWF and summer habitat to the west, adding it to the National Forest system and consequently precluding potential future development could result in long-term benefits to grizzly bears.

Activities on other ownerships – Forest Capital Partners owns substantial amounts of property within the Myrtle BMU, as well as in the PROA. The Bureau of Land Management (BLM) also manages several small parcels in the Myrtle BMU. Unlike Canada lynx habitat management, Federal agencies must compensate for loss of effective grizzly habitat caused by other landowners within BMUs. The majority of FCP lands within the Myrtle BMU are already relatively heavily roaded, so any future activities would probably emanate from existing roads. The USFS would still have to manage roads to offset any additional roadbuilding on these ownerships, but given the already high road densities on FCP lands, new construction would make relatively minor changes to core habitat or road densities. As a result, road building on FCP lands generally has little influence on core or road density values on adjacent National Forest – the exception being when roads are constructed close enough to the property line that the zone of influence from the road extends out into USFS land. Even in such a case, existing road densities are high enough on these other ownerships that additional road building would only cause minor decreases in effective habitat on USFS land that could be compensated for relatively easily.

Conclusion – Grizzly Bear

Alternative 2 would involve helicopter logging in grizzly bear core habitat. The intent of the core habitat concept is to maintain refugia where grizzly bears can be free from motorized disturbance. High-intensity, repetitive low-elevation helicopter use over several years could affect the utility of core habitat by disturbing or displacing grizzly bears, if they are present. While limiting seasons and duration of activities is expected to reduce the potential for disturbance and/or displacement, there are no guarantees that bears will not be present (and negatively affected) during helicopter harvest. The disturbance/displacement effect will be short-term (during implementation), and grizzly bears are expected to reestablish normal use patterns shortly after the source of disturbance is removed. Therefore, the impacts would not result in a core deduction, and no in-kind core replacement would be necessary.

None of the action alternatives would require permanent road building, and treatment utilizing restricted roads would not elevate OMRD in the Myrtle BMU above Terms and Conditions established in the 2004 BO (USDI 2004). Road reconstruction within the PROA would temporarily raise linear total road density an insignificant amount, and linear open road density would not change since this road would be unavailable for general public use. Virtually all acres in ground-based harvest units will be winter harvested or are within the influence zone of open roads, so potentially would have only minor impacts to core habitat. However, since the potential short-term effects are not insignificant or discountable, Alternative 2 may cause adverse impacts to grizzly bear during project implementation.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction to manage the habitat of species listed under the Endangered Species Act (USDA Forest Service 1987 p. II-6), and will maintain at least 70 square miles of security habitat in the Myrtle BMU (Wildlife Standard 4-c, p. II-27) ("myrt_sec.doc" – project file). Alternatives are also consistent with the Terms and Conditions of the BO for the Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones for the Kootenai, Idaho Panhandle, and Lolo National Forests (USDI 2004) for management of core habitats and road densities in BMUs and of linear road densities in identified occupied areas outside recovery zones.

B.1-G Sensitive Species

a. Black-backed Woodpecker

Methodology

The potential effects of management activities on black-backed woodpeckers were determined by the change in habitat conditions that would result from implementing the alternatives. Specific parameters analyzed for this assessment include the changes in distribution and quality of snag habitat. Snag availability was estimated by modeling USFS-managed property covered with pole-sized or larger timber that has not had any harvest for at least 20 years (or was *selectively* harvested prior to

being heavily impacted by the 2003 fire) and is more than 50 m from a drivable road prism. In all likelihood, this approach underestimates snag availability in several ways: 1) Not all snags near drivable roads will be taken by woodcutters, particularly smaller-diameter snags often utilized by black-backed woodpeckers. In addition, currently restricted roads are assumed to provide access to woodcutters in the event these roads will be opened during the snow-free season, although this is a relatively rare occurrence in the Project Area. 2) The analysis assumes no snags are retained in timber harvest units (with the exception of burned areas), despite implementation of minimum snag retention guidelines since at least 1987 (IPNF Forest Plan issuance). 3) As discussed below, other ownerships probably provide at least some level of available snag habitat, although the model assumes no habitat contribution from these ownerships. While there is no assurance that areas that meet the model criteria have high snag densities, given the increasing rate of tree mortality due to insects and disease, it is reasonable to assume that there are small pockets of mortality scattered throughout the project area that are providing suitable black-backed woodpecker habitat.

Alternative 1

Within the project area there are about 21,000 acres of USFS-administered lands capable of supporting forested habitats. This total includes approximately 17,180 acres of potential black-backed woodpecker habitat (calculated as described above) including the nearly 1,500 acres of high or moderate severity burn in unharvested stands from the 2003 Myrtle Fire. With the exception of these 1,500 burned acres (presumed to be currently suitable habitat), it is unknown how many of these acres are in fact providing nesting habitat, although small pockets of mortality likely occur throughout the area. Foraging habitat may be present throughout this area, as well as in low severity portions of the burn or in existing Mama Cascade units where large ponderosa pine and larch snags were retained.

No immediate changes in snag habitat would occur as a result of implementing this alternative. Habitat conditions would change according to natural events over time. As a healthy forest matures, some trees die from competition and other natural forces, resulting in higher quality and quantity of snags. Consequently, nesting and foraging habitat would be improved for snag dependent species in healthy, low risk stands.

In the high risk stands, the prevalence of root disease and insect damage would be expected to spread in this alternative, resulting in higher levels of tree mortality. The dead trees would be replaced by other shade tolerant species, which would be re-infected and die, perpetuating the cycle. This change would slowly and methodically replace such species as ponderosa pine, white pine, and western larch, preventing many stands from reaching mature structures.

Tree mortality would continue to provide an abundance of nesting and foraging habitat for some species. Because black-backed woodpeckers are nearly restricted to post-fire habitat, their populations would remain at low endemic levels. However, high fuel accumulations resulting from elevated tree densities would lead to a higher risk of fires, increasing the chance of stand-replacing fires. If a stand-replacing fire were to occur, it would create a temporary flush of habitat for black-backed woodpeckers.

Alternative 2

Direct and Indirect Effects

The proposed action would treat about 1,558 acres that could potentially be providing black-backed woodpecker nesting habitat. In all likelihood, treatment will reduce small snag densities below what this species prefers for nesting, although treated areas would remain as foraging habitat. However, despite the loss of potential nesting habitat in the project area, high quality nesting habitat should remain in the burned area for several more years. Tree mortality would continue in untreated stands, and additional snags may be created by underburning treated stands, thus producing more snag habitat.

Years of active fire suppression have resulted in significant reduction of black-backed woodpecker habitat, causing populations of this species to remain at relatively low levels. While the 2003 fire may have temporarily increased high quality habitat, black-backed woodpecker populations are expected to return to ambient low densities in the 3-5 years following the fire. The proposed action may reduce the quantity of available snag habitat in both the short and long term, since there is a desire to maintain low fuel concentrations in the project area. The proposed action does not include any fire salvage or treatments within the burn perimeter.

While tree cutting would remove many small snags, and subsequent stand conditions would result in lower levels of small snag recruitment, much of the Myrtle HFRA project area would remain unaffected by past and proposed cutting. Areas outside of proposed treatment areas would continue to be susceptible to insect and disease, thereby perpetuating small to medium sized snag habitat for black-backed woodpeckers. Annual aerial surveys of new insect-induced tree mortality across the Bonners Ferry Ranger District conducted by USFS Forest Health Protection personnel have shown that bark beetles infested an average

of almost 4,000 acres per year from 1990-1998 across the District, and the level of new infestation increased to over 20,000 acres from 1999-2000 (S. Kegley, pers. com.). This higher rate of infestation and mortality is expected to continue for the next few years mainly due to increasing mountain pine beetle, western balsam bark beetle and fir engraver populations, especially if drier than normal weather conditions continue. Additionally, mortality due to root diseases is not included in aerial survey data and has been steadily increasing. These data indicate that snag and down woody debris recruitment from insects and disease activity from 1990 through 1998 had been occurring at a steady rate of about two to five percent of the District per year and increased to around six to 22 percent of the District from 1999 to present. Based on the existing and predicted increase in snag levels over the project area, there should continue to be a quantity of snags less than 20" dbh that can be considered excess to meet the Northern Region Snag guideline recommended levels. Therefore, it is unlikely that the loss of 1,600 acres of potential nesting habitat – adjacent to a larger block of suitable habitat – would threaten the viability of this species at the project level.

Alternative 5

Direct and Indirect Effects

Only about 557 acres of potential black-backed woodpecker nesting habitat would be treated under this alternative. Overall, this alternative would treat – and reduce the risk of high-intensity fire on – about one-half as many acres as Alternative 2. As a result, Alternative 5 would have less of an immediate effect on black-backed woodpeckers, and would make smaller reductions in wildfire risk (which would be more favorable to black-backed woodpecker – a post-fire obligate species); but would result in less *quality* snag habitat in the long term since fewer high risk acres would be treated.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for black-backed woodpecker:

Past Activities and Events – Timber harvest on USFS lands would have reduced snag densities in logged stands in nearly every instance, particularly prior to adoption of the Forest Plan in 1987 when standards for snag retention were weak or non-existent. The long-term impact of these activities is the reduction of snags of all sizes. In subsequent years, snag retention and snag recruitment (leaving higher densities of green trees for future snags) in harvested areas has improved through implementation of Forest Plan standards and, more recently, adoption of the Northern Region Snag Protocol (USDA 2000). Recently, as discussed above, tree mortality in untreated stands has increased Forest-wide, increasing available black-backed woodpecker habitat as a consequence. As a result, the ultimate legacy of historic logging in the project area is limited to a decrease in *large*-diameter (>20" dbh) snags, since production of smaller snags in untreated areas as well as in harvest units >30 years old due to natural mortality of immature trees from insect and disease infestations has replaced small-diameter snags. As discussed in the Affected Environment section, the Myrtle Fire produced a temporary flush of high quality nesting and foraging habitat for this species. Suitable nesting habitat is conservatively estimated to have increased by approximately 1,455 acres, and foraging habitat increased by as much as 3,440 acres within the burned area. Past activities and events would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonal and yearlong open roads, and has the potential to reduce snags within 50 meters of open roads. While there may be minor reductions in miles of open roads as a result of the action alternatives, this would not significantly reduce snag vulnerability to firewood gathering. Black-backed woodpeckers have been described primarily as a post-fire obligate species--a species dependent upon habitat that results from a mixed lethal or stand-replacement fire that produces an abundance of snags. Interrupting the periodic disturbances created by lethal wildfires through continued fire suppression may threaten local populations of black-backed woodpeckers. Conversely, if a wildfire occurs in the project area that could not be suppressed, habitat may be enhanced. Various recreation activities and routine road maintenance are unlikely to have any impacts on black-backed woodpeckers.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on black-backed woodpeckers. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Since these activities are designed to produce stands with lower densities of larger stems and to reduce tree mortality, they would by definition negatively impact black-backed woodpeckers, which prefer high densities of smaller diameter snags. However, these activities would occur almost exclusively on dry forest types, and are designed to produce stands more representative of historical conditions. Black-backed woodpecker habitat would continue to be produced on many moist forest habitats, as well as some untreated dry forests, in and adjacent to the project area. Future road decommissioning may have short-term impacts on black-backed woodpeckers through disturbance, but would have long-term benefits by

reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – Treatment in the Big Mack timber sale could potentially reduce available nesting habitat by as much as 150 acres, although this reduction has already been incorporated into the existing condition for habitat analysis purposes. Some snags will be retained to meet snag retention guidelines, and should provide foraging opportunities for black-backed woodpeckers. However, treated areas will no longer contain high densities of small-diameter snags preferred for nesting.

Grandmother Mountain Land Exchange – The majority of the property in the Myrtle Creek drainage to be acquired by the IPNF has been heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, there are few snags of any size on this property; and it is probably providing no nesting, and limited foraging, habitat for black-backed woodpeckers. Over the next 40+ years, this area is likely to produce more habitat for cavity-dependent species under USFS administration, since there would be less emphasis placed on resource (timber) extraction than if it were privately owned.

Activities on other ownerships – The USFS is currently aware of planned activity on private (FCP) lands within the analysis area that includes shelterwood harvest of approximately 120 acres in the vicinity of proposed units G1 and G2. However, additional timber harvest and road building activities may take place on these and other private ownerships within the project area. As discussed in the Cumulative Effects Analysis introduction (above), other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property. While snag retention is often low in harvested areas on these ownerships, unharvested areas likely provide at least some level of small snag recruitment due to natural tree mortality.

Conclusion – Black-backed woodpecker

Although the action alternatives would reduce the quantity of available snag habitat, tree mortality would continue to persist in the analysis area, allowing black-backed woodpeckers to maintain populations at low endemic levels. As a result, black-backed woodpecker populations would remain at reduced densities and their current distribution would be sustained. Samson (2005) concluded that short-term viability of the black-backed woodpecker in the Northern Region and on the IPNF is not an issue because:

- 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.
- Increases in 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 (in 2004, 1,210 ha of 2,276,588 ha or 0.0005%) or overall timber harvest (8,581 ha of 9,045,255 or 0.0009% of forested landscapes in the Northern Region) is insignificant.

Consequently, the proposed action ***may impact* black-backed woodpeckers *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction 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 (USDA Forest Service 1987 p. II-28).

b. Flammulated Owl

Methodology

As discussed in the "Affected Environment" section, nesting habitat is considered the most critical and limiting habitat feature for flammulated owls. Flammulated owl habitat was evaluated by a habitat suitability index model (HSI) using data from the Forest timber stand database (TSMRS), and updated to reflect changes in condition identified by field walk-through exams or aerial photo interpretation. The model uses vegetation characteristics to determine if stands are currently suitable flammulated owl nesting/foraging habitat. Modeling rules and assumptions can be found in the project file (see *Interpretation of IPNF Wildlife Queries*, project file). The potential effects on the flammulated owl and its habitat were determined by predicting the change in habitat suitability that would result from each alternative.

The 3,105 acres identified by the habitat model as capable flammulated owl habitat in the Myrtle HFRA project area were contained within 65 stands. During the 2005 and 2006 field seasons, District wildlife personnel conducted site visits to determine suitability of 28 capable stands enclosing approximately 1,136 acres (see *mhfra_drysite.doc*, project file). On-site habitat validation generally included only stands in lower Snow Creek, since nearly all the capable habitat in Myrtle Creek was within high or medium severity portions of the burn, and only 23 acres of timber harvest is proposed in capable (currently unsuitable) habitat in this drainage. An additional 11 stands (386 acres) within the Myrtle fire perimeter were determined to be unsuitable through aerial photograph examination. In the Snow Creek drainage, field validation revealed that there are only approximately 76 acres of stands containing currently suitable habitat, with one contiguous patch ≥35 acres in size.

Alternative 1

While Alternative 1 would not alter existing vegetation patterns through mechanical means, mortality caused by agents such as root disease and insect "outbreaks" would continue to exert change on habitat conditions. There would be a continued shift toward more shade-tolerant species in the majority of the stands. Forest encroachment that historically would have been held in check by low-intensity fire would continue to proliferate and crowd out remaining open stands of ponderosa pine and Douglas-fir. Douglas-fir trees would continue to be recycled through disease-prone stands, creating a scenario that would discourage the development of more open, older forests of ponderosa pine and Douglas-fir. Old-growth dry-site forest stands would become increasingly crowded in the understory by shade-tolerant species, causing these stands to move further from suitable habitat conditions. Consequently, habitat suitability for flammulated owls would decline.

Without management intervention, the dry habitats in the project area would continue to degenerate. High fuel accumulations resulting from fallen trees would lead to a higher risk of stand-replacing fires. If a stand-replacing fire were to occur, it would take at least 100 years for successional processes to restore habitat which would be similar to today's condition due to continued fire suppression and subsequent dominance of shorter-lived, shade-tolerant species.

Alternative 2

Direct and Indirect Effects

The proposed action would treat approximately 1,080 acres of capable habitat, 76 acres of which are field-validated suitable habitat in two different stands of 49 and 27 acres each. It is important to note that these two stands are mostly (draws and benches) composed of unsuitable habitat - due to high densities of smaller stems in the understory - interspersed with smaller suitable areas (ridges). Group selection treatment would concentrate on the portions of the stands with congested understories, while leaving the parts with an existing structure of large, widely spaced stems untouched. This activity would result in a temporary disturbance to resident animals if they were present during implementation, and subsequent underburning may leave shrub and forb understory too depauperate to provide preferred foraging habitat for a few years. However, the ground cover shortly will have recovered sufficiently to provide habitat for the arthropod species flammulated owls rely upon for foraging.

Approximately 570 acres of proposed treatment areas are currently unsuitable due to excessive density of small-diameter stems in the understory, but contain a structure of large-diameter ponderosa pine, western larch and occasionally Douglas-fir that could, over time, be converted to suitable habitat through mechanical thinning ("suitable w/management"). If left untreated, it is questionable if any of these acres would revert to suitable habitat absent a stand-replacing disturbance event. With the exception of buffered riparian areas, all of these acres are proposed for group selection/commercial thin treatments. Another 290 unsuitable acres would also be trended toward suitable condition through thinning or group selection, but these stands lack existing structure of large-diameter stems that would allow relatively short-term conversion to suitable habitat through treatment.

An additional 139 acres of currently unsuitable habitat will be regeneration harvested. These stands currently contain predominantly small diameter lodgepole pine, and would likely remain in this cover type without management intervention. Converting the stands through regeneration cutting methods would alter species composition and favor the longer lived, more disease resistant species like ponderosa pine. This activity would promote the restoration of more open grown, older forests of ponderosa pine/Douglas-fir on these sites and lead to long-term habitat stability for flammulated owls.

With the current arrangement of vegetation, it is unlikely that lower Snow Creek supplies ideal flammulated owl habitat. The dry, rocky areas may provide small areas of suitable habitat, but these are likely of inadequate size to support flammulated owl populations. Wright (1996) found that suitable microhabitats may not be occupied by flammulated owls unless these conditions occurred across larger suitable landscapes. In the project area, suitable microhabitats in Snow Creek are few and widely spaced. The two stands containing substantial (>33%) suitable habitat are nearly two miles apart, with few if any

suitable microsites between. Treatment would, within a few years, result in about 650 acres of contiguous suitable habitat across the south face of lower Snow Creek.

Selective timber harvest poses two primary risks to flammulated owl habitat (assuming selection harvest does not consist of overstory removal or "high-grading"): the loss of large snags during harvest or post-harvest fuels treatments, and the elimination of small areas of dense small-diameter stems utilized as roosting sites. Timber harvest that strives for uniform spacing and elimination of all juvenile trees results in stands that do not contain adequate structural complexity for this owl to occupy. By contrast, group selection harvest results in a clumpy distribution of remaining trees with varying overstory canopy cover. In addition, there are three large draws (where no mechanical activities will take place) and more than a dozen smaller ones (that will only be commercially thinned – no slashing of pre-commercial regeneration will take place) spread out across this face that would still contain roosting areas and large snags, even if these habitat components were completely removed from the rest of these units. Leaving small draws unharvested or partially harvested should retain potential roosting patches as well as creating a buffer around existing snags for protection during post-harvest underburning.

Treatments in dry-site forest stands (including old growth stands) are designed to mimic or trend these stands toward structural conditions this species prefers. While there are no guarantees that flammulated owls will occupy these areas after treatment, it is apparent that most of these acres currently are not meeting habitat conditions preferred by flammulated owls, and will continue to move away from suitable condition over time. Therefore, it seems intuitive that manipulating stands that do not currently meet species habitat requirements presents far less risk to continued viability of the species than lack of action would. Both the Idaho Partners in Flight (IPF 2000) and Montana Partners in Flight (MPF 2000), in their conservation plans, recommend dry-site restoration treatments that include removal of small diameter trees and subsequent burning (as is proposed here) to enhance and/or restore habitat for this species.

In 2006 District surveys documented flammulated owl presence in a previously harvested stand on Dawson Ridge. The area in which the owl responded was harvested in 2000 and underburned in 2002. The prescription for this unit was commercial thin with group selection. The objective of this prescription included restoring the role of fire in ponderosa pine stands in the Dawson Ridge ecosystem and regenerating groups of ponderosa pine and larch, while improving the growth and vigor of the residual trees (similar to prescription objectives in lower Snow Creek). Flammulated owl presence had also been documented in nearby stands in 1999 and 2000. While it may not be appropriate to assume that this silvicultural treatment *improved* (i.e., changed habitat from an unsuitable to suitable condition) flammulated owl habitat, it is encouraging given the management history of Dawson Ridge that owls are using the area. Additionally, these positive responses do imply that our dry forest silvicultural practices are at least *maintaining* suitable habitat.

Alternative 5

Direct and Indirect Effects

Elimination of stands that are allocated old growth or in inventoried roadless areas would result in treatment of approximately 690 acres of capable flammulated owl habitat. Of these acres, one suitable stand (27 acres) would be treated, and an additional approximately 340 acres would ultimately be converted to suitable habitat through treatment. All treatment of capable habitat would take place in Snow Creek, as the treatment of the one capable stand in Myrtle Creek would be dropped.

While this alternative would not reverse negative flammulated owl habitat trends to the extent of Alternative 2, it would measurably reduce the risk of stand replacing fire in capable habitat in Snow Creek compared to the no action alternative. The 367 acres that would be maintained or potentially converted to suitable conditions would leave a more patchy arrangement of suitable habitat across the south face of lower Snow Creek. This comparative lack of contiguity of suitable habitat would presumably be less productive for flammulated owls than the conditions ultimately produced under Alternative 2. Although Alternative 5 is expected to result in better long-term (>2 years after implementation) habitat conditions than lack of action, it would not restore and maintain habitat to the extent that Alternative 2 would.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for flammulated owl:

Past Activities and Events – Recent and historic regeneration harvest, as well as historic overstory removal ("high-grading") timber harvest in lower Myrtle and Snow creeks would have reduced available flammulated owl habitat in the project area. These activities, in combination with active fire suppression in unlogged stands, have contributed to the lack of habitat for this species currently in the project area. As discussed in the Affected Environment section, the Mama-Cascade timber sale reduced understory congestion in dry-site stands in an attempt to restore conditions to a state similar to what would naturally

have occurred with periodic fire. However, most of the treated stands were subsequently affected by stand-replacing fire in 2003. The proposed action would help restore natural processes by favoring tree species composition and structures that are consistent with historic vegetative patterns of dry site ecosystems. While some stands have lost or are losing sufficient forest structure to achieve habitat suitability, this action would lead to long-term stability of habitat for flammulated owls by promoting more open grown stands of ponderosa pine and Douglas-fir and creating opportunities for managing stands with fire in the future. Past activities and events would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity has the potential to reduce large snags within 50 meters of open roads. While there may be minor reductions in miles of open roads as a result of the action alternatives, this would not significantly reduce snag vulnerability to firewood gathering. Interrupting the periodic disturbances created by lethal wildfires through continued fire suppression probably has mixed impacts on flammulated owls. High-intensity wildfire often reverts stands back to an earlier successional stage. In some cases this would interrupt immature stands from reaching habitat suitability, and in other cases would regenerate stands with high densities of small stems that may never reach suitability lacking disturbance. Regardless, fire suppression through the years has heavily contributed to reduction of open grown ponderosa pine stands by preventing periodic underburns in these stands. Since this activity is expected to continue, the results would be partially compensated for by activities described in this proposal. Various recreation activities and routine road maintenance are unlikely to have any impacts on flammulated owls.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on flammulated owls. However, thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Additionally, thinning and underburning would improve species composition and structure, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning and underburning actions would promote long-term stability of habitat conditions for flammulated owls. Future road decommissioning may have short-term impacts on flammulated owls through disturbance, but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – The Big Mack timber sale does not contain capable (dry forest) flammulated owl habitat within harvest units, so will have no effect on flammulated owl habitat.

Grandmother Mountain Land Exchange – The majority of the property in the Myrtle Creek drainage to be acquired by the IPNF has been heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, there are few live trees or snags of any size on this property; and it is probably providing no habitat for flammulated owls. In the future, this area is likely to produce more habitat for cavity-dependent and old-growth associated species under USFS administration, since there would be less emphasis placed on resource (timber) extraction than if it were privately owned.

Activities on other ownerships – The USFS is currently aware of planned activity on private (FCP) lands within the analysis area that includes shelterwood harvest of approximately 120 acres in the vicinity of proposed units G1 and G2. However, additional timber harvest and road building activities may take place on these and other private ownerships within the project area. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion – Flammulated Owl

In currently suitable habitat, implementation of the action alternatives may result in disturbance to flammulated owls during project implementation, as well as a short-term (1-2 years) reduction of foraging habitat in treated areas. However, currently suitable habitat will remain in a suitable condition, and treatment will reverse the general trend of these stands toward unsuitable habitat conditions. In addition, as many as 860 acres of currently unsuitable habitat will be trended towards suitable condition under Alternative 2, but only 584 acres under Alternative 5. Therefore, these actions would lead to long-term stability of habitat conditions for flammulated owls. In the short term, there would be no decrease in suitable habitat acres as a result of these alternatives. Effects of actions would not indicate a local or regional change in habitat quality or population status, allowing flammulated owls to maintain their current distribution. Samson (2005) concluded that short-term viability of the flammulated owl in the Northern Region and IPNF is not an issue because:

- 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 (in 2004, 8,581 ha of 9,045,255 ha or 0.0009%).

Based on this analysis, this project ***may impact* flammulated owls *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction 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 (USDA Forest Service 1987 p. II-28).

c. Northern Goshawk

Methodology

Goshawk nesting habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). Since slope data in the TSMRS database is an average of plots across the stand, using this data to determine suitability can cause the model to exclude stands that have relatively flat microsites, or include portions of stands that are too steep for goshawks to select as nest sites. To rectify this, the model was only used to identify vegetative factors that are predictors of goshawk nest sites, while topographic limitations were determined from digital elevation model (DEM) data. As a result, modeled goshawk nesting areas did not necessarily conform to delineated stand boundaries, but were identified by combining the stand layer with two meter resolution DEM data. While suitable northern goshawk nesting habitat was initially determined using the Forest-wide HSI model (see *Interpretation of IPNF Wildlife Queries*, project file), habitat suitability was validated for a large portion of capable stands in the project area through site visits or by comparing data with ancillary data such as aerial photographs and forester's reconnaissance notes.

The habitat suitability model, in conjunction with the topographic screen described above, identified some 8,540 acres capable of providing goshawk nesting habitat (of the original 12,950 capable habitat acres) within 293 individual stands on USFS-administered lands in the Myrtle HFRA project area. District personnel visited 113 of these stands, incorporating approximately 3,424 acres of capable nesting habitat, for field validation purposes (see *gos.dbf*, project file). In addition to capable stands proposed for treatment, field validated habitat included most of the capable lower Snow Creek stands and sporadic stands throughout the upper Myrtle Creek drainage. Capable habitat in the lower Myrtle drainage was not field validated, since most of these stands were heavily impacted by the Myrtle Fire (and presumably are not supplying large contiguous blocks of suitable habitat) and are not proposed for treatment. However, 960 acres in 24 stands within the Myrtle fire perimeter were determined to be unsuitable for nesting through aerial photo interpretation. Additionally, recent (2002) aerial photographs were used to determine nesting habitat suitability for another 23 stands (approximately 790 acres) that were obviously unsuitable due to recent timber harvest or had an open-canopied structure. In a few instances, aerial photographs were utilized to compare unverified stands with adjacent stands of similar appearance that had been field validated.

Approximately 1,664 capable nesting acres were determined to be currently suitable. Suitable nesting habitat is mostly contained within 11 contiguous stands larger than 30 acres, with five of these areas more than 100 acres in size. In general, capable but unsuitable stands were: 1) strongly impacted by the Myrtle fire (insufficient overstory canopy), 2) dominated by small-diameter trees, or 3) contain adequate numbers of large stems, but are heavily congested in the understory by high densities of small stems.

In addition, another approximately 433 acres were classified as "marginal" goshawk nesting areas. These stands were often large and/or relatively diverse in vegetative structure. The majority of acres in these stands were too congested in the understory to provide suitable goshawk habitat, but they also contained small, isolated areas of acceptable nesting structure. Stands classified as "marginal" habitat were not counted toward currently suitable acres, and with the exception of approximately 73 acres, would not be affected by treatment.

Alternative 1

As discussed above, a number of capable stands are unsuitable either because they lack a mature overstory component, or they have a mature overstory component but have grown out of suitability because the understory is congested by a high density of smaller stems. As time passes, more stands will move away from suitability due to increasing understory congestion. Deteriorating stand health will result in large, uniformly-spaced stems being replaced by more numerous, densely-packed smaller stems. The high amount of ladder fuels in stands will prevent natural fire from clearing out this understory. Large snags will eventually disappear, trending these stands even further away from suitable goshawk nesting and foraging habitat. A large stand-replacing fire would remove the dense forests this species prefers, but small fire-produced openings may be

beneficial for foraging. Regardless of whether these stands suffer from stand-replacing fire or not, suitable goshawk nesting habitat will likely be lost over time.

Effects Common to Action Alternatives

Reynolds et al. (1992) advise maintaining Vegetation Structural Stage (VSS) proportions within goshawk home ranges of 10% each in VSS 1 & 2, and 20% each in VSS 3-6. Existing condition and projected changes of VSSs within capable goshawk habitat in the project area gives the results displayed in the following table (note these numbers are based on 12,950 capable *habitat* acres, rather than capable *nesting* acres discussed above). These results show that goshawk habitat is fairly well distributed across VSSs in the project area, but skewed toward VSS 4-6, and somewhat lacking in VSS 3. However, about 800 acres of sapling stands are over 20 years old, and will soon move into pole size classes if they have not already. This progression would result in a size class distribution in VSS 3 & 4 of about 10% each under both action alternatives. The proposed timber harvest would also remove acres from VSSs 4 & 5. This analysis assumes that any unit with proposed regeneration harvest reverts to VSS 1. Suggestions for VSS distribution are conservative in nature, and are only recommendations rather than requirements. Other resource concerns and/or past disturbances may make it impossible to reach recommended VSS distribution in a given area.

Table B.10 VSS percentages within the Myrtle HFRA Project Area

VSS	Size Class	Alternative 1		Alternative 2*		Alternative 5*	
		Acres	%	Acres	%	Acres	%
1	Open	710	5.5	1,552	12.0	915	7.1
2	Seed/Sapling	2,163	16.7	2,163	16.7	2,163	16.7
3	Immature/Pole	912	7.0	616	4.8	826	6.4
4	Immature/Medium	3,765	29.1	3,423	26.4	3716	28.7
5	Mature/Large	2,341	18.1	2,138	16.5	2271	17.5
6	Old Growth	3,055	23.6	3,055	23.6	3,055	23.6

*Numbers reflect post-treatment condition for action alternatives.

The historic goshawk territory in lower Snow Creek may have remained unoccupied due to the construction and subsequent use of a foot trail going down to Snow Creek Falls. The original nest is nearly ½ mile from the nearest proposed harvest unit, so even if this territory were reoccupied, it is unlikely that the nest or post-fledging family area would be altered or disturbed by project activities. In addition, design features built into the action alternatives would reduce the potential for disturbance of nesting goshawks or harvest in nest stands. Any documented territories in the vicinity of proposed harvest will be investigated for occupancy before treatment is allowed during the nesting season. All known or discovered nests will be buffered from harvest activities by a minimum 40-acre buffer, and mechanized activities will be restricted within ½ mile of active nests during the nesting period (March 15 – August 15).

Alternative 2

Direct and Indirect Effects

Approximately 1,442 acres of capable nesting habitat would be impacted by this proposal, including about 213 acres that are currently suitable. Treated areas are unlikely to retain sufficient overstory canopy cover to remain as suitable nesting habitat in the short term, and the desire to limit potential fuel loads in the area would probably prevent these stands from reaching suitable nesting condition in the long term as well. An additional approximately 73 acres of “marginal” habitat would also be treated in this proposal – about 16 acres by group selection and 57 acres of irregular shelterwood. The resulting post-harvest stands will also be unsuitable nesting habitat. However, timber harvest would make measurable reductions in fuel loading, thus reducing the possibility of stand-replacing fire in the future that may destroy adjacent suitable nesting habitat.

Reduction of 213 acres of suitable goshawk habitat would leave nine contiguous suitable nesting stands greater than 30 acres in size within the project area, although one of the remaining stands would be only about 33 acres and would not be within ½ mile

of any other currently suitable nest stand. Since there are approximately 13,000 acres of capable goshawk habitat in the project area, the post-treatment condition would still meet the Reynolds et al. (1992) recommendation of at least three suitable nest areas per 5,000-6,000 acre home range. However, suitable nest stands are not uniformly distributed across the project area, and this action would reduce goshawk nesting habitat in the southeastern portion of the project area to the 33-acre contiguous stand discussed above.

Nonetheless, goshawk habitat would be reduced in this area in order to enhance habitat for flammulated owls. Northern goshawks have proven to be somewhat flexible in their choice of nest stands on the District, occasionally utilizing stands with inferior structural conditions. Also, new goshawk territories are being discovered on the District nearly every year. In the last five years, at least seven new territories have been documented, four of which are known to have produced young in 2006 ("d7goshawk.xls" – project file). Conversely, flammulated owls are uncommon in the local area, with relatively small amounts of suitable habitat remaining (as discussed in "Affected Environment", above). This species is locally less abundant, has more specialized habitat needs, and prefers habitat conditions that compliment desired fuel concentrations in the project area. Therefore, it seems prudent to tilt the management of stands capable of providing habitat for either species in favor of flammulated owls – particularly in light of the evidence that these stands historically were maintained in an open-grown condition that more closely approximated flammulated owl habitat (see "Forest Vegetation", Chapter 3).

Alternative 5

Direct and Indirect Effects

About 690 acres of capable nesting habitat would be treated under Alternative 5, including group selection harvest on 113 suitable acres. An additional 16 acres of "marginal" nesting habitat would also be treated by group selection. The remaining treatment of currently unsuitable acres includes commercial thinning (~118 acres), group selection (~248 acres), shelterwood (~150 acres) and seedtree (~42 acres) harvests. Similar to Alternative 2, treated areas would likely be rendered unsuitable for goshawk nesting (due to insufficient canopy cover), and dry forest type stands would be managed for reduced fuel loading that would not allow them to reach suitable conditions in the future. However, 10 suitable nest areas >30 acres would remain after harvest, including two in the southeastern portion of the project area.

Cumulative Effects Common to Action Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for northern goshawk:

Past Activities and Events – In combination with past natural and human-caused events, the total effect of action alternatives would help restore natural processes by favoring tree species composition and structures that are consistent with historic vegetative patterns of dry site ecosystems. While some stands have lost or are losing sufficient forest structure to achieve habitat suitability, proposed actions would lead to long-term stability of habitat for northern goshawks by promoting and maintaining a more open forest structure. In general, sales that involved regeneration logging or overstory removal damaged goshawk habitat, while sales that involved salvage or thinning from below preserved or improved habitat. None of these activities would have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity may be disruptive to northern goshawks that may be nesting in the area, as they are particularly sensitive to disturbance during the courtship and nesting periods. However, since it would emanate from open roads, firewood gathering would only incrementally elevate disturbance above what motorized traffic would normally provide. It is unlikely that personal use firewood cutting would make habitat modifications that would substantially impact goshawks. Continued fire suppression has mixed effects on northern goshawks. While suppression efforts may protect currently suitable nest stands from stand-replacing fire, this activity has also contributed to the understory congestion of dry-site stands that has reduced suitable goshawk habitat in recent years. Various recreation activities and routine road maintenance are unlikely to impact northern goshawks, although off-road recreational use during the spring and early summer may disturb nesting goshawks to some degree.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on northern goshawks. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. Additionally, this thinning would improve species composition, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning actions would promote long-term stability of habitat conditions for northern goshawks. Future road decommissioning may have short-term impacts on goshawks through disturbance, but would

have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – The stands being harvested in the Big Mack timber sale are dominated by medium diameter subalpine fir. Goshawk use of this forest type has not been documented on the District. For purposes of habitat analysis, the approximately 142 acres affected by this sale were considered to be "open" for VSS calculations.

Grandmother Mountain Land Exchange – The majority of the property in the Myrtle Creek drainage to be acquired by the IPNF has been heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, there are few live trees or snags of any size on this property; and it is probably providing no habitat for goshawks. Over the next 40+ years, this area is likely to produce more mature forest habitat under USFS administration, since there would be less emphasis placed on resource (timber) extraction than if it were privately owned.

Activities on other ownerships – The USFS is currently aware of planned activity on private (FCP) lands within the analysis area that includes shelterwood harvest of approximately 120 acres in the vicinity of proposed units G1 and G2. However, additional timber harvest and road building activities may take place on these and other private ownerships within the project area. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion – Northern Goshawk

While goshawk nesting territories have not been recorded in the vicinity of the project area in recent years, sufficient habitat exists to support populations of this species. Despite the potential reduction of suitable nesting habitat under the action alternatives, the area would continue to provide an adequate number of potential nesting stands as recommended by Reynolds et al. (1992). No harvest operations would take place within a minimum 40-acre buffer surrounding known or discovered nests in order to protect the integrity of the nest stand structure, and a limited operating season (no harvest March 15 – August 15) would be applied to harvest units within ½ mile of stands in which evidence of territorial nesting goshawks is found during sale preparation, harvesting, or post-sale mechanized activities. Samson (2005) concluded that short-term viability of the goshawk in the Northern Region and IPNF is not an issue because:

- 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 on today's landscape.
- Level of timber harvest in the Northern Region is insignificant (in 2004, 8,581 ha of 9,045,255 ha or 0.0009%).

As a result, the proposed activity ***may impact* northern goshawks *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction 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 (USDA Forest Service 1987 p. II-28). In addition, the Myrtle HFRA project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

d. Fisher

Methodology

Fisher habitat was evaluated using a habitat suitability model derived from data in the Forest timber stand database (TSMRS). Modeling rules and assumptions can be found in the project file. The analysis is based on management guidelines from *Fisher Biology and Management in the Western United States* (Heinemeyer and Jones 1994) and *DRAFT, Forest Carnivores in Idaho* (IDF&G 1995). Although the guidelines make a distinction between "preferred" and "suitable" habitat, they are grouped together to assess habitat quality; and so were not separated for this analysis. IDF&G (1995) also makes minor distinctions between fisher and marten habitat, but *Martes* species were treated as a guild in this assessment. The percent of the area in mature/old forest structure (i.e. suitable habitat) is displayed and compared to the guidelines, and changes from the existing condition relative to guidelines for forest structure discussed.

Fisher and marten habitat is difficult to model because habitat requirements are not well understood and the timber stand database does not consistently characterize the amount of large woody debris these species require for denning and cover. It is possible that the model overestimates fisher habitat because there is incomplete data on snags or down logs. However, the analysis eliminates from suitable habitat any mature stands that have been thinned within the last 30 years (regeneration harvested stands would automatically be eliminated by the resulting size class descriptor); and mature, unlogged stands are probably providing sufficient dead and down material. Additionally, any confirmed old growth within capable fisher/marten habitat can be considered currently suitable, as these mature stands provide large amounts of standing and down material that these species prefer. Allocated moist-site old growth in capable fisher habitat comprised almost 6,200 acres, so the final suitable habitat estimate of 8,650 acres may be somewhat conservative. The analysis assumes that treated acres would no longer be suitable habitat, but a fisher's generalist diet implies that they will forage in nearly any type of forested habitat provided there is sufficient ground cover to attract prey.

Because of their preference for older stands with dense canopy cover and large snags (used for maternal dens), suitable fisher habitat closely mimics that required for other old-growth indicator species such as goshawk and pileated woodpecker. However, unlike goshawks, fishers prefer stands with congested understories for the cover these stands offer for hunting and avoiding predators. The potential effects on the fisher and its habitat were determined by predicting the change in habitat suitability that would result from each alternative.

Alternative 1

The no action alternative would preserve potential foraging habitat for fisher, and would bring some stands into suitable denning condition more rapidly than treatment would. However, with this comes the increased risk of stand-replacing wildfire, which would effectively remove most burned-over areas from suitable fisher denning habitat for many years. Because the canopy cover of the drier types is higher than it would be under a natural fire regime, fisher may tend to use these dry site stands more now than they would have historically. Not coincidentally, these stands are at higher risk of stand-replacing wildfire than historic, open grown dry-site stands would have been. In summary, while the no action alternative would provide better fisher habitat than the action alternatives in the near future, some of these acres may subsequently be converted to unsuitable condition through fire.

Alternative 2

Direct and Indirect Effects

Alternative 2 would treat approximately 1,007 acres of capable fisher denning habitat, only about 121 acres of which are currently suitable. Most (95 acres) of the suitable habitat proposed for treatment will be regenerated. This treatment likely represents a permanent loss of potential fisher denning habitat, since the management objective to prevent future fuel accumulations would not allow these stands to attain suitable denning condition. The loss of a relatively small amount of suitable habitat in the lower portion of the project area will be partially offset by reductions in fuel accumulations that may help protect adjacent riparian areas and suitable habitat further up in the drainage from wildfire.

The existing forest structure and projected distribution under the proposed action on NFS lands in the Myrtle HFRA wildlife analysis area, along with guidelines for forest structure by subdrainage, are displayed in the following table. The table includes information on the existing condition and projected effects of alternatives on forest structure of fisher/marten habitat in the Myrtle HFRA Project Area.

Table B.11 Effects on Forest Structure of Fisher/Marten Habitat

							Subdrainage Guidelines		
Forest Structure	**Existing Condition[1]**		**Alternative 2**		**Alternative 5**		**High Quality**	**Moderate Quality**	**Low Quality**
	acres	**%**	**acres**	**%**	**acres**	**%**			
Mature/sawt.	10,962	64	10,727	63	10,920	64	65-75%	≥40%	30-40%
Immature sawt.[2]	3,214	19	2,676	16	3,044	18	10-25%	na[3]	na
Pole/sapling	1,707	10	1,473	9	1,682	10	10-25%	na	na
Open/seed	1,223	7	2,230	13	1,460	9	na	na	na

[1]per cent of NFS capable habitat in the wildlife analysis area [2]includes multistory stands
[3]not applicable – no guidelines identified

The analysis uses the total capable acres on NFS lands in the project area as a "subdrainage", as this amount (17,106 acres) is within the Heinemeyer and Jones (1994) recommendation for subdrainage size (6,178-61,780 acres). Based on the amount of mature/sawtimber forest structure and old growth, the existing condition of the Myrtle HFRA wildlife analysis area narrowly falls short of the criteria for a high quality subdrainage. The proposed alternative would reduce mature forest content by about 1.4%. However, given the high proportion of immature sawtimber in the project area, it is likely that the amount of mature sawtimber would exceed 65% within the next 10-15 years.

In addition, standards outlined in the LCAS should benefit fisher as well as lynx by preserving potential denning habitat and snowshoe hare habitat. Also, INFS guidelines assure that riparian habitats important to fishers are preserved. This proposal represents impacts on about 5.8% of the capable fisher habitat in the project area, and only 1.4% of currently suitable habitat.

Alternative 5

Direct and Indirect Effects

Alternative 5 would only treat considerably fewer (<240) acres of capable fisher habitat than Alternative 2, since most of the acres common to both alternatives are dry site (not capable) forests. This alternative would only reduce mature forest content by less than 0.5%, but would reduce wildfire risk on fewer acres as well.

Cumulative Effects Common to All Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for fisher:

Past Activities and Events – Past logging activities, including salvaging of occasional stems, typically deteriorates fisher habitat by removing forest canopy, snags, and current and future dead and down material. While fisher may use previously harvested stands for foraging and occasionally denning, previously unharvested stands are preferred for the latter. Any of the past timber sales had the potential to cause declines in fisher habitat, but particularly the riparian area logging done prior to the 1950's. In combination with past natural and human-caused events, the proposed action would reduce the quantity of suitable fisher denning habitat. However, given the low density of fisher populations, it is unlikely that they are limited by denning habitat. None of these activities would have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonally and yearlong open roads. This activity has the potential to reduce snags within 50 meters of open roads. While there may be minor reductions in miles of open roads as a result of the action alternatives, this would not significantly reduce snag vulnerability to firewood gathering. Although it is unlikely to disrupt normal fisher use patterns, this activity could result in fisher habitat deterioration adjacent to open roads by removing large snags that represent future dead and down wood denning opportunities. Fire suppression activities are generally good for fisher habitat, as they protect denning habitat from stand-replacing fire and contribute to understory congestion in dry-site stands that provide cover for small mammals that fishers prey upon. As a result, continued fire suppression would partially offset the effects of this proposal. Various recreation activities and routine road maintenance are unlikely to impact fishers, although motorized over-snow can provide access for trappers who may inadvertently catch fishers.

Other Restoration Projects – It is unlikely that noxious weed treatments would have any impacts on fisher. Thinning young, small diameter trees and future underburning would be designed to increase the overall health and vigor of the stands. This is expected to produce lower densities of large diameter trees, potentially creating fisher denning habitat. However, this activity would generally be confined to drier forest types that fisher are less likely to utilize. Future road decommissioning may have short-term impacts on fisher through disturbance and temporary loss of a small amount of foraging habitat (brushing currently undriveable roads), but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential foraging habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – The Big Mack timber sale area is a moist forest (mixed conifer) type with a declining larch and white pine component. While there may be areas of suitable denning habitat in the planned harvest area, there is a limited number of large diameter trees that would provide the best den sites. Harvest will result in a short-term reduction of potential denning suitability, but would encourage growth of large diameter larch, white pine and Douglas-fir that should provide this habitat component in the future. For purposes of fisher/marten habitat analysis, the approximately 142 acres affected by this sale were considered to already be unsuitable, and the forest structure classified as "open/seedling."

Grandmother Mountain Land Exchange – The majority of the property in the Myrtle Creek drainage to be acquired by the IPNF has been heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, there are few live trees or snags of any size on this property; and it is probably providing no habitat for fishers. Over the next 40+ years, this area is

likely to produce more mature forest habitat under USFS administration, since there would be less emphasis placed on resource (timber) extraction than if it were privately owned.

Activities on other ownerships – The USFS is currently aware of planned activity on private (FCP) lands within the analysis area that includes shelterwood harvest of approximately 120 acres in the vicinity of proposed units G1 and G2. However, additional timber harvest and road building activities may take place on these and other private ownerships within the project area. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion -- Fisher

On the Bonners Ferry Ranger District, the amount of fisher denning habitat is comparable to the quantity available historically, as evidenced by comparison of the sum of mature/large and old growth forest size classes now versus historically (see "Forest Vegetation", Ch. 3). Despite a general direction on the IPNF to restore long-lived early seral species, there has also been an effort to preserve mature and old-growth stands, allow natural succession in riparian areas, and preserve and recruit large woody debris forest wide. While this management strategy may temporarily reduce fisher habitat at the local scale, habitat should improve for this species with time and should be maintained on a landscape scale. There will be no permanent increases in access with any of the alternatives, so there will be no decrease in security for fisher.

In addition, standards outlined in the LCAS will benefit fisher as well as lynx. These standards assist in protection of high quality denning habitat, and assure that there will be limits to the amount of forest conversion over a given decade, and that snowshoe hare habitat will be protected to supply high densities of this important prey species. INFISH guidelines and BMPs will assure that riparian habitats important to fishers will be preserved. Consequently, the proposed action ***may impact* fisher *or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species***.

Consistency with Forest Plan and Other Regulations

All action alternatives are consistent with the Forest Plan direction 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 (USDA Forest Service 1987 p. II-28). In addition, the Myrtle HFRA project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

B.1-H Management Indicator Species

a. Pileated Woodpecker

Methodology

Habitat management for pileated woodpeckers is based on direction in *Old-Growth Habitat and Associated Wildlife Species in the Northern Rocky Mountains* (USDA 1990) and is based on an analysis done for size class and old growth. The analysis methodology for determining potential effects on pileated woodpeckers involved mapping old growth and mature forest stands (i.e. suitable nesting habitat) in the wildlife analysis area and delineating hypothetical 1,000-acre home ranges around suitable nesting stands/groups of stands.

Based on relative habitat values and the acres of suitable nesting habitat a home range should have (USDA 1990), areas with at least 100 acres of contiguous mature/old forest habitat and an additional contiguous 100 acres of immature/sawtimber size tree habitat were identified as having sufficient suitable nesting habitat. Once home ranges with suitable nest stands were identified, the suitability of surrounding stands in the home range to provide adequate feeding habitat was evaluated. Within each home range at least 500 acres of sawtimber/mature sawtimber forest and/or immature sawtimber habitat is needed to provide adequate feeding habitat (USDA 1990). Project impacts on suitable habitat were then determined for each home range.

This analysis also addresses potential reduction of large snags, and trends toward mature forest structure. Direct and indirect effects reflect changes in habitat conditions that would result from implementation of the alternatives. As discussed in the Affected Environment section, snag habitat for nesting is considered more limiting than foraging habitat. Nesting habitat is dependent on the age and size of trees, which makes pileated woodpeckers a good indicator species for older, larger-diameter

trees and late-successional forests. Specific parameters analyzed for this assessment include the changes in distribution and quantity/quality of large snag habitat.

Alternative 1

There would be a continued shift in species composition toward more shade tolerant species in the majority of the stands. This change would trend stands toward a smaller size class and younger age class of trees. Consequently, snag production would shift away from the larger, longer-lived species, affecting the long-term stability and persistence of large snag habitat in the Myrtle Creek area. Habitat for species associated with large snags, such as the pileated woodpecker, would continue to decline. Although timber harvests over the last 20 years have begun to change the species composition toward long-lived seral tree species, the presence of large snags would continue to be relatively uncommon due to the overabundance of Douglas-fir and grand fir.

High fuel accumulations resulting from dead and dying trees would lead to a higher risk of stand-replacing fires. If a stand-replacing fire were to occur in the upper Myrtle Creek drainage, there would be little consequence to pileated habitat because there would only be loss of a small amount of currently suitable habitat. However, stand-replacing fire in the lower Snow Creek or unburned (in 2003) portions of lower Myrtle Creek would have greater impacts on this species, since these areas contain a higher percentage of currently suitable nesting habitat in the project area.

Alternative 2

Direct and Indirect Effects

The proposed action would treat approximately 595 acres of potential pileated woodpecker nesting habitat, 212 acres of which would be seedtree or shelterwood harvests and would lose suitable nesting structure. This represents potential short-term loss of about 4% of the potential nesting habitat in the project area. Foraging habitat would remain, to some extent, in nearly all treated areas. Timber harvest would generally focus on smaller diameter stems of shade tolerant species, while large diameter snags and snag recruitment trees – particularly ponderosa pine and larch – would be protected. Outside of proposed units, tree mortality in lower risk stands would continue to advance, producing higher quantities of smaller snags, but not quality snags required by pileated woodpeckers.

Analysis identified a total of nine hypothetical home ranges that were associated with potential nesting stands of >100 acres. Once home ranges with suitable nest stands were identified, the suitability of surrounding stands in the home range to provide adequate feeding habitat was evaluated. Each hypothetical home range currently contains at least 500 acres of sawtimber/mature sawtimber forest and/or immature sawtimber habitat to provide adequate feeding habitat. Impacts on suitable habitat were then determined for each homerange, again assuming that commercial thinning and group selection harvest would leave high enough average canopy cover across the stand to retain the previous size class, while seedtree and shelterwood harvest would convert a stand to the "open/seedling" stage.

The existing condition of the nine hypothetical homeranges, along with the projected effects of each action alternative, is shown in the following table. Under Alternatives 2 and 5, all of the home range areas would continue to provide adequate forest structure to support pileated nesting and feeding.

Table B.12 Existing condition and projected effects on hypothetical pileated woodpecker home ranges

Home range	Alternative	Size Class (Acres)			
		Mature/Sawt.	Imm. Sawt.	Pole/Sapling	Open/Seed.
HR 1 (1,012 ac.)	Alt. 1	739	32	193	48
	Alt. 2	739	32	193	48
	Alt. 5	739	32	193	48
HR 2 (1,053 ac.)	Alt. 1	624	51	318	60
	Alt. 2	624	51	318	60
	Alt. 5	624	51	318	60

To aid in reading this table, alternating Homerange information has been shaded, for instance HR1 is on clear lines, HR2 is on shaded lines, HR3 is on clear lines, and so on through the table.

Table B.12 continued – Existing condition and projected effects on hypothetical pileated woodpecker home ranges.

Home range	Alternative	Size Class (Acres)			
		Mature/Sawt.	Imm. Sawt.	Pole/Sapling	Open/Seed.
HR 3 (999 ac.)	Alt. 1	812	0	186	0
	Alt. 2	812	0	186	0
	Alt. 5	812	0	186	0
HR 4 (1,020 ac.)	Alt. 1	461	398	86	75
	Alt. 2	441	287	40	251
	Alt. 5	461	398	86	75
HR 5 (1,016 ac.)	Alt. 1	641	44	188	142
	Alt. 2	567	9	51	389
	Alt. 5	641	44	188	142
HR 6 (1,007 ac.)	Alt. 1	665	195	56	91
	Alt. 2	603	118	22	264
	Alt. 5	640	156	56	155
HR 7 (1,049 ac.)	Alt. 1	367	544	106	32
	Alt. 2	367	544	106	32
	Alt. 5	367	544	106	32
HR 8 (1,010 ac.)	Alt. 1	285	401	287	37
	Alt. 2	234	311	252	213
	Alt. 5	285	353	287	85
HR 9 (1,023 ac.)	Alt. 1	260	576	96	93
	Alt. 2	260	576	96	93
	Alt. 5	260	576	96	93

A reduction in snag densities over the short-term may impact nesting habitat; however, design features for snag retention (discussed in Chapter 2) would reduce these impacts. While some of the existing areas proposed for treatment currently may provide nesting (snags) and/or foraging habitat for pileated woodpeckers, the harvest prescriptions as designed would generally provide for long-term maintenance of seral species such as white pine, ponderosa pine, and western larch. Western larch and ponderosa pine stands with large-diameter snags are considered high-quality habitat for this species. Project implementation would improve pileated woodpecker nesting habitat within the project area in the long term by increasing high quality, large-diameter snags.

Design features of the project were devised to ensure the retention and selection of snags at a level and distribution to support viable populations of species which use snags. Snags and snag replacements would be retained where possible at levels recommended by the Region 1 Snag Management Protocol. The Snag Protocol recognizes that not all stands are able to meet snag guidelines, but that the overall goal is to provide adequate snag habitat over the landscape. Stands in the project area would continue to decline in health and vigor and would become increasingly crowded with immature trees, ultimately resulting in increased risk of severe wildfire that could remove mature forest stands utilized by pileated woodpeckers.

Treatment of dry sites to remove competing understory trees so that the stands obtain a more open condition may decrease the value of the stands to pileated woodpeckers. Pileated woodpeckers prefer dense stands with large snags. Currently, this is often the scenario in today's dry sites because the density has resulted from fewer understory burns, and the existing large snags resulted from earlier open stands with less competition. Thus, the existing condition of good habitat in dense dry sites is a temporary situation that would decline through stand-replacing wildfires, or death and falldown of the large snags. Removing competing understory would increase the number of large snags in the long term, but may reduce the density of the stand below that preferred by pileated woodpeckers.

Alternative 5

Direct and Indirect Effects

The proposed action would treat only about 70 acres of potential pileated woodpecker nesting habitat, less than 25 acres of which would be harvested using a seedtree or shelterwood prescription. Short-term vegetation changes would be relatively minor, and only one hypothetical home range (HR6) would be measurably altered. As a result, this alternative would do relatively little to reverse the continued shift in species composition toward more shade tolerant trees that is trending stands toward a smaller size class and younger age class of trees.

Cumulative Effects Common to All Alternatives

The following past, ongoing and reasonably foreseeable actions are considered relevant in a cumulative effects discussion for pileated woodpecker:

Past Activities and Events – Timber harvest on USFS lands in Myrtle and Snow creeks would have reduced snag densities in logged stands in nearly every instance, particularly prior to adoption of the Forest Plan in 1987 when standards for snag retention were adopted. The long-term impact of these activities was the reduction of snags of all sizes. In subsequent years, snag retention and snag recruitment (leaving higher densities of green trees for future snags) in harvested areas has improved through implementation of Forest Plan standards and, more recently, adoption of the Northern Region Snag Protocol (USDA 2000). In general, sales that involved regeneration logging or overstory removal damaged pileated woodpecker habitat, while sales that involved thinning from below preserved or improved habitat. While tree mortality in untreated stands has increased Forest-wide, the majority of affected trees are in smaller size classes. As a result, the ultimate legacy of historic logging in the project area is a decrease in *large*-diameter (>20" dbh) snags. However, these activities would not have cumulatively significant impacts when added to the proposed action, since the effects are already incorporated into the environmental baseline.

Current Management Activities – Firewood cutting is anticipated to continue along seasonal and yearlong open roads. Large snags within suitable nesting habitat, including potential nest trees, could be removed by personal use firewood cutters within 50 m of open roads. Because of this, it is generally assumed that these roadside areas do not provide sufficient habitat for snag dependent species. While personal use firewood cutting may locally reduce snag densities, on a landscape scale this amounts to only a small portion of the District land base. Personal use firewood cutting along open roads is unlikely to cause conspicuous changes in structure of affected stands. Various recreation activities and routine road maintenance are unlikely to have any impacts on pileated woodpeckers.

Other Restoration Projects – Thinning young, small diameter trees would be designed to increase the overall health and vigor of the stands. Additionally, thinning and underburning would improve species composition and structure, resulting in stands that are more ecologically stable in the face of potential disturbances. Consequently, thinning and underburning actions would help promote long-term stability of habitat conditions for pileated woodpeckers. It is unlikely that noxious weed treatments would have any impacts on this species. Future road decommissioning may have short-term impacts on pileated woodpecker through disturbance, but would have long-term benefits by reducing human access/disturbance (decommissioning of currently drivable roads) and increasing potential habitat acres (revegetation of previously cleared roadbeds).

Currently active USFS timber sales – The stands being harvested in the Big Mack timber sale are dominated by medium diameter subalpine fir that are not likely relied upon for nesting. Treatment will open up the stands enough to allow for the restoration of white pine and larch as significant components of the stand, enhancing nesting habitat over time. In addition, this project incorporates design features that maintain minimum numbers of snags within harvest units and promote retention of large, long-lived snags. For purposes of pileated woodpecker habitat analysis, the approximately 142 acres affected by this sale were considered to already be unsuitable (HR5), and the forest structure classified as "open/seedling."

Grandmother Mountain Land Exchange – The majority of the property in the Myrtle Creek drainage to be acquired by the IPNF has been heavily impacted by the Myrtle Fire and subsequently salvage logged. As a result, there are few live trees or snags of any size on this property; and it is probably providing no nesting, and limited foraging, habitat for pileated woodpeckers. Over the next 40+ years, this area is likely to produce more mature forest habitat under USFS administration, since there would be less emphasis placed on resource (timber) extraction than if it were privately owned.

Activities on other ownerships – The USFS is currently aware of planned activity on private (FCP) lands within the analysis area that includes shelterwood harvest of approximately 120 acres in the vicinity of proposed units G1 and G2. However, additional timber harvest and road building activities may take place on these and other private ownerships within the project area. As discussed in the introduction to cumulative effects analysis, other ownerships cannot be relied upon for long-term habitat contributions because they are highly susceptible to adverse modifications (e.g. rural developments, forest land

conversions) and irretrievable alterations. Due to the uncertainty of management actions and lack of detailed habitat data on these ownerships, the USFS assumes no contribution of suitable habitat for sensitive species/MIS from adjacent property.

Conclusion – Pileated Woodpecker

The proposed project incorporates design features that maintain minimum numbers of snags within the harvest units. In addition to this, there are numerous snags being created outside of the proposed units that would not be treated. Fuel reduction in the form of removal of some dying trees may be favorable in the long term to this species because of the reduction of fire risk. Although this project and the others proposed for the Idaho Panhandle National Forests would make only a small decrease in fuel loading, it is an incremental effect that cumulatively over time should assist in reducing the risk of stand-replacing fires. For pileated woodpeckers, stand-replacing fires are a negative impact because they reduce the canopy even though they also create large numbers of snags. Treatment would trend stands toward a larger size classes and older age classes of trees. No treatments are proposed that would reduce old growth structure or integrity. Samson (2005) concluded that short-term viability of the pileated woodpecker in the Northern Region and on the IPNF is not an issue because:

- 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 (in 2004, 8,581 ha of 9,045,255 ha or 0.0009%).

Consequently, the proposed action may cause temporary reductions in **pileated woodpecker** nesting habitat at a local level, but would not likely indicate a local or regional change in habitat quality or population status.

<u>Consistency with Forest Plan and Other Regulations</u>

All proposed alternatives are intended to meet or exceed Forest Plan goals and objectives for managing snag habitat (USDA 1987, Appendix X). While some tree cutting would occur within designated old growth in the Myrtle HFRA analysis area, this would be limited to improvement of dry-site old growth; other designated old growth would continue to be managed for old-growth characteristics. The Myrtle HFRA project is consistent with Forest Plan direction for old-growth habitat management (see "Old Growth", Ch. 4).

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B.2 - Fisheries Resource

B.2-A Affected Environment and Existing Condition

This section describes the current condition of the fisheries resource and the elements that could be affected by the alternatives, if one of them were implemented. Section A.3-B describes the potential effects of the Proposed Action (Alternative 2), Alternative 5, and Alternative 1 (No Action) which would defer all proposed management activities.

B.2-A.1 Regulatory Framework

The principle regulatory direction applicable to the management of fisheries resources on the Idaho Panhandle National Forests (IPNF) includes:

- The Endangered Species Act of 1973 (ESA), as amended
- National Forest Management Act of 1976 (NFMA)
- Idaho Panhandle National Forests Forest Plan (USDA 1987)
- Rules Pertaining to the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code, 2000)
- Executive Order 12962 of June 7, 1995 (Recreational Fishing)
- State of Idaho Governor's Bull Trout Plan
- Clean Water Act and Idaho State Water Quality Standards

The **Endangered Species Act** of 1973 (ESA) Section 7 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.

The **National Forest Management Act** of 1976 (NFMA) 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 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) amended certain Forest Plan direction regarding stream and fish habitat protection measures.

Idaho Forest Practices Act – The Forest Service has agreements with the State to implement Best Management Practices or Soil and Water Conservation Practices for all management activities. Proposed activities would be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22), which outlines Best Management Practices that meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

Executive Order 12962 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 **Governor's Bull Trout Plan**'s mission is to "…maintain and or restore complex interacting groups of bull trout populations throughout their native range in Idaho" (State of Idaho, 1996). Through a process involving state and federal agencies, interested groups and individuals (i.e., Basin Advisory Groups, Watershed Advisory Groups, Technical Advisory Teams), a Draft Problem Assessment was prepared (Panhandle Bull Trout Technical Advisory Team; PBTTAT 1998) for the Kootenai River Basin.

The **Clean Water Act** stipulates that states are to adopt water quality standards. Included in these standards are provisions for identifying beneficial uses, establishing the statues of beneficial uses, setting water quality criteria, and establishing BMPs to control non-point sources of pollution.

Under the Idaho Water Quality Standards, designated beneficial uses for Myrtle Creek, Snow Creek and Deep Creek relevant to the fisheries resource are cold water communities and salmonid spawning. Tributaries of Myrtle Creek, Snow Creek, and Deep Creek within the project area do not have designated beneficial uses, but do support existing beneficial uses, which are therefore protected under the water quality standards.

Portions of Myrtle Creek and Snow Creek are considered to not be fully supporting cold water aquatic life use or salmonid spawning due to thermal modifications. Portions of Deep Creek are considered to not be fully supporting cold water aquatic life use or salmonid spawning due to thermal modifications, siltation and suspended solids. Due to these designations, the direction is to have no net increase in sediment or temperature due to management activities in the Myrtle Creek, Snow Creek or Deep Creek watersheds (see Appendix D more detailed information).

B.2-B Analysis Methods

B.2-B.1 Cumulative Effects Analysis Area

The appropriate scale or geographic bounds for a cumulative effects analysis relates to an area that would be affected by the proposed action or reasonable alternatives. This area is referred to as the cumulative effects analysis area and may vary between resources. The task of selecting the geographical boundaries involved several factors, including the scope of the project considered, the features of the land, species' distribution and range in relation to available habitat and points of diminishing effects.

For species analyzed in detail, the cumulative effects analysis area encompasses the Myrtle Creek and Snow Creek drainages, and a small portion of the Deep Creek drainage and totals approximately 40,365 acres and covers all or part of 26 sub-watersheds (see Map Appendix, Aquatics Map 2). The boundaries of the cumulative effects analysis area are drawn along natural topographic features and are largely comprised of watershed delineations. Approximately 10,682 acres (26 percent) of the cumulative effects area is on private lands or other governmental agency lands outside of the IPNF Administrative Boundary. All streams within the project area flow onto private land or are tributaries of streams that flow onto private land. (See Chapter 3 Watershed Hydrology for further information concerning land ownership and Figure 1.1 – Vicinity Map, for land ownership patterns.)

a. Effects Analysis

Surveys were conducted, where relevant and applicable, to determine presence of fish. However, presence surveys do not necessarily determine absence of a species. Therefore, a more meaningful and creditable approach in conducting an analysis is to assume presence based on the attributes of a particular stream, using survey information to help validate suitability of streams. In some cases, surveys can identify key habitats (e.g. spawning sites) that can be further protected through mitigation measures.

b. Methodology

Information was gathered from district fish and hydrology files, historical records, aerial photographs and published scientific literature. Also, information from the Idaho Department of Fish and Game (IDFG) and U. S. Fish and Wildlife Service (USFWS) provided electrofishing and stocking data, as well as additional knowledge of the fisheries resources in the Kootenai River Basin.

Additional information for the fisheries analysis was compiled from the Lower Kootenai River Geographic Assessment (USDA draft in progress) and the Kootenai River Bull Trout Problem Assessment (Panhandle Bull Trout Technical Advisory Team – PBTTAT, 1998 working draft).

Roads and streams within the project area were surveyed or field reviewed in 2001, 2004 and 2005. Fish presence and general habitat surveys within the project area were conducted in Myrtle Creek, Mack Creek, Adverse Creek, Cooks Creek and Snow Creek (Project File - Fisheries). Additional stream information from past surveys was reviewed to verify general stream channel types, cross sectional profiles, woody debris composition and stream temperatures.

Several field reviews of the project area and project area streams were conducted in 2004, 2005 and 2006 by North Zone fisheries biologist and technicians, along with the hydrologist, soil scientist, project silviculturist and project leader at times, to assess the current habitat conditions and to identify possible fisheries issues. In July 2006, a field trip was taken with several members of the project interdisciplinary team and a representative of the Idaho Department of Environmental Quality (DEQ) to assess portions of the project area and discuss the possibility of limited treatments within the ephemeral draws of a few units in the Snow Creek drainage.

B.1-A.2 Species Screen

The Council on Environmental Quality (40 CFR 1502.2) directs that impacts be discussed in proportion to their significance. Some fish species require a detailed analysis/discussion to determine effects of an action on them. Other fish species may not be impacted or impacted at a level that does not increase risk to the species. Some species may be adequately protected through features of the project design. Generally, these species do not require a detailed discussion and analysis.

The appropriate methodology and level of analysis needed to determine potential effects are influenced by a number of variables including presence of a species or its habitat, the scope and nature of the activities associated with the proposed action and alternatives, and the risk to factors that could ultimately result in a meaningful adverse or favorable effect.

The screening process includes the review and use of the following documents and uses a variety of information including scientific literature, resource inventories and sighting records:

- Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin
- Idaho Panhandle National Forest Land and Resource Management Plan

- Conservation Assessments and Strategies for fish species

c. Species Not Analyzed in Detail

A preliminary analysis was conducted for each potentially affected fish species and their habitat to determine the scope of analysis. The species listed in the following table would not likely be affected by the proposed activities because:

- they do not have suitable habitat,
- they are not regularly present,
- they are not expected to be in streams within the project area, or
- the species would not be impacted,
- they are impacted, but at a level that does not pose a risk to the species, or
- the potential impacts would be adequately mitigated by features of the project design.

For these reasons, the species listed in the following table were not analyzed in detail. Preliminary analysis information is located in the Fisheries section of the project file.

Table B.13 Fisheries Species Not Analyzed In Detail

Species	Rationale for Elimination from Detailed Analysis	Preferred Habitat
Threatened and Endangered Species		
Kootenai River White Sturgeon (*Acipenser transmontanus*)	No suitable habitat is present within the project area. The project area is outside recognized sturgeon habitat.	Large lakes and rivers. In Idaho, found only in the Kootenai River system.
Sensitive Species		
Burbot *(Lota lota)*	Historically present, but are not currently occupying habitat within the cumulative effects area.	Large lakes and rivers. In Idaho, found only in the Kootenai River system.
Interior Redband Trout *(Oncorhynchus mykiss gairdneri)*	Only hybridized individuals possibly present within analysis area. Effects to this species and its habitat will be analyzed using westslope cutthroat and bull trout as MIS species.	Cool, clean, relatively low gradient streams. On the IPNF, pure interior redband trout are found only in isolated tributaries of the Kootenai River outside of the cumulative effects analysis area.

d. Species Analyzed in Detail

This section describes the status and distribution of fish species analyzed in detail that have been identified as species of concern within the project area and could potentially be affected by proposed activities. It also describes the environmental baseline and relevant habitat components that may or may not be affected by the alternatives, if they were to be implemented. Information presented in this section is based on scientific literature, fisheries databases, professional judgment and recent field surveys (see Fisheries section of the project file).

Table B.14 Fisheries Species Analyzed Detail.

Species	Rationale for Detailed Analysis	Preferred Habitat
Threatened and Endangered Species		
Bull Trout (*Salvelinus confluentus*)	Suitable habitat is very limited, but present within the project area.	Cold, clear streams with gravel/cobble substrate for spawning and lots of deep pools
Sensitive Species		
Westslope Cutthroat Trout *(Oncorhynchus clarki lewisi)*	Suitable habitat is present within the project area.	Cold, clear streams with rocky, silt-free riffles for spawning and deep pools for feeding and resting

Threatened and Endangered Species

Bull Trout

Bull trout, listed under the Endangered Species Act as a threatened species, are known to reside in the Kootenai River Basin, which includes Myrtle Creek, Snow Creek and Deep Creek watersheds. All three bull trout life history forms (resident, fluvial, adfluvial) are present in the Kootenai River Basin (PBTTAT - Panhandle Bull Trout Technical Advisory Team, 1998 working draft). Myrtle Creek, Snow Creek and Deep Creek are the only streams within the cumulative effects analysis area with documented bull trout use. However, all three streams provide only limited opportunities for bull trout spawning due to migration barriers and incompatible habitat conditions (what are the conditions? Natural or management influenced?). No known bull trout populations exist, either historic or current, in the tributary watersheds of Myrtle Creek and Snow Creek above the falls. No other streams within the analysis area are known to support bull trout.

Habitat Requirements

Bull trout appear to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Habitat characteristics including water temperature, stream size, substrate composition, cover and hydraulic complexity have been associated with distribution and abundance (Jakober 1995, Rieman and McIntyre 1993, Pratt 1985). In streams, all life stages of bull trout are associated with some form of cover such as large woody debris, undercut banks, boulders or pools (Fraley and Shepard 1989, Hoelscher and Bjornn 1989, Thomas 1992).

Bull trout spawn in the fall and their preferred spawning habitat generally consists of lower gradient stream reaches with loose, clean gravel (Fraley and Shepard 1989). However, if the substrate and habitat attributes are suitable, spawning can occur in steeper reaches.

Stream channel equilibrium (stability) is the balance between sediment yield, water yield, and channel morphology that exists within a stream system. Studies indicate that shifts away from channel equilibrium can result in negative changes in the structure and function of stream ecosystems (Bilby and Likens 1980, Schlosser 1982, Fraley and Shepard 1989) and their dependent fish populations. Bisson and Sedell (1982) reported that where stream channels became destabilized, riffles elongate and in many cases extended through former pool locations resulting in loss of pool volume. They suggested that declines in larger, adult bull trout might be the result of their dependency upon deeper water habitats. Maintaining lateral and instream habitat complexity, in association with channel stability, can best provide persistence of bull trout over time (Karr and Freemark 1983, Karr and Dudley 1981, Gorman and Karr 1978).

Stream temperature (below 15 degrees Celsius (Goetz, 1989) approximately 59 degrees Fahrenheit) and substrate composition are important characteristics of suitable bull trout habitats. Bull trout have repeatedly been associated with the coldest stream reach within basins. The lower limits of many strong bull trout distributions mapped by Lee, et.al. (1997) c orrespond to a mean annual air temperature of about 4 degrees Celsius (ranging from 3 to 6 degrees Celsius (approximately 37 to 43 degrees Fahrenheit)) and should equate to ground water temperatures of about 5 to 10 degrees Celsius (approximately 41 to 50 degrees Fahrenheit) Meisner, 1990. Water temperature can be strongly influenced by land management activities (Henjum, et.al. 1994).

Vegetation can strongly influence the habitat conditions of bull trout streams. Canopy cover adjacent to streams provides shade and helps to maintain cooler water temperatures during the summer months. During the winter, conifers can also reduce the risk of freezing and the formation of anchor ice by providing insulation (PBTTAT, 1998). Large trees that fall into the stream channel can benefit habitat conditions by creating pools, providing cover and shade, introducing nutrients, contributing to channel stability and dissipating stream energy (Murphy and Meehan 1991).

Risks to Bull Trout Populations and Habitat

Bull trout are vulnerable to human-induced factors that increase water temperature and sediment loads, change flow regimes, block migration routes, and establish non-native trout, particularly brook trout (Behnke 2002).

Resident forms of bull trout appear to be absent in the cumulative effects area and fluvial forms are perilously low, although habitat connectivity remains available in the lower portions of Myrtle Creek, Snow Creek and Deep Creek. However, levee construction and channelization of the lower portions of Myrtle Creek for Kootenai National Wildlife Refuge purposes has altered stream dynamics such as bed load movement and sediment depositional areas, which has negatively impacted potential spawning and rearing habitat. Also, bull trout habitat in the valley reaches are influenced by Kootenai River level and temperature fluctuations.

Several obstacles toward the re-establishment of a healthy bull trout population in the cumulative effects area exist, including:

- the presence of eastern brook trout throughout the system, which have the potential to out-compete bull trout for limited rearing and spawning habitat and food,
- the perilously low population of bull trout in the Kootenai River,
- natural migration barriers render the majority of the cumulative effects area inaccessible to bull trout, and
- the impacts of roads, past logging, farming, stream channelization and other past disturbances which have increased the sand load in the lower portions of the creeks, covering riffle areas and filling pools which historically supported adult bull trout.

Sensitive Species

Westslope Cutthroat

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 2000 the U.S. Fish and Wildlife Service (USFWS) determined that westslope cutthroat trout did not warrant listing as a threatened species (USDI 2000). In 2003, the USFWS reconsidered the listing of westslope cutthroat trout and again determined that their listing was not warranted (USDI 2003).

A population status review of westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined (Shepard et al 2002). However they currently occupy over 18,000 stream miles in Idaho, which is approximately 95 percent of their historical distribution (Shepard et al 2002). Reiman and Apperson (1989) also concluded that populations of westslope cutthroat trout in northern Idaho have declined, but they estimated that there were viable populations existing in only approximately 36 percent of their historical Idaho range. Shepard et al (2002) concluded that the discrepancy between the two assessments is likely due to differences in the mapping scales used, the response of some westslope cutthroat trout populations to protective measures, the inclusion of new information and earlier assessments were made during drought conditions without the benefit of long term data.

Westslope cutthroat trout have been documented in Snow Creek during snorkeling and electrofishing surveys (Project File – Fisheries). In 2004, a cutthroat trout was identified in Myrtle Creek, but due to the stocking of unknown variations of cutthroat trout in Myrtle Creek by the Idaho Department of Fish and Game in 1974, it could not be determined if the species documented was a westslope cutthroat trout or a remnant of the stocking. In addition, unknown variations of cutthroat trout were stocked in Snow Lake (origin of Snow Creek) in the late 1960s and throughout the 1970s by Idaho Department of Fish and Game. From the early 1980s through 2004, westslope cutthroat trout were stocked in Snow Lake.

Habitat Requirements

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

Resident life history strategies of westslope cutthroat trout are currently present in watersheds within the project area. Resident populations remain in river tributaries throughout their life. Certain life histories (e.g. fluvial and adfluvial fish) use river tributaries for early rearing and spring spawning as adults, but typically migrate to river or lake habitat as they mature. In the fall, fish that have not previously returned to river and lake areas migrate to deeper water where they congregate and over-winter (Bjornn 1975).

Westslope cutthroat trout exhibiting the fluvial and adfluvial life strategies are not present within the cumulative effects area due to natural migration barriers and the limited amount of suitable habitat below the barriers.

Risks to Westslope Cutthroat Populations and Habitat

The primary cause of the decline in westslope cutthroat was found to be habitat loss and degradation (Rieman and Apperson 1989). Competition, predation by non-native species, genetic introgression• and over-fishing have also contributed to the decline of westslope cutthroat trout populations (McIntyre and Rieman 1995).

Westslope cutthroat trout have been negatively affected by the presence of introduced eastern brook trout. Brook trout out-compete westslope cutthroat trout in areas where habitat is degraded (Behnke 1992). In 1961, eastern brook trout were

• Introgression – the introduction of genes from one population or species into another through interbreeding or hybridization.

introduced into Cooks Lake, which is the origin of the Cooks Creek tributary to Myrtle Creek. This timeframe corresponds with a period of high levels of management in the drainage. The associated habitat degradation may have accelerated the decline of potential westslope cutthroat trout populations in the Myrtle watershed. In Snow Creek and Myrtle Creek, the distribution of westslope cutthroat trout and an unknown cutthroat trout variety, respectively, overlaps with eastern brook trout and cutthroat trout may be out-competed in the portions of the stream where habitat degradation has occurred.

Consequently, within the cumulative effects area, Myrtle Creek and Snow Creek are likely the most important streams to species persistence for westslope cutthroat trout. In addition to these streams, the connectivity between stream habitat and Kootenai River habitat is extremely important to westslope cutthroat trout exhibiting a fluvial life history. However, Myrtle Creek and Snow Creek both have waterfall migration barriers that limit connectivity.

B.2-B.2 Existing Habitat Conditions

Natural events and processes (e.g. wildfires, floods), as well as human activities (e.g. logging, road building), have influenced the environmental conditions within the cumulative effects analysis area. Effects of natural disturbances have interacted with other land changing processes to form the basic character of watersheds and the dependent stream resources. Due to the variability in location, frequency, intensity and ultimately, the effects of natural processes on the physical environment, dynamic landscapes with diverse conditions are formed at various spatial scales. Biological communities, including native fish populations, led to the development of functional ecosystems that are inherently resilient to effects from natural disturbance regimes representing pulse-type disturbances, such as periodic fire (Reeves et al. 1995). Pulse disturbances influence the natural range of environmental conditions that are expected for ecosystems functioning at broad geographic scales, but typically allow systems to begin recovering to pre-disturbance conditions relatively soon after the disturbance.

Natural disturbance regimes (e.g. flood, wildfire, etc) and their associated properties (e.g. sedimentation rates and other influences on aquatic habitat) have been altered in the cumulative effects area by human activity. Land use activities that have modified natural disturbance characteristics include, but are not limited to roads, logging, fire suppression and stream modifications (constriction, diversions, culverts, etc.). Many of these human influences are considered press-type disturbances that continue to affect the condition and trend of fisheries resources long after the initial disturbance. Press disturbance differs from pulse disturbance in several aspects, but generally press disturbance is persistent in ecosystems and impairs the ability for ecosystems to recover to pre-disturbance conditions (Reeves et al. 1995). Within the cumulative effects area, the recovery process from pulse disturbances has been hindered to some degree by the presence of various press disturbances.

The cumulative effects analysis area for this project has primarily been affected by fires (natural disturbances), as well as logging and road construction (human activity). The disturbance history has played a large role in determining habitat conditions in fish-bearing streams. Within the analysis area, only streams that are known or presumed to be fish bearing streams will be discussed in detail.

More information concerning the existing condition of the watershed hydrology and how it has been influenced by past natural events and past management activities can be found in Chapter 3 – Watershed Hydrology and Appendix D.

a. Myrtle Creek (Tributary of Kootenai River)

Myrtle Creek is a low to high gradient stream that flows into the Kootenai River approximately seven miles to the northwest of the City of Bonners Ferry. Within the project area, Myrtle Creek can primarily be categorized as a Rosgen stream type “B” with sections of stream type “A” in the headwaters, and stream type “C” in the middle portions of the watershed. During habitat surveys, substantial amounts of large woody debris, along with ample amounts of pools were noted. Abundant riparian vegetation throughout the watershed was also noted. Past timber harvest and road building in portions of Myrtle Creek have altered its natural hydrological regime (see Chapter 3 – Watershed Hydrology). Two segments of Myrtle Creek are currently considered by DEQ to not be fully supporting cold water aquatic life or salmonid spawning due to thermal modifications (see Appendix D for more information regarding DEQ determinations).

Although the entire Myrtle Creek watershed is within the cumulative effects area, only approximately the lower half of the stream would be potentially affected by the action alternatives due to the location of project activities. A series of steep cascade/falls and a large barrier falls, approximately 120 feet high and 300 to 500 feet in length are located a little over two miles upstream from Myrtle Creek’s confluence with the Kootenai River. In 2003, a human-caused fire burned portions of the Myrtle Creek drainage above the barrier falls and below the headwaters area.

From the falls upstream through the 2003 fire perimeter, Myrtle Creek is a medium to high gradient, bedrock-controlled channel. This type of channel tends to transport material downstream to lower gradient “response” channels, where it tends to settle out. The response reach in Myrtle Creek is below the falls on the Kootenai River Wildlife Refuge. The lowest approximately 1.6 miles have been diverted and diked, and have a sand-silt substrate. The next half of a mile of stream below the falls has a rubble-boulder substrate with small pockets of gravel.

Overall, the vegetation throughout the Myrtle Creek riparian area did not burn with a high enough fire severity to kill alder, brush and/or trees during the 2003 fire, although surveys did indicate a somewhat lower canopy closure in some portions of the riparian area that burned. The rest of the Myrtle Creek riparian area within the burned area boundary either did not burn at all or burned as a light severity, mosaic underburn. No other fish bearing streams were directly affected by the 2003 fire. Yellow Pine Creek (non-fish bearing) and several ephemeral draws were burned extensively with the loss of almost all of the understory vegetation and most trees within the riparian area. However, ground cover vegetation has rebounded considerably since the fire. Based on this, it is unlikely any direct effects to fisheries resulted from the 2003 fire.

The largest impact to fisheries from the 2003 fire was the delivery of large amounts of sediment to the low gradient response reach of Myrtle Creek below the falls on the Kootenai River Wildlife Refuge, particularly surrounding a rain event in July 2004. This is the reach inhabited by bull trout. Much of this reach has sand/silt substrate as a result of channelization and other past disturbances. The potential for debris torrents and erosional processes within the burned portion of the watershed increases the risk of bull trout habitat degradation in the lower reaches of Myrtle Creek by covering spawning gravels; filling pools, interstitial spaces and other rearing habitat: and decreasing food availability by suppressing aquatic macroinvertebrates.

Myrtle Creek also has documented use by an unknown variation of cutthroat trout, burbot (sensitive species), rainbow trout, eastern brook trout, kokanee, torrent sculpin, slimy sculpin, longnose dace and mountain whitefish. Although burbot historically utilized Myrtle Creek below the falls for winter spawning, the increase in Kootenai River? winter water flow and velocities as a result of the construction of the Libby Dam have substantially reduced the burbot population and they have not been documented in Myrtle Creek in recent decades. In the 1974, the Idaho Department of Fish and Game stocked Myrtle Creek with an unknown variation of cutthroat trout.

b. Deep Creek (Tributary of Kootenai River)

Deep Creek is a low gradient stream that flows into the Kootenai River approximately 3.5 miles to the west of the City of Bonners Ferry. Deep Creek, along with its tributaries, drains the south end of the Kootenai Valley. It runs through sand-alluvial solids, which were part of the historical lakebed of Kootenay Lake. Deep Creek has been heavily impacted by logging, farming, fire, stream channelization, roads and pipeline constructions (PBTTAT 1998). The increased stream loads of sand have covered riffle areas and filled pools which historically supported adult fish. Six segments of Deep Creek are currently considered by DEQ to not be fully supporting cold water aquatic life or salmonid spawning due to thermal modifications, siltation and suspended solids (see Appendix D for more information regarding DEQ determinations).

The portion of Deep Creek between Caribou Creek and the confluence of Deep Creek and the Kootenai River (approximately 20% of the drainage) is the only portion of the stream within the cumulative effects area of this project (See Map Appendix – Aquatics Map 2). This lower portion is not considered to contain suitable salmonid spawning habitat (PBTTAT[7] 1998). Although it is likely some salmonid spawning occurs in Deep Creek, most of the trout production occurs in its tributaries.

Deep Creek has documented use by bull trout (threatened species), westslope cutthroat trout (sensitive species), burbot (sensitive species) and interior redband trout (sensitive species), as well as rainbow trout, eastern brook trout, torrent sculpin, slimy sculpin, black bullhead, pumpkinseed, yellow perch, lake chub, redside shiner, northern pikeminnow, longnose sucker, largescale sucker, peamouth chub, longnose dace and mountain whitefish. Although burbot historically utilized Deep Creek during winter spawning runs, the increase in winter water flow and velocities as a result of the construction of the Libby Dam in the early 1970s has substantially reduced the burbot population and they have not been documented in Deep Creek in recent decades. For interior redband trout, only individuals hybridized with coastal rainbow trout or cutthroat trout are present in the Deep Creek drainage (Kootenai Tribe of Idaho (KTOI) and Montana Fish, Wildlife and Parks (MFWP) 2004). In the 1960s, 70s and 80s, the Idaho Department of Fish and Game stocked Deep Creek with brook, cutthroat and rainbow trout. (Fisheries Project Files)

c. Snow Creek (Tributary of Deep Creek)

Snow Creek is a low to high gradient stream that flows into Deep Creek approximately four miles upstream from its confluence with the Kootenai River. Within the project area, Snow Creek can primarily be categorized as a Rosgen stream type “B” with sections of stream type “A” in the headwaters, and stream type “C” in the middle portions of the watershed. Although the entire Snow Creek watershed is within the cumulative effects area, only approximately the lower half of the stream would be potentially affected by the action alternatives due to the location of project activities. Two segments of Snow Creek are currently considered by DEQ to not be fully supporting cold water aquatic life or salmonid spawning due to thermal modifications (see Appendix D for a more information regarding DEQ determinations).

Past logging and road building have led to habitat degradation in Snow Creek and have altered its natural hydrological regime (see Chapter 3 – Hydrology). Sediment levels are excessive and pool filling is occurring in all pool types. Fish migration into the Snow Creek drainage is blocked by a barrier falls approximately 0.5 miles from its confluence with Deep Creek. Approximately the lowest quarter of a mile of Snow Creek contains a good gravel substrate and should provide spawning

habitat except in years when the Kootenai River water levels are high enough to back water up and reduce flows. The remaining portion of the stream below the falls contains a boulder-rubble substrate with a few pockets of gravel.

Bull trout have been documented in the past in Snow Creek below the barrier falls. Snow Creek also has documented use by westslope cutthroat trout (sensitive species), burbot (sensitive species), rainbow trout, eastern brook trout, torrent sculpin, slimy sculpin, longnose dace and mountain whitefish. Although burbot historically utilized Snow Creek below the falls for winter spawning, the increase in Kootenai River? winter water flow and velocities as a result of the construction of the Libby Dam have substantially reduced the burbot population and they have not been documented in Snow Creek in recent decades. Starting in the late 1960s through 1981, the Idaho Department of Fish and Game stocked Snow Lake, the origin of Snow Creek, with unspecified cutthroat trout. Starting in 1981 through as recently as 2004, Snow Lake was stocked with westslope cutthroat trout.

Direct environmental effects are those occurring at the same time and place as an activity.
Indirect effects are those that occur later in time or are spatially removed from the activity.
Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of the source. Cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time.

Past actions contribute to the baseline conditions that provide a foundation for the analysis (e.g. previous timber harvesting, road building, and fire suppression actions since the early 1900s). Past activities (such as timber harvest) and natural processes (such as vegetative succession and floods) are described in the Affected Environment section and provide baseline conditions for stream habitats.

A list of the past, ongoing and reasonably foreseeable actions that could contribute to the cumulative effects for the species being analyzed are identified in Chapter 1.

d. Peak, Jim and Cooks Creeks (Tributaries of Myrtle Creek)

These streams are tributaries to Myrtle Creek within the project area, but are located upstream from all proposed activities and therefore would not be affected by the implementation of any of the alternatives. Cooks and Peak Creeks can primarily be categorized as Rosgen stream type "B" streams, while Jim Creek generally represents a Rosgen stream type "A". All three creeks are currently considered by DEQ to have thermal modifications, but their beneficial uses have not been assessed (see Appendix D for a more information regarding DEQ determinations).

These streams are the only tributaries in the Myrtle Creek watershed known to support fisheries. However, although native species were likely present historically, the only fish species known to currently occupy these streams are non-native eastern brook trout. In 1961, eastern brook trout were introduced in Cooks Lake, the origin of Cooks Creek. None of these streams support bull trout due to their location upstream from barrier falls.

B.2-C Fisheries Environmental Consequences

B.2-C.1 Introduction

This section provides information regarding the potential consequences on those fish species identified in the preceding section (existing conditions/affected environment) that may be affected by the alternatives. Direct, indirect and cumulative effects are disclosed. Effects are quantified where possible, and qualitative discussions are also included.

B.2-C.2 Methodology

Ultimately, the effect of the project on stream habitat is the main concern for fisheries resources. The analysis of direct and indirect effects is based on the ways the various components of the project (e.g. location, size of cutting units, methods of logging systems, road maintenance and reasonably foreseeable actions) are expected to affect stream habitat (e.g. changes in sediment and/or water yield) within the analysis area. See Chapter 4 Watershed Hydrology for more information concerning changes in sediment and water yield.

a. Analyzing Effects – Direct, Indirect and Cumulative Effects

Although bull trout and westslope cutthroat trout utilize streams differently based on their unique natural histories and biological requirements, considerable overlap occurs in the habitat use for these species. Bull trout are fall spawners and westslope cutthroat trout are spring spawners; however, both species require cold, clear streams with a mixture of riffles and deep pools in order to sustain their populations. Project activities are designed to limit or eliminate the impact to both species and project activities would potentially affect these species similarly. Therefore, the potential impacts to bull trout and westslope cutthroat from project activities will be analyzed collectively.

Due to the number of fish species within the cumulative effects area, analysis of direct, indirect, and cumulative effects to fish will use the concept of management indicator species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group (USDA 1987). The Idaho Panhandle National Forests Forest Plan identifies cutthroat trout and bull trout as potential MIS for fisheries conditions. Westslope cutthroat trout or bull trout are

native to all fish bearing streams within the cumulative effects area. They are also likely sensitive indicators for all cold water biota within the stream segments (Meehan 1991). Therefore, westslope cutthroat and bull trout are appropriate MIS for the fisheries analysis of this project.

Table B.15 Issue Indicators Used To Measure Effects

Species	Indicator
Threatened and Endangered Species	
Bull Trout	Changes in the quality of stream habitat (e.g. sediment yield, water yield, large woody debris, water temperature)
Sensitive Species	
Westslope Cutthroat Trout	Changes in the quality of stream habitat (e.g. sediment yield, water yield, large woody debris, water temperature)

b. Direct and Indirect Effects

Project activities that have the potential to impact stream habitat include:

- timber-harvesting (e.g. helicopter, skyline and tractor logging),
- road maintenance and
- prescribed burning.

Important fish parameters potentially affected by these management activities include:

- water temperature,
- large woody debris frequency,
- sediment yield and water yield,
- width to depth ratios,
- pool quality and pool frequency.

Several factors limit the potential impact of project activities on stream habitat parameters. The project design (e.g. mostly helicopter or skyline logging, limited (0.6 miles) new temporary road construction on an existing roadbed, no new road construction, timing restrictions on project activities, location of treatment units) significantly reduces the potential impacts of harvesting activities on soil compaction/disturbance and erosion, which in turn reduces the potential impact to adjacent streams from sediment. The designation of Riparian Habitat Conservation Areas (RHCAs) and the associated limitations on activities within them also substantially reduces or eliminates effects from the project on stream habitat. Research studies and monitoring results conducted on the IPNF verify that when RHCAs are implemented during timber harvesting, sediment delivery to stream channels is “not measurable” or “is negligible” (USDA 1999, 2000, 2001, 2002, 2003, Belt et al 1992, Reid and Hilton 1998). In addition, the implementation of BMPs further reduces the potential for negative impacts to streams as a result of the action alternatives. See Chapter 2 discussion of Design Criteria and Mitigation Measures for more information.

c. Alternative 1 – No Action

Description

Under this alternative, no new management activities would occur in the project area. Management activities such as fire suppression, activities related to projects analyzed in earlier documents and routine road and trail maintenance would continue to occur. See Chapter 2 for a more detailed description of the No Action Alternative.

Under the No Action Alternative, none of the stream crossings or roads identified as existing or potential threats to the watershed would be improved and there would be no new road construction. In addition, none of the hazardous fuels treatments or prescribed burning activities proposed to reduce the risk of a large-scale wildfire within the Myrtle Creek and Snow Creek watersheds would occur.

Effects

The No Action Alternative would not directly affect aquatic resources or fisheries habitat in the project area. However, there would continue to be an indirect effect to the watersheds from stream crossings and roads identified as existing or potential threats to aquatic resources. Under this alternative, none of the identified threats would be eliminated or improved and the existing sediment delivery from these sources would continue to negatively impact the watershed. In addition, without the implementation of the proposed activities to reduce hazardous fuels there would be no decrease in the risk of a large-scale

stand replacing fire within the cumulative effects area, which has the potential to substantially increase the amount of sediment in the drainage and potentially degrade fish habitat.

d. Alternative 2 – Proposed Action

Alternative 2 would harvest approximately 2086 acres[1] within the Myrtle Creek, Snow Creek and Deep Creek Watersheds. Of the acres to be treated, 859 acres (41 percent) would be in the Myrtle Creek drainage, 1,191 acres (57 percent) would be in the Snow Creek drainage and 36 acres (2 percent) would be in the Deep Creek drainage. Of the acres to be treated, 1,129 acres (54 percent) would be harvested by helicopter logging, 527 acres (25 percent) would be harvested by ground-based logging and 430 acres (21 percent) would be harvested by skyline logging. Within the proposed treatment areas, 1,031 acres (49 percent) would receive a group selection treatment, 806 acres (39 percent) would be treated with an irregular shelterwood harvest, 190 acres (9 percent) would be treated with a commercial thin and 59 acres (3 percent) would be treated with a seed tree harvest.

All approximately 2,086 acres harvested would receive some type of fuels treatment with 1,038 acres (50 percent) being underburned, 1,022 acres (49 percent) being grapple piled and 25 acres (1 percent) of yarding tops.

Chapter 2 contains a more detailed description of the alternatives and an explanation of the different harvesting and fuels treatment types.

e. Alternative 5

This alternative would harvest approximately 865 acres within the Myrtle Creek and Snow Creek Watersheds. Of the acres to be treated 96 acres (11 percent) would be treated in the Myrtle Creek drainage and 769 acres (89 percent) would be in the Snow Creek drainage. Of the acres to be treated, 370 acres (43 percent) would be harvested by helicopter logging, 292 acres (34 percent) would be harvested by ground-based logging and 203 acres (23 percent) would be harvested by skyline logging. Within the proposed treatment areas, 522 acres (60 percent) would receive a group selection treatment, 169 acres (20 percent) would be treated with an irregular shelterwood harvest, 139 acres (16 percent) would be treated with a commercial thin and 35 acres (4 percent) would be treated with a seed tree harvest.

All approximately 865 acres would receive some type of fuels treatment with 519 acres (60 percent) being underburned and 346 acres (40 percent) being grapple piled.

Chapter 2 contains a more detailed description of the alternatives and an explanation of the different harvesting and fuels treatment types.

f. Features Common to Alternative 2 and Alternative 5

In accordance with the Inland Native Fish Strategy (INFS) and the project design features, the appropriate stream buffers would be implemented on project area streams based upon the stream characteristics (e.g. fish bearing/non-fish bearing, perennial/intermittent) (see Chapter 2 – Features Designed to Protect Fish and Fish Habitat). However, the majority of the harvest units proposed for treatment are at a distance from fish bearing streams that exceeds the RHCAs defined by INFS and would therefore provide additional protection to project area streams.

During the prescribed underburning of Units G2, G4, G7S, G7H and G9 in the Snow Creek drainage in the spring, a backing fire would be allowed to creep into the outer edges of the designated 150-foot RHCAs as a low intensity underburn. No other activities would occur within these 150-foot RHCAs. Units G5 and G6 in the Snow Creek are proposed to be grapple piled, but may also receive some underburning that could enter the outer edges of the adjacent RHCAs. In Units G2, G6, G7H, G7S and G9, there are multiple ephemeral draws with a 50-foot RHCA that would receive a limited harvest within the RHCA to reduce fuels and allow for the underburning of the units during the spring, as was discussed with DEQ during a field visit to the affected draws. The limited treatment within these ephemeral draws would consist of no ground based equipment within the RHCA, the retention of all ponderosa pine and western larch, the removal of only Douglas-fir and lodgepole pine smaller than 12 inches dbh and the retention of all tree species larger than 12 inches dbh (See Chapter II – Features Designed to Protect Fish and Fish Habitat). Unit G9 discussed above would not receive any harvest or subsequent underburning under Alternative 5.

The underburning of these G units in the spring would impact portions of the RHCA of three intermittent, non-fish bearing, unnamed tributaries of Snow Creek and multiple ephemeral draws. No prescribed fire would be allowed within RHCAs during fall burns (see Chapter 2 – Features Designed to Protect Fish and Fish Habitat).

Based on the site specific characteristics of the drainages, the majority of the proposed harvesting in the Snow Creek drainage would be implemented during the dry summer months and all ground-based harvesting in the Myrtle Creek drainage would be

[1] All numbers and percentages are approximate and are based on the most accurate information available.

implemented during the winter. These timing restrictions would increase the level of protection for soil and streams within the project area.

Under the action alternatives, approximately 0.6 miles of Road 402C within the Snow Creek drainage would be temporarily re-opened (on an existing roadbed). This would involve the reconstruction of a stream crossing on an intermittent, non-fish bearing stream channel approximately 0.33 miles from its confluence with Snow Creek. The stream crossing that would be reconstructed is currently an under-sized pipe with a small fill failure above it that is currently contributing sediment to the stream channel. This road and stream crossing would be reconstructed during the dry summer months when the channel has little to no flow and would be removed following project activities. Following project activities this road would be decommissioned back to its junction with Road 402 (total decommissioning of approximately one mile).

The action alternatives would decommission approximately 1.31 miles of road and recondition existing roads within the project area that would be used as haul routes – approximately 29 miles under Alternative 2, or approximately 22 miles under Alternative 5. Roads that have been identified as existing sediment sources or sites that pose a high risk of failure leading to a negative impact on aquatic resources, have been identified and prioritized for decommissioning as funding sources become available. Road reconditioning activities would include the improvement of stream crossings, the strengthening of cut/fill slopes, increasing the ditch drainage frequency, road surfacing, adding rolling dips and routine road maintenance (see Appendix D for a detailed list and description of each of these activities). Alternative 5 would recondition less road miles in the Snow Creek drainage because less acres would need to be accessed for treatment, resulting in fewer miles of haul route. All of these activities would act to decrease existing sources of sediment to project area streams and would also decrease the risk of future impacts from the existing road system.

g. Effects Common to Alternative 2 and 5

Water Temperature

Water temperature is one of the most important variables affecting salmonids and other aquatic organisms, influencing the timing of migration and spawning, egg maturation, growth, diseases, and pollutants (Bjornn and Reiser 1991). High water temperatures can delay or stop salmonid migration, spawning, egg development, and rearing (Bjornn and Reiser 1991). Water temperatures are affected by the amount of shade provided by riparian vegetation. Potential increases in stream temperature are addressed by assessing the degree of activities in riparian areas that may result in increased solar radiation to streams.

The action alternatives would not reduce the amount of riparian vegetation in the vast majority of the RHCAs due to the implementation of the appropriate RHCAs per the INFS Standards and Guidelines, which limits management activities within the RHCAs (see Chapter 2 – Features Designed to Protect Fish and Fish Habitat and Appendix B section B.3-D on Fish Management Direction). The RHCAs discussed in the above descriptions of the action alternatives could receive some underburning along their edges and could lose some ground cover and small brush in the affected areas, but would not be subject to prescribed burning with enough intensity to impact large brush or trees. Also, as described above, some ephemeral draws would receive limited timber harvest, but all larger diameter trees (and consequently the trees with the fullest crowns) would be designated as leave trees. This treatment would also favor the growth and development of larger diameter seral species (such as ponderosa pine and western larch) that would be more resilient to disturbance and would act as future shade trees. These draws do not typically transport water above ground and given that, in conjunction with the fact that the majority of the overstory would be retained, the proposed activities in these draws would not affect water temperature.

Consequently, there would be no reduction in the overstory canopy or in the recruitment/development of future shade trees in the majority of RHCAs, including the RHCAs of all perennial and intermittent streams. Any reduction in the overstory canopy or reduction in the recruitment/development of future shade trees within the designated ephemeral draws of a few units in Snow Creek would be limited and would not affect water temperature due to the lack of surface water. Therefore, no change in water temperature is expected to occur as a result of the implementation of Alternative 2 or Alternative 5. Thus the action alternatives would not further degrade water temperature and would be in compliance with DEQ regulations (see Appendix D for more detailed descriptions of DEQ guidance). Alternative 5 would have a few less acres treated within the ephemeral draws due to Unit G9 not receiving treatment under this alternative and would therefore have slightly less of an impact than Alternative 2, although neither action alternative is expected to negatively affect water temperature. However, Alternative 2 would provide greater protection against stand replacing fires that have the potential to remove trees within riparian areas, which would lead to increases in water temperature.

Large Woody Debris

Large woody debris (LWD) is a component of habitat quality and complexity, and is also an important contributor to stream productivity, cover and food production for fish and other aquatic organisms. In small low-order streams, LWD also contributes to channel stability. Under natural conditions, LWD is contributed to streams from the surrounding riparian areas as individual trees fall over, or in large numbers as a result of disturbance events such as wind storms, wildfires, or floods, which potentially wash large amounts of material into the stream.

Large woody debris is one of the most important sources of habitat and cover for salmonids in streams. Bisson et al. (1997) found that relationships exist between LWD, habitat complexity and salmonid production. LWD is also an important stream component for pool quality and frequency, width to depth ration, bank stability, water velocity reduction and the trapping of gravels.

The action alternatives would not reduce the amount of LWD currently in streams due to the implementation of RHCAs per the INFS Standards and Guidelines, which limits management activities within the RHCAs (see section B.3-D on Fish Management Direction). In addition, through the use of these buffers, the retention of riparian vegetation would maintain the recruitment of future LWD from existing trees within the RHCA. The RHCAs that could receive some underburning along their edges, and the ephemeral draws that could be underburned would not be subject to prescribed burning with enough intensity to impact the recruitment of future LWD. Therefore, there would no measurable impact on LWD within the cumulative effects area as a result of the implementation of either action alternative.

Alternative 5 would have a few less acres treated within the ephemeral draws due to Unit G9 not receiving treatment under this alternative and would therefore have slightly less of an impact than Alternative 2, although neither action alternative is expected to negatively affect large woody debris. However, Alternative 2 would provide a greater protection against stand replacing fire that has the potential to remove large amounts of trees within riparian areas, which would increase the availability of large woody debris in the short term, but would be detrimental to the recruitment of future large woody debris for a long period of time.

Water yield

Increases in water yield may indirectly affect fish habitat through the following affects:

- increased bank erosion,
- channel down cutting,
- increased accumulation of larger streambed materials,
- reduction in the number of pools, and
- overall reduction in habitat complexity.

The drainages in the analysis area and the native fish species present within them evolved under water flow regimes associated with a more open vegetative pattern caused by periodic fire on the landscape. The effective use of fire suppression over approximately the last 90 years has allowed for an increasingly dense vegetative layer not historically found in the majority of the project area, which has likely decreased water yield.

Under the implementation of Alternative 2 or Alternative 5, the level of vegetative openings created would not exceed the natural range of variability. Therefore, water yield would not be outside current natural conditions. Although there is expected to be a small increase in water yield in Myrtle and Snow Creeks associated with the proposed action, the affect is expected to be limited to the short term (5 to 10 years) and to be well within the capabilities of the watersheds (see Chapter 4 – Watershed Hydrology). Additional bedload scour during high flows would not be expected. Redds existing in the cumulative effects area would not be affected by this undetectable or slight increase in water yield.

Alternative 5 would have less acres treated, which would result in less of an increase in water yield than Alternative 2, although neither action alternative is expected to alter water yield beyond current natural conditions. However, Alternative 2 would provide a greater protection against stand replacing fire that has the potential to remove large amounts of vegetation that could increase water yield beyond current natural conditions (see Chapter 4 – Watershed Hydrology).

Sediment

Increased sediment deposition can adversely affect salmonid spawning and rearing habitat. Salmonid production was found to be inversely proportional to cobble embeddedness and fines in spawning gravel (Stowell et al. 1983, Bjornn and Rieser 1991, Everest et al. 1987). Excessive sediment interferes with water flowing through spawning gravels and reduces the transport of oxygen to incubating eggs (Chapman 1988), which in turn lowers egg and fry survival (Stowell et al. 1983, Burton et al. 1990). Fine sediments in cobble substrate fill interstitial spaces and reduce summer and winter rearing habitat for salmonids, as well as impacting macroinvertebrate abundance and diversity, an important food source for salmonids, particularly juveniles (Bjornn et

al 1977, Chapman and McCleod 1987). Sediment can also reduce the volume of pools, further degrading summer and winter rearing habitats for salmonids.

Except for the potential for underburning along the edges of the RHCAs discussed in the descriptions of Alternative 2 and Alternative 5 above and the limited timber harvest and underburning of the designated ephemeral draws, all project activities would occur outside of RHCAs and in most cases the distance from streams to the boundaries of harvest units is greater than the defined INFS RHCA distances. The design criteria established for the limited timber harvest in the designated ephemeral draws would greatly reduce or eliminate the likelihood of sediment generation or transport through excluding ground based equipment within the draws, restricting tree removal based on species and size and requiring spring burning only (see Chapter 2 – Design Features to Protect Fish and Fish Habitat) because these criteria would limit ground disturbing activity within the draws and would maintain the overall characteristics of the draws by retaining the majority of the overstory and conducting prescribed burning only when soil moisture content would limit fire intensity.

Therefore, the risk of any sediment generated by logging activities actually reaching a live channel is very low and likely immeasurable (Belt et al. 1992, Reid and Hilton 1998); although Alternative 5 would have a reduced risk of sediment being generated because it treats fewer acres than Alternative 2. Sediment mobilized by harvest activities would be likely be filtered and captured by vegetation remaining in the RHCAs before reaching streams. In the areas where underburning would be allowed to creep into the outer edges of the RHCAs, the risk of sediment delivery to streams would be lower than allowing the construction of firelines along the RHCA boundaries, which would have the potential to channelize sediment and increase the likelihood that it would reach live water, particularly in areas with steep slopes.

In addition, the reconditioning and decommissioning of roads and their associated stream crossings (Alternatives 2 and 5), would ultimately reduce the amount of sediment currently being directly input into project area streams, which would increase the drainages' effectiveness for salmonid production. The reduced baseline sediment yield resulting from the road reconditioning and decommissioning would also aid in the recovery of the watershed. The implementation of either alternative would decrease the risk of a large-scale stand replacing fire within the cumulative effects area, which has the potential to substantially increase the amount of sediment in the drainage. Alternative 5 would not achieve as great of a decrease in risk as Alternative 2 because hazardous fuels would not be treated on as many acres (see Chapter 4 – Watershed Hydrology).

Since the reconstruction of approximately 0.6 miles of road to temporarily re-open this portion of Forest Road 402C would involve the reconstruction of a stream crossing on a small, unnamed tributary of Snow Creek (approximately 0.33 miles upstream from its confluence with Snow Creek), there is the potential to increase the amount of sediment delivered to the stream during reconstruction. However, the existing stream crossing is comprised of an undersized culvert that has a small fill failure above it, which is currently contributing sediment directly to the stream. The reconstruction of the crossing would eliminate this sediment source. This is an intermittent, non-fish bearing stream and the construction would take place during the dry summer months during low or no flow with the entire road to be removed back to its junction with Forest Road 402 following project implementation (a total of approximately one mile of decommissioning). Impacts to the stream would further be reduced by the implementation of all applicable INFS Standards and Guidelines and BMPs during the reconstruction and subsequent removal of the reconstructed road segment. Therefore, there is low potential for the road and stream crossing reconstruction to increase sediment delivery to a fish bearing stream at a level that would negatively impact the fisheries resource.

Consequently, although a slight increase in sediment within the project area is possible during road and stream crossing reconditioning, following these activities, there would be a decrease in the amount of sediment into the Myrtle Creek and Snow Creek drainages, thus protecting water quality and improving fish habitat conditions. Therefore, there is expected to be no change or a slight decrease in the amount of sediment input into Deep Creek, the only stream within the project area DEQ designated as having sediment concerns, and thus the implementation of either action alternative would be in compliance with DEQ regulations (see Appendix D for more detailed descriptions of DEQ guidance).

B.2-C.3 Past, Present and Reasonably Foreseeable Actions

The following is a description of past, present and reasonably foreseeable actions, to establish the appropriate geographic and time boundaries for the cumulative effects analysis. Activities identified below are ones that are relevant to the fisheries cumulative effects analysis. Other activities listed in Chapter 1 are not discussed here because there is no soil or watershed disturbance created by these activities. These include tree planting, firewood gathering, hunting and helispot maintenance.

a. Past Activities

Past Wildfires, Timber Harvest and Road Building – Wildfires, timber harvesting and road construction activities have occurred throughout the cumulative effects area. All of these events were used in the WATSED, WEPP and FuME models to determine the current baseline condition and to look at historic ranges of variability. This is discussed in Chapter 4 Watershed

Hydrology section of this document. These activities have, to varying degrees based on the activity and location, impacted stream habitat and fish.

b. Current and Ongoing Management Activities

Suppression of Wildfires

There has been a history of fire suppression within the analysis area over the past 90 years, which has led to an increase in tree density caused by the encroachment of shade tolerant species within dry site habitat (see Chapter 3 Vegetation for more information). In stands outside the 2003 Myrtle Creek Fire, the higher tree densities, along with the associated increase in insect and disease leading to increased mortality, has increased the risk of a catastrophic wildfire outside of the natural range of variability. This has the potential to negatively impact stream habitat. Since changes in water yield are associated with vegetation conditions, the existing and future vegetative trends would have an effect on water yield.

Activities on Private Land

Timber harvest activities within the cumulative effects area are expected to occur on private land within the next 5 years[2]. Timber harvest on private land must follow the rules and Best Management Practices set by the Idaho Forest Practices Act (Title 38, Chapter 13, Idaho Code). These rules and BMPs are designed to help prevent sediment delivery to stream channels and to prevent any cumulative watershed effects. However, activities on private land that yield sediment delivery to streams or remove recruitable large woody debris, or otherwise affect fish habitat, would contribute to the cumulative condition. Due to stream habitat degradation associated with activities on private land within the cumulative effects area, the portions of the streams located on National Forest lands are vital for the continued existence of salmonid species.

Vegetative treatments and other activities associated with the Myrtle-Cascade FEIS and ROD of 2001

Activities occurring within the Myrtle Cascade Timber Sale were analyzed in the Myrtle-Cascade FEIS (add reference). Major project activities left to be completed associated with the Myrtle-Cascade FEIS is the shelterwood harvesting of approximately 60 acres, the underburning of approximately 162 acres and the grapple piling and burning of approximately 80 acres. Completion of these tasks is open ended based on available burn windows and soil moisture conditions. No additional effects to watersheds or fisheries beyond what was analyzed for and disclosed in the Myrtle Cascade FEIS are expected to occur.

c. Reasonably Foreseeable Actions

Grandmother Mountain Land Exchange

The Grandmother Mountain Land Exchange is a land exchange between Forest Capital Partners, a privately owned timber management company, and the Forest Service. The exchange is scheduled to be completed in 2007. The majority of the land involved in the exchange is located on the St. Joe Ranger District – outside the cumulative effects area of this project. However, under this land exchange, the Forest Service would obtain approximately 280 acres located in the lower Myrtle Creek drainage, including approximately 0.75 mile of Myrtle Creek, which includes Myrtle Creek Falls. The acquisition of this parcel would benefit water quality, bull trout and other aquatic species within the cumulative effects area through the long-term protection of lands adjacent to Myrtle Creek and Myrtle Creek Falls.

City of Bonners Ferry Water Intake Facility

The City of Bonners Ferry operates their water intake facility on approximately 0.77 acres of National Forest System land in the Myrtle Creek drainage. The facility has been in operation since the late 1920s.

Noxious Weeds Monitoring and Treatment

This activity would follow guidelines established in the Bonners Ferry Noxious Weeds Control Project EIS and Record of Decision (USDA 1998). Effects to aquatic resources were analyzed in that document and its adaptive strategy. No additional effects to watershed or fisheries beyond what was analyzed for and disclosed in the Bonners Ferry Noxious Weeds Control Project EIS are expected to occur.

Underburning of Dry Site Old Growth

Prescribed burning activities would follow applicable INFS standards and guidelines, as well as established BMPs, which would substantially reduce or eliminate the impact of these activities on watersheds or fisheries. See Chapter 4 Vegetation – Old Growth discussion for more information.

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[2] At this time, Forest Capital Partners is planning approximately 120 acres of irregular shelterwood/commercial thinning on their land in lower Snow Creek (personal communication Nishek, 2006.)

B.2-C.4 Fisheries Cumulative Effects

a. Alternative 1 – No Action Alternative

Because none of the identified roads and stream crossing that pose existing or potential threats to aquatic resources would be eliminated or improved under this alternative, they would continue to negatively impact streams and fish habitat. Over time the risk of failure of culverts at stream crossings would increase as they age beyond their expected design life. An indirect effect of this alternative would be the absence of fuel reduction activities, which would result in an increased probability of a large-scale fire outside of the natural range of variability. Although natural fires have always periodically occurred within the analysis area, the scale of fires that are more likely to occur under the No Action Alternative would cause an increase in sediment delivery to the streams within the project area beyond what would be naturally expected, which would likely result in a negative impact to the fisheries resource.

b. Alternative 2 – Proposed Action

Alternative 2, in conjunction with ongoing activities and reasonably foreseeable actions, would result in a short-term increase in sediment (during project implementation), but an overall reduction in sediment risk following project implementation. Based on the direct and indirect effects discussed above, the risk of any sediment delivery from harvest activities actually reaching a live channel is low. The short-term increase in sediment yield associated with the proposed action is small compared to the overall reduction in sediment yield and risk of sediment delivery resulting from the decommissioning of roads and the reconditioning of existing roads within the project area as described in the above analysis.

The potential short-term increase in sediment may impact individual westslope cutthroat, but would not lead toward a trend in Federal listing. In the long term, based on the above analysis, since the proposed action is designed to not negatively affect aquatic resources and to decrease the existing sediment sources, stream habitat within the project area would be expected to continue a trend of passive restoration through processes such as the maturing of trees within the RHCAs to provide for stream shading and in-stream large woody debris recruitment. Similarly, cumulative effects from the project and reasonable foreseeable actions may affect, but are not likely to adversely affect bull trout, and are expected to benefit individual survival in the long-term.

c. Alternative 5

Alternative 5, in conjunction with ongoing activities and reasonably foreseeable actions, would result in a short-term increase in sediment (during project implementation), but an overall reduction in sediment risk following project implementation. Based on the direct and indirect effects discussed above, the risk of any sediment delivery from harvest activities actually reaching a live channel is low. The short-term increase in sediment yield associated with the proposed action is small compared to the overall reduction in sediment yield and risk of sediment delivery resulting from the decommissioning of roads and the reconditioning of existing roads within the project area as described in the above analysis

The potential short-term increase in sediment may impact individual westslope cutthroat, but would not lead toward a trend in Federal listing. In the long term, based on the above analysis, since the proposed action is designed to not negatively affect aquatic resources and decrease the existing sediment sources, stream habitat within the project area would be expected to continue a trend of passive restoration through processes such as the maturing of trees within the RHCAs to provide for stream shading and in-stream large woody debris recruitment. Similarly, cumulative effects from the project and reasonable foreseeable actions may affect, but are not likely to adversely affect bull trout, and the overall reduction in sediment over the long term would be expected to benefit individual survival in the long-term.

B.2-C.5 Conclusion of Effects

Based on the above analysis, negative impacts to stream habitat from Alternative 2 or Alternative 5 would, at the most, be negligible due to the proposed activities and project design. Project implementation, when viewed in conjunction with the cumulative effects of past, ongoing and reasonably foreseeable actions, would maintain stream habitat conditions for fisheries resources within the National Forests lands potentially affected by project activities.

The table on the following page displays the summary of effects to threatened, endangered and sensitive species.

Table B.16 Summary of Effects

Species	Effect of Alternative 2 – Proposed Action	Effect of Alternative 5
Threatened and Endangered Species		
Kootenai River White Sturgeon	No Effect	No Effect
Bull Trout	May Affect, Not Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect
Sensitive Species		
Burbot	No Impact	No Impact
Interior Redband Trout	No Impact	No Impact
Westslope Cutthroat Trout	May impact individuals or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.	May impact individuals or their habitat, but will not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

B.2-C.6 Consistency with the Forest Plan and Other Regulations

a. Idaho Panhandle National Forests Land and Resource Management Plan

Both action alternatives meet the requirements of the IPNF Forest Plan for fisheries resources, as amended by the Inland Native Fish Strategy. Specific requirements and how this project meets them are listed in the following section (A.3-d) on Fish Management Direction.

Fry Emergence Amendment to the Forest Plan

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 (IPNF 2005). 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 INFS 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 for fry emergence success were accurate or precise.

b. Endangered Species Act

Both action alternatives meet the requirements of the Endangered Species Act. The project may affect, but is not likely to adversely affect threatened bull trout, and would not jeopardize their continued existence. There is no designated critical habitat for bull trout within the cumulative effects area.

c. National Forests Management Act – Species Viability

Fish species that may be affected by the project (bull trout, westslope cutthroat trout, and rainbow trout) are also distributed across the Forest. For example, bull trout and rainbow trout are found in 8 of 13 (61 percent) of 4th code HUC watersheds (i.e. large watersheds, such as Kootenai River Basin) on the IPNF. Cutthroat trout currently occur in 100% of 4th code HUC watersheds on the Forest. There is no connectivity between the Kootenai River watershed, which includes Myrtle Creek and Deep creek, along with their tributaries and nine of the other 4th code HUC watersheds on the Forest (e.g. St. Joe River).

At the smaller watershed scale (e.g. Myrtle Creek and Snow Creek, 6th code HUC watersheds), bull trout are known to inhabit approximately 5% of the watersheds in the Kootenai River drainage, while westslope cutthroat trout and rainbow trout occur in approximately 100%.

Based on the distribution of species across the Forest, the lack of connectivity between large watersheds, the limited cumulative effects area (i.e. effects are limited to the lower portions of Myrtle Creek, Deep Creek and Snow Creek watersheds), and the negligible short-term effects and potential beneficial long-term effects on these species and their habitat,

the Myrtle HFRA project would not affect the viability of any threatened, endangered, sensitive or MIS fish species on the IPNF.

d. Executive Order 12962

Both action alternatives are consistent with this executive order regarding aquatic systems and recreational fisheries. Short-term effects 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.

e. State of Idaho Governor's Bull Trout Plan

Both action alternatives are consistent with the direction in the Governor's Bull Trout Plan. Long-term effects from the decommissioning of roads with known sediment sources are expected to benefit bull trout and their habitat.

B.2-D Fisheries Management Direction and Guidelines

This section discusses the State of Idaho Governor's Bull Trout Plan and the applicable elements of the Inland Native Fish Strategy.

B.2-D.1 State of Idaho Governor's Bull Trout Plan

The Governor's Bull Trout Plan (State of Idaho 1996) can be described by the following:

- The mission of the plan is to "…maintain and/or restore complex interacting groups of bull trout populations throughout their native range in Idaho."
- The Plan created the Basin Advisory Groups, which oversee the Watershed Advisory Groups (WAG). The Technical Advisory Team's role is to assist the Watershed Advisory Groups with issues regarding the recovery of bull trout in each key watershed.

As stated above, this project is consistent with direction in the plan.

B.2-D.2 INFS Standards and Guidelines (USDA A7-13; 1995)

Only INFS standards and guidelines that apply to the range of alternatives for the Myrtle HFRA Project are addressed here; those standard and guidelines that do not apply are in the INFS document located in the project file. The following INFS standards and guidelines are addressed below with comments (in italics) regarding the way(s) in which this project would meet the standards and guidelines.

- Timber Management
- Roads Management
- Fire and Fuels Management
- General Riparian Area Management
- Watershed and Habitat Restoration
- Fisheries and Wildlife Restoration

a. Timber Management

(INFS Record of Decision page 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[3], complete watershed analysis prior to salvage cutting in RHCAs.

[3] "The intent of designating priority watersheds is to provide a pattern of protection across the landscape where habitat for inland native fish would receive special attention and treatment." (INFS Record of Decision page A-13) There are no priority watersheds in the project area.

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.

Effectiveness: High. No commercial harvest is to occur within the RHCAs, except for a limited harvest for fuels reduction purposes within the ephemeral draws of Units G2, G6, G7H, G7S and G9 (see Chapter 2 – Features Designed to Protect Fish and Fish Habitat for a detailed description of the restrictions).

b. Roads Management (A-7-8)

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 National Forest System lands, but have been coordinated with all those listed when applicable.

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.

No construction of new roads, temporary roads, or landings is proposed within RHCAs in priority watersheds.

b. Minimizing road and landing locations in Riparian Habitat Conservation Areas.

No new roads or landings are proposed within RHCAs under 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 (IDT) evaluated access and road improvement needs within the project area and completed a Roads Analysis Report with standards and management objectives (see the project file).

Effectiveness: Moderate.

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 road.

Effectiveness: High. The temporary road (402-C) would be reconstructed with this design.

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.

The roads would be designed to avoid disrupting the natural hydrologic flow.

Effectiveness: High. Avoiding disruption of the natural hydrologic flow would be part of the road package.

f. Avoid sidecasting of soils or snow. Sidecasting of road material is prohibited on road segments within or abutting RHCAs in priority watersheds.

There are no priority watersheds in the project area.

Effectiveness: High. Since there are no priority watersheds in the project area, no material would be sidecast in priority watersheds.

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 reconditioning originate from the above standards. The action alternatives would meet this standard.

Effectiveness: High. An existing road is 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. The reconstruction of an existing road and the proposed road reconditioning would be part of the Timber Sale Contract, so the likelihood that the projects would be completed is high.

RF-5. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.

Several crossings of fish-bearing streams occur within the boundaries of the Myrtle HFRA project area, both on National Forest System Land and on private industry land. However, the culverts at the crossings of Cooks Creek (a fish-bearing

stream) on Road 661 and Road 2400 are acting as passage barriers. Although these crossings are on National Forest System lands, they are outside the project area; thus they are considered as future opportunities.

Effectiveness: High. The proposed road reconditioning and reconstruction within the project area (see Chapter 2 description of Alternatives 2 and 5) would maintain or improve fish passage at existing stream crossings. The identified fish passage barriers on Cooks Creek are outside of the project area. Other funding sources would need to be investigated as a means of reconstructing these crossing with the appropriate structures or by removing the culvert on Road 2400.

c. Fires/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 pre-suppression 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 escaped 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 (RMOs).

The proposed prescribed burn projects originate from the above standards. The action alternatives would meet this standard.

Effectiveness: High. There would be no prescribed fire ignitions, fireline construction, landings, staging areas or the use of chemical retardant foam within any RHCA. During spring prescribed burns, a backing fire would be allowed to creep into the outer edges of designated 150-foot RHCAs in Units G2, G4, G5, G6, G7H, G7S and G9 and the designated ephemeral draws in Units G2, G6, G7H, G7S and G9 would be underburned with the unit, where prescribed fire would not retard the attainment of the RMOs.

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 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.

d. 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 affect instream flows, therefore, this standard does not apply.

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.

Removal of smaller diameter trees of some species such as Douglas-fir and lodgepole pine would occur in the ephemeral draws as described above to allow for burning and fuels reduction, where these activities would not retard the attainment of the RMOs.

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 in the Bonners Ferry Noxious Weed FEIS, the proposed action would meet this standard.

Effectiveness: High. Standards would be met as required by the Bonners Ferry Noxious Weed FEIS.

RA-4. Prohibit storage of fuels and other toxicants within Riparian Habitat Conservation Areas. Prohibit refueling within Riparian Habitat Conservation Areas unless there are no other alternatives. Refueling sites within a Riparian Habitat Conservation Area must be approved by the Forest Service 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.

Effectiveness: Moderate. This standard would be applied in the prescribed burn plans associated with the Myrtle HFRA project. The placement of pumping sites and limits on the amount of water intake to be used for prescribed burning operations is discussed as a Design Feature in Chapter II, Protection of Fish When Using Streams for Prescribed Burning Control. 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.

e. Watershed and Habitat Restoration (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.

Effectiveness: High. The proposed watershed restoration projects as described in Chapters 2 and 4 originate from the above standard. The action alternatives would meet this standard. The No Action Alternative would not meet this standard.

WR-2. Cooperate with Federal, State, local, and Tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans (CRMPs) or other agreements to meet RMOs.

Effectiveness: Moderate to High. Cooperation at the multiple levels as listed occurred within the framework for developing the proposed activities of this project and that future resource management would develop a CRMP for the Kootenai River system.

f. Fisheries and 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.

Effectiveness: High. Improvements to existing road drainage structures, road decommissioning and culvert removals are habitat enhancement actions that would be implemented in a manner that contributes to attainment of Riparian Management Objectives.

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. Fish stocking, harvest and/or poaching are all regulated by State management guidelines.

Effectiveness: High. Existing habitat would be preserved under this project.

B.2-E Summary of the Biological Assessment

The analysis and documentation of the existing condition of the affected environment, and the predicted effects of the alternatives (Alternative 1 – No Action, Alternative 2 – Proposed Action, and Alternative 5) formed the basis for the Biological Assessment of the Fisheries Resource. Since the information on the affected environment and environmental consequences is provided above, it is not repeated. This section summarizes the Biological Assessment (BA) to round out the disclosure of the Fisheries analysis. The complete BA is located in the Fisheries Project File.

B.2-E.1 Introduction

Threatened and Endangered species are managed under authority of the Federal Endangered Species Act (36 U.S.C. 1531-1544) and the National Forest Management Act (16 U.S.C. 1600-1614). In accordance with Section 7 of the Endangered Species Act, federal agencies are required to make certain that all actions they "authorize, fund, or carry out" will not likely

jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of designated critical habitat.

USDA Forest Service Policy (FSM 2670) requires a review of programs and activities, through a biological assessment, to determine whether any threatened or endangered species is likely to be affected by the proposed action(s). The purpose of this biological assessment is to evaluate the potential effects to threatened or endangered fish species from the Myrtle HFRA Project.

B.2-E.2 Effects to Listed Species

On March 1, 2006, the U.S. Fish and Wildlife Service issue a list of threatened and endangered species that are present within Boundary County, Idaho and may be present on the Idaho Panhandle National Forests within the evaluation area (USDI Fish and Wildlife Service 2006). These species include the Kootenai River white sturgeon *(Acipenser transmontanus)* and bull trout *(Salvelinus confluentus)*.

The following table summarizes the conclusion of effects to the listed species.

Table B.17 Threatened and Endangered Species Summary of Conclusion of Effects

Species	Species or Habitat Present?[4]	Species or Habitat Potentially Affected?	Likelihood of Adverse Effects?	Determination of Effects
Kootenai River White Sturgeon (*Acipenser transmontanus*)	No	No	None	No Effect
Bull Trout (*Salvelinus confluentus*)	Yes	Yes	Low	NLAA

B.2-E.3 Rationale for Effects Determination

Kootenai River White Sturgeon – In Idaho, the distribution of Kootenai River white sturgeon is limited to the Kootenai River system. The Kootenai River white sturgeon was removed from further analysis because no suitable habitat is present within the proposed action area and the project area lies outside of designated critical habitat for sturgeon. Therefore the proposed action would have ***no effect*** on Kootenai River White Sturgeon

Bull Trout – Bull trout are listed under the Endangered Species Act as a threatened species. They are known to reside in the Kootenai River Basin, which includes Myrtle Creek, Snow Creek and Deep Creek watersheds. All three bull trout life history forms (resident, fluvial, adfluvial) are present in the Kootenai River Basin (PBTTAT 1998 working draft). Myrtle Creek, Snow Creek and Deep Creek are the only streams within the cumulative effects analysis area with documented bull trout use. However, all three streams provide only limited opportunities for bull trout spawning due to migration barriers and incompatible habitat conditions. No known bull trout populations exist, either historic or current, in the tributary watersheds of Myrtle Creek and Snow Creek above the falls. No other streams within the analysis area are known to support bull trout.

B.2-E.4 Conservation Measures

The following conservation measures would be included to eliminate or reduce any potential conflicts. These measures are non-discretionary and are necessary to achieve the current determination of effects.

1. If any endangered or threatened species are located within the areas affected by the proposed action, project activities would be altered, as necessary, in order for the proper protection measures to be taken.

2. Inland Native Fish Strategy – Standards and guidelines established by the Inland Native Fish Strategy (INFS) would be used to protect water quality and fish habitat, including the designation of Riparian Habitat Conservation Areas (RHCAs). These zones include 300-foot (slope distance) protection zones for fish-bearing streams, 150-foot (slope distance) protection zones for permanently flowing (perennial) non-fish bearing streams, ponds, lakes, reservoirs and wetlands greater than one acre and a 50-foot (slope distance) protection zone for intermittent streams and sensitive landtypes. Commercial timber harvesting would be prohibited in these RHCAs.

[4] Species presumed to be present within the affected area based on the distribution of the species, habitat conditions required by the species and the current stream habitat conditions of the action area.

Ephemeral draws would have a 50-foot (slope distance) protection zone if they are either directly tied to an intermittent channel or lack large woody debris and vegetation that prevent scouring or head cutting. Limited timber harvesting would be conducted in designated draws under the limitations described in the "Ephemeral Draws" design feature described below.

3. Ephemeral Draws – Limited activities would be allowed to occur within the 50-foot RHCA of the specified ephemeral draws in Units G2, G6, G7H, G7S and G9 to reduce the level of hazardous fuels within the draws under the following restrictions:

- No ground based equipment within the RHCAs to prevent ground disturbance. If crossing one of these draws is necessary in order to reduce the need for multiple breaches of the road cut-slope to provide access for tractor skidding in Unit G6, the hydrologist would be consulted to determine the best location of the crossing, taking into account BMPs, topography, methods (e.g. snow road, log cribs) as is appropriate.
- Hand felling and whole tree yarding would be allowed in the draws where a feller buncher cannot reach in order to reduce fuels within the draw.
- Only lodgepole pine and Douglas-fir less than 12 inches dbh would be allowed to be removed.
- All ponderosa pine and western larch would be designated as leave trees because they are more fire resistant and western larch would continue to add needles annually to the RHCA organic profile.
- Underburning would be allowed only in the spring to allow for a moist soil mantle and to avoid the consumption of large woody material during the fire.

4. Protection of RHCAs during Prescribed Burning – There would be no prescribed fire ignitions or fireline construction within any RHCAs. During spring prescribed burning in Units G2, G4, G5, G6, G7H, G7S and G9, a backing fire would be allowed to creep into the outer edges of the designated 150-foot RHCAs as a low intensity underburn. No prescribed fire would be allowed within RHCAs during fall burns.

5. Protection of Aquatic Habitat During In Stream Work – Activities that would take place within perennial streams (e.g. culvert removal/replacement) would take place after July 15 and prior to September 15 to minimize erosion and sedimentation from these ground-disturbing activities, thereby reducing the risk of effects from sediment during spring runoff and to avoid effects to westslope cutthroat trout redds and staging or spawning bull trout downstream.

6. Protection of Fish When Using Streams for Prescribed Burning Control – to avoid adverse effects to fish and redds while using natural water sources, water removal may not exceed 90 gallons per minute and pumping sites would be located away from spawning gravels. The intake hose would be screened to prevent accidental intake of small fish. An emergency spill clean up kit would be on site in the unlikely event of a fuel spill outside the containment system. This is consistent with INFS direction (USDA 1995; RA-5).

(See Chapter 2 design features and mitigation measures for additional information about this project.)

B.2-E.5 Statement of Findings

Based on the above analysis, it was concluded that the proposed action would have ***no effect*** on the Kootenai River white sturgeon and ***may affect, not likely to adversely affect*** bull trout.

Appendix C -- Site Specific Best Management Practices

C.1 - 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 States 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

Soil and Water Conservation Practices (SWCP) employed by the Forest Service and BMPs identified in Idaho Water Quality Standards (IDAPA16.01.2300.05) 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, 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.

C.2 - 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.

C.3 - 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.

C.4 - Items Common to All Soil and Water Conservation Practices

C.4-A 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.

C.4-B 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.

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

C.5 - Key Soil and Water Conservation Practices

Class * Soil and Water Conservation Practice (FSH 2509.22)

* **Classes of SWCP (BMP)**

A = Administrative
G = Ground Disturbance Reduction
E = Erosion Reduction
W = Water Quality Protection
S = Stream Channel Protection/Stream Sediment Reduction

11 – Watershed Management

W 11.01 Determination of Cumulative Watershed Effects
W 11.02 Soil and Water Resource Monitoring and Evaluation
W 11.03 Watershed Improvement Planning and Implementation
W 11.04 Floodplain Analysis and Evaluation
W 11.07 Oil and Hazardous Substance Spill Contingency Planning
W 11.09 Management by Closure to Use
W 11.14 Management of Snow Survey Sites

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 15.20 Water Source Development Consistent with Water Quality 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

C.6 - Site Specific Best Management Practices

PRACTICE 11.01 – Determination of Cumulative Watershed Effects
PRACTICE 11.02 – Soil and Water Resource Monitoring and Evaluation
PRACTICE 11.03 – Watershed Improvement Planning and Implementation

Objectives: To determine the cumulative effects or impacts on beneficial water uses by multiple land management activities. Past, present or reasonably foreseeable future actions in watershed are evaluated relative to natural or undisturbed conditions. To monitor baseline watershed conditions for comparison with State standards, Forest Plan Standards, and estimation of long-term trend; to ensure the health and safety of water users; to evaluate SWCP's effectiveness; and to determine the adequacy of data, assumptions, and coefficients. To improve degraded watershed conditions, to minimize soil erosion, and to improve water availability or quality.

Effectiveness: High

Compliance: Meets FPS rules

PRACTICE 11.04 – Floodplain Analysis and Evaluation
PRACTICE 11.05 - Wetlands Analysis and Evaluation

Objectives: To delineate floodplains and wetlands within sale areas in order to prevent damage to facilities or degradation of soil and water resources. To protect floodplains and wetlands and avoid, where possible, the long and short-term adverse impacts to soils and water resources associated with the occupancy and modification of such.

Effectiveness: High

Compliance: FPA Rule 4.d.v(c) – Meets

PRACTICE 11.06 – Public Supply Watershed Management

Objectives: To manage community and noncommunity public supply watersheds to comply with State water quality standards.

Effectiveness: High

Compliance: Meets FPA rules

PRACTICE 11.14 – Management of Snow Survey Sites

Objectives: To protect snow courses and related date sites from effects by land management activities.

Effectiveness: High

Compliance: Meets FPA rules

PRACTICE 13.02 – Slope Limitations for Tractor Operation
PRACTICE 13.03 - Tractor Operation Excluded from Wetlands, Bogs, & Wet Meadows

Objective: To reduce gully and sheet erosion and associated sediment production. To maintain wetland functions and avoid adverse soil and water resource impacts, turbidity, and sediment production associated with the destruction or modification of wetlands, bogs and wet meadows. To reduce sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.

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 Wetlands Protection:

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].

An equipment exclusion zone shall extend a minimum of 50 feet from the wetlands, bogs, and wet meadows.

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 (Erosion Control Seeding). Timber Sale Contract provision (Temporary Road, Skid Trail/Skid Road and Landing) will identify that scarification/ripping of compacted landings and closed roads will be a minimum of 9 inches, not to exceed 2 feet.

All temporary roads, landings, and skid trails will also be fertilized to give the new plants extra support in becoming established.

The standard Idaho Panhandle National Forests moist site erosion control seed mix will be used.

PRACTICE 14.03 – Use of Sale Are Maps for designing Soil and 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:

The stream courses (perennial, intermittent, and ephemeral) 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 standards and protected stream courses will be applied to the following areas:

1. Myrtle Creek - The entire main-stem length and its tributaries which include: Yellow Pine, Adverse, Mack, and White Pine Creeks and other unnamed tributaries shown on USGS base maps.
2. Snow Creek - The entire main-stem length and its tributaries which include: Curve Creek and other unnamed tributaries shown on USGS base maps.
3. Any unnamed channels that are shown on the sensitive landtype map.

a. 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.
b. 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. A hydrologist, soils scientist, or fisheries biologist will work with the Presale Forester to insure that the above features have been designated on the Sale Area Map during contract development.

PRACTICE 14.06 - Riparian Area Designation
PRACTICE 15.12 - Control of Construction in Riparian Areas

Objective: To minimize the adverse effects on Riparian Areas with prescriptions that manage nearby logging and related land disturbance activities.

Effectiveness: Moderate

Compliance: FPA Rules 3.g.ii, iii, & iv; 3.f.iv - Meets

Implementation: Riparian areas will be protected through the following requirements that will be incorporated into timber sale layout, or into the timber sale contract as identified below:

1. Provide the large organic debris, shading, soil stabilization, wildlife cover, and water filtering effects of vegetation along Class I streams [FPA Rule 3.g.i-iii]. The following measure(s) are implemented during sale layout:

(a) A Stream Protection Zone that consists of a buffer of 300 feet slope distance from the edge of the channel for Myrtle and Snow Creeks. No timber harvest activities shall occur within the Stream Protection Zone or INFS Buffers.
(b) A Stream Protection Zone that consists of a buffer of 150 feet slope distance from the edge of the channel for the perennial tributaries to Myrtle and Snow Creek, this includes Mack and Adverse Creeks. No timber harvest activities shall occur within the Stream Protection Zone.
(c) A Stream Protection Zone that consists of a buffer of 100 feet slope distance from the edge of the channel for the intermittent tributaries to Myrtle and Snow Creeks. No timber harvest activities shall occur within the Stream Protection Zone.

2. Waste resulting from logging operations, such as crankcase oil, filters, grease and fuel containers, shall not be placed inside the Stream Protection Zones [FPA Rule 3.f.iv and TSC Provision BT6.34].

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 minimum criteria will be used in controlling erosion and restoring landings and skid trails to minimize erosion:

General:

1. Deposit waste material from construction or maintenance of landings and skid and fire trails in geologically stable locations at least 100 feet outside of the appropriate Stream Protection Zone and Riparian Habitat Conservation Areas [FPA Rule 3.f.iii].
2. Skid trails and landings will be seeded with a mix specified in the contract.

Landings (please see project file map of locations of Haul Routes and Landings):

1. Landings will not be located in ephemeral draws or swales that were created by or are prone to landslides.
2. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams.
3. 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].
4. Landings will drain in a direction and manner that will minimize erosion and will preclude sediment delivery to any stream.
5. 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. 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 obliterated by the purchaser following completion of the logging activities. The obliteration will include restoring natural slope contours and placing slash and logs on top of the disturbed soil, and use of seeding where needed.
2. 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].
3. The sale administrator with the approval of the hydrologist, soils scientist or fisheries biologist will designate the spacing of water bars on skid trails. [Reference FSH 7709.56].
4. Ground skidding in all Myrtle Creek Units and Snow Creek Units G3 and G10 will be restricted to winter operating seasons on frozen ground or a minimum of 18 inches of snow. This will minimize ground disturbance and compaction which could lead to increased sediment production and delivery within the municipal watershed.
5. 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.

6. In units D2, G1, G3, G6, G8, G10, and G11, only existing skid trails will be used where present or the units will be winter logged to prevent new soil compaction above existing levels.
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 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

Objective: To assure the adequacy of required timber sale erosion control work on timber sales.

Effectiveness: High

Compliance: No directly related FPA Rule

Implementation and Responsibility: Timber Sale Contract 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 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 15.07 - 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.

a. Temporary roads 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.

b. 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.

c. Unstable cut and fill slopes will be stabilized.

d. Additional relief culverts will be installed to very frequently cross drain the roads. Distances between relief pipes will generally not exceed 200 to 250 feet.

e. 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.

f. Gravelling will be used on native road surfaces to reduce surface erosion - especially near stream crossings. A minimum of a 4 inch lift is recommended.

g. 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 (IFPA Rule 4(c)(vi) and applicable Timber Sale Contract Clause).

h. 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.

i. Prior to fall or spring runoff, install drainage structures or cross drain uncompleted roads that are subject to erosion.

j. Install relief culverts at a minimum grade of 1 percent greater than road gradient (IFPA Rule 4(c)(viii) and Standard Road Specifications-Special Project Specification 204.1).

k. Energy dissipaters or downspouts will be placed below problem culvert outlets (Reconstruction item).

l. 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.

m. 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), applicable Timber Sale Contract Clause, and Standard Road Specifications-Special Project Specification).

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 deemed necessary by the hydrologist, soils scientist, or fisheries biologist. 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

Also see 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 (Must be agreed upon by the hydrologist, soils scientist, or fisheries biologist). 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 15.14 – Diversion of Flows around Construction Sites

Objective: To minimize downstream sedimentation by insuring that all stream diversions are carefully planned.

Effectiveness: High

Compliance: Meets SCA Rules

Implementation: Flow in stream courses may only be diverted if the Forest Service deems it necessary for the contractor to meet contractual specifications. Such a diverted flow shall be restored to the natural stream course as soon as practicable. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment.

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 Timber Sale Contract provision (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. 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. Side cast 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 Clause, 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], to be approved by the hydrologist, soils scientist, or fisheries biologist.
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 applicable Timber Sale Contract Clauses].

Effectiveness: These measures should effectively minimize erosion from roads.

1. 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.
    (e) 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.
    (f) The roads may be permanently or seasonally blocked to vehicular traffic [FPA Rule 4.d.iv].
    (g) Roads will be seeded and fertilized.
    (h) The roads may be permanently or seasonally blocked to vehicular traffic.
2. Abandoned Roads. An abandoned road is not intended to be used again. No subsequent maintenance of an abandoned road is required after the road is made hydrologically inert:
    (i) The road is left in a condition suitable to control erosion by out-sloping, water barring, seeding, or other suitable methods.
    (j) Ditches are cleaned.
    (k) The road is blocked to vehicular traffic.
    (l) 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). It is recommended that roads be completely obliterated and/or made hydrologically inert in lieu of continued road maintenance.

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 – Obliteration of Temporary Roads

Objective: To reduce sediment generated from temporary roads by decommission or obliterating them at the completion of their intended use.

Effectiveness: High

Compliance: Meets FPA Rules

Implementation: Effective obliteration is generally achieved through a combination of the following measures:

1. Recontouring stream crossings to natural gradient and width restoring full floodplain and valley features to natural contour.
2. Recontour unstable fill or cutslopes to natural contours. Decompact the bench portion of the road prism a minimum of 14 inches before placing excavated fill against the cutslope and on the prism.

3. Provide adequate cross drainage for the road. Waterbars placed on a maximum spacing of 30 feet will be the primary means of cross draining roads with stable cut and fill slopes. Outsloping will be the primary means of cross draining unstable road segments.
4. Road returned to resource production through revegetation. Stream crossings will be seeded with a seed mix approved for erosion prevention and covered with straw mulch. Natural regeneration of grass, brush, and trees can usually be relied upon to re-vegetate the portions of the road prism between stream crossings. Available or recruited wood debris, vegetation, and slash will be used to promote revegetation and protection of disturbed soil surfaces.

PRACTICE 18.02 – Formulation of Fire Prescriptions
PRACTICE 18.03 – Protection of Soil and Water from Prescribed Burning
PRACTICE 18.05 – Stabilization of Fire Suppression Related Watershed Damage

Objective: To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients and debris from entering surface water. To stabilize all areas that have had their erosion potential significantly increased, or their drainage pattern altered by suppression related activities.

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.

1. Foaming agent will not be used in Myrtle Creek above the diversion for city water. Foaming agents (if used outside of Myrtle Creek) will not be used for water control lines where any of the ephemeral channels could carry the material to intermittent or perennial streams.
2. Machine constructed firelines will not be used on the sensitive landtypes displayed on the Soils Map (project file)
3. Firelines must be frequently waterbarred (not to exceed 50 foot spacing when going up and down the hill).
4. 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).
5. Limit prescribed burning to those times when surface soil moisture is above 25 percent to reduce the potential for damage from hot burns.

Appendix D - Watershed Hydrology Supporting Information

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Appendix D - Watershed Hydrology Supporting Information

D.1 - Introduction

This appendix provides detailed background and supporting information that was used in the analysis of the Myrtle Creek HFRA Project and preparation of the documentation in this Final EIS. Sections of this analysis are referenced in the Watershed Hydrology portions of Chapters 3 and 4 (such as Appendix D.2 TMDLs).

The following discussions also include documentation of the analysis that was conducted on all roads within the Myrtle Creek and Snow Creek watersheds. It is important to keep in mind that the Myrtle Creek HFRA Project includes only those road management activities included in the descriptions of Alternative 2[1] and Alternative 5 in the main body of the FEIS. Other road management activities (such as the list of roads displaying decommissioning priorities) were analyzed to assess their current condition and their effects in the Myrtle Creek and Snow Creek watersheds. However, these activities are considered future opportunities and are not part of the current proposal. They are included in the discussion of cumulative effects in the trends analysis section.

This Appendix contains information on the following items:

- Total Maximum Daily Loads (TMDLs)
- Model Information and Disclosures
- Channel Morphology Definitions
- Rosgen Channel Flow Chart
- Reference Reach Comparison Analysis
- Function Call Information
- Road Erosion Risk Criteria
- Roads and Road Segments, and their decommissioning priority, in the Myrtle Creek HFRA Project Area
- Stream Survey Analysis
- Aquatic Trend Analysis

D.2 - Total Maximum Daily Loads (TMDLs)

D.2-A Introduction

The federal Clean Water Act (CWA) requires states and tribes to restore and maintain the chemical, physical, and biological integrity of the nation's waters. States and tribes, pursuant to Section 303 of the CWA, are to adopt water quality standards necessary to protect fish, shellfish, and wildlife while providing for recreation in and on the nation's waters whenever possible (33 USC 1251.10).

One of the CWA requirements is that every two years, the Idaho Department of Environmental Quality (DEQ) is to conduct a comprehensive analysis of Idaho's water bodies to determine whether they meet state **water quality standards** and support beneficial uses or if additional pollution controls are needed. The subsequent report serves as a guide for developing and implementing water quality improvement plans (**total maximum daily loads, or TMDLs**) to protect water quality and achieve federal and state water quality standards.

Simply put, a TMDL (Total Maximum Daily Load) is a pollutant budget -- a calculation of the maximum amount of a pollutant that a water body can receive from human-caused sources and still meet water quality standards. This budget is expressed in terms of loads: the amounts of pollutants added to a water body during a given time or per a volume of water. For example, a load allocation to a water body might be 5 kilograms of phosphorus per day from a given source.

[1] Alternative 2 would decommission Roads 402-C and 1309-UA, and recondition approximately 29 miles of roads that would be used as haul routes associated with the silvicultural treatments.. Alternative 5 would also decommission Roads 402-C and 1309-UA, and recondition approximately 22 miles of roads that would be used as haul routes.

A TMDL budget takes into account loads (called Load Capacity (LC)) from **point, nonpoint**, and **natural background** sources. The load assigned to point sources is called a wasteload allocation (WLA); the load assigned to nonpoint sources is called a load allocation (LA). Natural background (NB), when present, is considered part of the LA, but is often broken out on its own because it represents a part of the load not subject to control. Because of uncertainties regarding quantification of loads and the relation of specific loads to attainment of water quality standards, the rules regarding TMDLs (Water quality planning and management, 40 CFR Part 130) require a margin of safety (MOS) be a part of the TMDL. Practically, the margin of safety is a reduction in the load capacity that is available for allocation to pollutant sources. The natural background load is also effectively a reduction in the load capacity available for allocation to human made pollutant sources.

Elements of a TMDL:

- Point Sources, assigned as Wasteload Allocations (WLA)
- Non-point Sources, assigned as Load Allocations (LA)
- Natural Background (NB) Sources, considered part of the LA, but often considered separately because it is not something land managers are able to control.
- Margin of Safety (MOS)

Another step in a loading analysis is the quantification of current pollutant loads by source. This allows the specification of load reductions as percentages from current conditions, considers equities in load reduction responsibility, and is necessary in order for pollutant trading to occur. The load capacity must be based on critical conditions – the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both load capacity and pollutant source loads vary, and not necessarily in concert, determination of critical conditions can be more complicated than it may appear on the surface.

A load is fundamentally a quantity of a pollutant discharged over some period of time, and is the product of concentration and flow. Due to the diverse nature of various pollutants, and the difficulty of strictly dealing with loads, the federal rules allow for "other appropriate measures" to be used when necessary. These "other measures" must still be quantifiable, and relate to water quality standards, but they allow flexibility to deal with pollutant loading in more practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint loads and allow "gross allotment" as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants whose effects are long term, such as sediment and nutrients, EPA allows for seasonal or annual loads.

The budget is balanced at the point where water quality standards are just being met and is allocated among all the various sources. Like keeping money in the bank for a rainy day, some of the budget is set aside as a margin of safety. And, like cash flow in a business, the pollution budget must take into account the seasonal or cyclic nature of pollutant loads and the receiving water's capacity, so a temporary exceedance does not occur.

The TMDL budget can be summarized (written as a mathematical problem) as follows. The equation is written in this order because it represents the logical order in which a TMDL is developed.

Load Capacity (LC) =
margin of safety (MOS)
+ natural background (NB)
+ allocations to pollutant sources (WLA and LA)
= TMDL (which must equal the Load Capacity)

First the load capacity is determined. The load capacity is the quantity of a pollutant a water body can receive over a given period without causing violations of state water quality standards. Then the load capacity is broken down into its components. A margin of safety is determined and subtracted; then natural background, if relevant, is quantified and subtracted; and then the remainder is allocated among pollutant sources. When the breakdown and allocation are completed, the result is a "TMDL", which must equal the load capacity. WLA represents a point source pollutant, LA represents a non-point source pollutatn.

In addition to being a pollutant load, "TMDL" also refers to the written, quantitative assessment of water quality problems and contributing pollutant sources. The Department of Environmental Quality (DEQ) has the authority and the responsibility to ensure that TMDLs are completed and submitted for U.S. Environmental Protection Agency (EPA) approval. On tribal lands, the EPA is likely to lead TMDL efforts with considerable help from the state, the tribe, and other agencies. The EPA has the responsibility to approve or disapprove all TMDLs. If the EPA formally disapproves a state TMDL, EPA is obligated under the Clean Water Act to issue a new TMDL within 30 days.

D.2-B History and Background of the Clean Water Act

In 1972, Congress passed the Federal Water Pollution Control Act, more commonly called the Clean Water Act. The goal of this act was to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Water Environment Federation 1987). The act and the programs it has generated have changed over the years, as experience and perceptions of water quality have changed.

The CWA has been amended 15 times, most significantly in 1977, 1981, and 1987. One of the goals of the 1977 amendment was protecting and managing waters to insure "swimmable and fishable" conditions. This goal, along with the 1972 act to restore and maintain chemical, physical, and biological integrity, relates water quality with more than just chemistry.

The federal government, through the EPA, assumed the dominant role in defining and directing water pollution control programs across the country. DEQ implements the CWA in Idaho, while the EPA oversees Idaho and certifies the fulfillment of CWA requirements and responsibilities.

D.2-C Idaho's Role and Beneficial Uses

Idaho adopts water quality standards to protect public health and welfare, enhance the quality of water, and protect biological integrity. A water quality standard defines the goals of a water body by designating the use or uses for the water, setting criteria necessary to protect those uses, and preventing degradation of water quality through antidegradation provisions.

The state may assign or designate beneficial uses for particular Idaho water bodies to support. These beneficial uses are identified in the Idaho water quality standards and include the following:

- Aquatic life support–cold water, seasonal cold water, warm water, salmonid spawning, modified
- Contact recreation–primary (swimming), secondary (boating)
- Water supply–domestic, agricultural, industrial
- Wildlife habitats
- Aesthetics

The Idaho legislature designates uses for water bodies. Industrial water supply, wildlife habitats, and aesthetics are designated beneficial uses for all water bodies in the state. If a water body is unclassified, then cold water and primary contact recreation are used as additional default designated uses when water bodies are assessed.

Water quality standards have been established by the Idaho legislature and approved by the U.S. EPA. The water quality standards designate beneficial uses and set water quality goals for the waters of the state and are designed to protect, restore, and preserve water quality in areas designated for specific uses such as cold, cool, or warm water fisheries; agricultural water supply; recreation; wildlife habitat; and aesthetics. Uses have been designated for most, but not all, water bodies within Idaho.

Section 303(d) of the Clean Water Act establishes requirements for states and tribes to identify and prioritize water bodies that do not meet water quality standards. Currently, DEQ is required to conduct a comprehensive analysis of Idaho's water bodies every two years to determine if they meet water quality standards. This analysis is published and submitted to the EPA in a document called an "**Integrated Report**.[2]" Idaho must develop a water quality plan, a TMDL, for those water bodies not found to be meeting water quality standards.

In Idaho, TMDLs are assessed on a subbasin level, which means water bodies and pollutants within a hydrologic subbasin are generally addressed in a single document. A subbasin is based on a cataloging unit of the U.S. Geological Survey (USGS) (a subbasin is the same as a USGS fourth field hydrologic unit, or HUC). There are 84 subbasins (HUCs) in Idaho. As of March 2004, 35 of Idaho's 84 HUCs have approved TMDLs.

D.2-D Subbasin Assessments (SBAs)

A subbasin assessment is the first step in developing a TMDL or recommending removing a water body from the list of impaired waters in the Integrated Report. Conducting the assessment entails analyzing and integrating multiple types of water body data, such as biological, physical, chemical, and landscape data. A subbasin assessment describes the following characteristics of the affected area:

- The Water Quality Concerns,
- Status of Beneficial Uses of Individual Water Bodies,
- The Nature and Location of Pollution Sources, and
- Past and Ongoing Pollution Control Activities.

The subbasin assessment's main purpose is to determine the causes and extent of the impairment when water bodies are not attaining water quality standards.

[2] At the time of publication of this FEIS, the Integrated Report was available online at www.deq.state.id.us/water/data_reports/surface_water/monitoring/integrated_report.cfm

While a subbasin assessment is not required by the Clean Water Act, DEQ completes the assessment to ensure impairment listings are up to date and accurate. The subbasin assessment is usually part of the TMDL document (Integrated Report), but may be prepared separately.

A subbasin assessment entails analyzing and integrating multiple types of water body data, such as biological, physical/chemical, and landscape data to address several objectives, as follow:

- Determine the degree of designated beneficial use support of the water body (i.e., attaining or not attaining water quality standards).
- Determine the degree of achievement of biological integrity.
- Compile descriptive information about the water body, particularly the identity and location of pollutant sources.
- Determine the causes and extent of the impairment when water bodies are not attaining water quality standards.

D.2-D.1 Impaired Waters, TMDLs and Pollution vs. Pollutant

Some conditions that impair water quality do not receive TMDLs. The EPA does consider certain unnatural conditions (such as flow alteration, human-caused lack of flow, or habitat alteration) that are not the result of the discharge of a specific pollutants as "pollution." TMDLs are not required for water bodies impaired by pollution, but not by specific pollutants. A TMDL is only required when a pollutant can be identified and in some way quantified.

Unnatural conditions that impair water quality are categorized as pollutants or pollution. A pollutant is a substance that can be identified and in some way quantified. Examples include bacteria or sediment. Temperature changes are also considered a pollutant because they are quantifiable. Conditions that can be identified, but that are not caused by a quantifiable pollutant, are categorized as "pollution". Examples include flow alteration, human-caused lack of flow, and habitat alteration

A TMDL is only required to address pollution that is caused by pollutants. Therefore, if a water body is impaired because of pollution (e.g. flow alteration), but not a pollutant (e.g. sediment), that water body will not receive a TMDL for that pollution. If a water body is impaired by pollution and a pollutant (e.g., habitat alteration and bacteria), it will receive a TMDL for the pollutant (in this example, bacteria).

Pollution Sources – Point and Nonpoint

In general, watersheds are subject to two broad categories of pollution sources: point and nonpoint. Point source pollution is typically associated with industrial discharges, municipal waste treatment facilities, and confined animal feeding operations. The effects can be directly traced to a particular source or facility (a "point"). Point source pollution can often be measured at an outfall or pipe.

Nonpoint source pollution, on the other hand, is more difficult to identify. It includes, among other things, the cumulative effects of fertilizers and pesticides that farmers and homeowners may use; the oil that is carelessly poured down storm drains; and various land use practices including urban development, agriculture, and forestry. Due to its rural nature, most pollution in Idaho is nonpoint source pollution.

The specific pollutants of concern vary from watershed to watershed. In much of rural Idaho, water quality concerns center around excess sedimentation, elevated stream temperatures, and nutrient overloading. In developed areas, concerns often focus on bacteria, oil and grease, and dissolved oxygen. In industrial or mining areas, heavy metals are often at the top of the list.

Beneficial Use Reconnaissance Program (BURP)

DEQ collects data on individual water bodies in Idaho through the **Beneficial Use Reconnaissance Program (BURP)**[3] and solicits data from outside sources such as other government agencies. These data are compared to Idaho's **water quality standards** to determine if a particular water body is meeting standards and supporting beneficial uses, and the findings are documented in the **Integrated Report.** While DEQ frequently is able to determine what pollutants (if any) are impairing water quality from this data, this determination is not required at this stage. A water body may be listed in DEQ's Integrated Report as not supporting its beneficial uses or meeting standards, but be listed with the pollutant as "unknown."

In the subbasin assessment phase of writing a TMDL, more data about the water body are collected. At this stage, DEQ determines what pollutants are causing the impairments and the sources of those pollutants. Because a TMDL is a total maximum daily load, pollutants are generally measured and allocated as loads (a concentration [mass/volume] or the amount of a pollutant measured over time [mass/time]). However, it is not always feasible to measure pollutant loads directly or to compare a pollutant load to beneficial use support. In those situations, surrogate measures are used. A surrogate is simply one measurement substituted for another. Surrogates are typically used because the substitute is more easily measured or used than

[3] At the time of FEIS publication, information on this program was available from DEQ on the internet at www.deq.state.id.us/water/data_reports/surface_water/monitoring/overview.cfm

the attribute of real interest. A surrogate is often a more practical gauge of progress in reaching water quality objectives than a load by itself.

An example of a common surrogate used in TMDLs is assigning a target of a certain percent shade to a stream segment instead of assigning an actual temperature "load." A temperature load (such as kilocalories/mile/day) is too abstract to provide a useful or easily understandable allocation. However, a surrogate allocation of a certain percent shade cover over a stream is much easier to measure and understand. The appropriate percent shade cover would provide the conditions necessary to meet water quality standards (in this case, a maximum temperature), just as a temperature load would.

While surrogates can be used as targets, they cannot, by themselves, be used to determine if a stream is in compliance with water quality standards or is meeting beneficial uses. For example, if a stream is assigned a surrogate target of 50% shade and it reaches that target, that fact alone cannot be used to say that the stream now meets its beneficial uses or water quality standards. Stream temperatures must still be taken to compare to standards and biological data must be gathered to determine beneficial use support.

D.2-E Beneficial Uses

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses are interpreted as existing uses, designated uses, and presumed uses as briefly described in the following paragraphs. The *Water Body Assessment Guidance*, second edition (Grafe et al. 2002) gives a more detailed description of beneficial use identification for use assessment purposes.

D.2-E.1 Existing Uses

Existing uses under the CWA are “those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the water quality standards.” The existing in-stream water uses and the level of water quality necessary to protect the uses shall be maintained and protected (IDAPA 58.01.02.050.02, .02.051.01, and .02.053). Existing uses include uses actually occurring, whether or not the level of quality to fully support the uses exists. A practical application of this concept would be to apply the existing use of salmonid spawning to a water that could support salmonid spawning, but salmonid spawning is not occurring due to other factors, such as dams blocking migration.

D.2-E.2 Designated Uses

Designated uses under the CWA are “those uses specified in water quality standards for each water body or segment, whether or not they are being attained.” Designated uses are simply uses officially recognized by the state. In Idaho these include uses such as aquatic life support, recreation in and on the water, domestic water supply, and agricultural uses. Water quality must be sufficiently maintained to meet the most sensitive use. Designated uses may be added or removed using specific procedures provided for in state law, but the effect must not be to preclude protection of an existing higher quality use such as cold water aquatic life or salmonid spawning. Designated uses are specifically listed for water bodies in Idaho in tables in the Idaho water quality standards (see IDAPA 58.01.02.003.27 and .02.109-.02.160 in addition to citations for existing uses).

D.2-E.3 Presumed Uses

In Idaho, most water bodies listed in the tables of designated uses in the water quality standards do not yet have specific use designations. These undesignated uses are to be designated. In the interim, and absent information on existing uses, DEQ presumes that most waters in the state will support cold water aquatic life and either primary or secondary contact recreation (IDAPA 58.01.02.101.01). To protect these so-called “presumed uses,” DEQ will apply the numeric cold water criteria and primary or secondary contact recreation criteria to undesignated waters.

If in addition to these presumed uses, an additional use, (e.g., salmonid spawning) exists, because of the requirement to protect levels of water quality for existing uses, the additional numeric criteria for salmonid spawning would apply (e.g., intergravel dissolved oxygen, temperature). However, for example, if cold water aquatic life is not found to be an existing use, a use designation to that effect is needed before some other aquatic life criteria can be applied in lieu of cold water criteria (IDAPA 58.01.02.101.01).

D.2-F The TMDL Process

When a water body is listed as impaired in the Integrated Report, it is placed on the **TMDL schedule.** Each TMDL must be submitted to the EPA by December 31 the year it is due. The general steps involved in writing a TMDL are listed below. Generally, it takes approximately two years to write a TMDL; however, this process can take longer if the subbasin is highly complex.

- DEQ prepares a draft subbasin assessment with input and advice from a **watershed advisory group (WAG)**[4].
- DEQ presents the draft subbasin assessment to the watershed advisory group, **basin advisory group (BAG)**, or both.
- DEQ revises the draft subbasin assessment and determines water quality targets.
- DEQ develops draft total maximum daily load allocations.
- DEQ presents the proposed load allocations to the watershed, or basin advisory group, or both.
- DEQ incorporates comments from the watershed and basin advisory groups and prepares the TMDL for formal public comment.
- A formal 30-day public comment period occurs.
- DEQ responds to public comments.
- DEQ submits a final TMDL to the EPA for approval.
- Concurrent with submittal to the EPA, DEQ publishes notice in the *Idaho Administrative Bulletin*[5] that the TMDL has been submitted to the EPA. Those affected by the TMDL may file an appeal within 35 days of publication in the Bulletin.
- The EPA approves or disapproves the TMDL; if the EPA disapproves a TMDL, EPA has 30 days to issue a new one.

When a TMDL is completed, the next task is to implement its recommendations and meet its goals. An implementation plan, guided by an approved TMDL, is written and provides details of the actions needed to achieve load reductions and a schedule of those actions. It also specifies the monitoring needed to document action and progress toward meeting water quality standards.

State and federal government agencies can often assist in this process by providing technical assistance and grants, but it is the residents, businesses, and landowners within the watershed who determine success. Watershed advisory groups are in a key position to lead the implementation plan. Of course, it is not the plan, but the results of that plan, that will return waters to a healthy state that will support swimming, fishing, and other uses. Local people need to be involved in solving the problems; they are also the main beneficiaries of the end results.

D.2-F.1 The TMDL Integrated Report

Every two years, DEQ is required by the federal **Clean Water Act** to conduct a comprehensive analysis of Idaho's water bodies to determine whether they meet state **water quality standards** and support beneficial uses, or if additional pollution controls are needed. This analysis is summarized in an "Integrated Water Quality Monitoring and Assessment Report" (Integrated Report), which is submitted to the U.S. EPA for approval. The report serves as a guide for developing and implementing water quality improvement plans **(or TMDLs**) to protect water quality and achieve federal and state water quality standards.

An Integrated Report must be approved by the EPA before it can be used by a state to guide its management decisions. Idaho's most recent *approved* version is its **2002 Integrated Report.** This document will continue to guide DEQ's water quality management decisions until a **2004/2006 Integrated Report** is completed by DEQ and approved by EPA.

The Integrated Report serves three functions. First, it is a reporting requirement of the Clean Water Act, so DEQ must prepare an Integrated Report to be in compliance with federal law. Second, it provides the public the opportunity to learn about and comment on the status of all of Idaho's waters. Third, the Integrated Report compiles environmental data and information from all components of DEQ's surface water quality program, as well as from other agencies, organizations, and individuals, which gives water quality managers a comprehensive look at the relative quality of all of Idaho's water bodies and helps them to set priorities and allocate resources accordingly.

Prior to 2002, the Integrated Report did not exist in its current form. Instead, two documents were prepared and submitted to the EPA. The first of these was a list (called a "§303(d) list") of all impaired waters in the state, as required under Section 303(d) of the Clean Water Act. The second was a report (called a "§305(b) report") that summarized the status of all of Idaho's

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[4] At the time of FEIS publication, information on these advisory groups was available from DEQ on the internet at www.deq.state.id.us/water/data_reports/surface_water/tmdls/overview.cfm#BAGs#BAGs

[5] At the time of FEIS publication, the Idaho Administrative Bulletin was available on the internet at http://admin.idaho.gov/adminrules/bulletin/mstrtoc.htm

waters, as required under Section 305(b) of the Clean Water Act. The Integrated Report is a combination of these two documents.

Assessment Units and Water Quality Limited Stream Segments

The Integrated Report identifies water bodies differently than old §303(d) lists and §305(b) reports. The old lists and reports used "water quality limited segments" to identify streams and portions of streams that were impaired; the Integrated Report uses "assessment units." Assessment units are groups of similar streams within a subbasin that have similar land use practices, ownership, or land management. Assessment units and water quality limited segments do not always correlate, so it can be difficult to compare directly from an old §303(d) list or §305(b) report to a current Integrated Report. A **"crosswalk"** has been developed to assist in finding 1998 §303(d) listed segments within the assessment unit framework used in the 2002 Integrated Report.

Integrated Report Water Body Classifications

The Integrated Report classifies all of the state's waters into one of five different categories, which correspond to the five sections of the report, as follows:

1. Waters Attaining All Standards
2. Waters Attaining Some (most) Standards
3. Waters with Insufficient Date and Information to Determine if Any Standards are Attained
4. Impaired or Threatened for One or More Standards, but Not Needing a TMDL
5. TMDL Needed

Section 1: Water of the State Attaining All Standards

Section 1 contains only a few pristine waters that lie completely in wilderness or roadless areas and comply with all of Idaho's narrative water quality criteria. Idaho has many waters that support all beneficial uses but lack an assessment methodology addressing the wildlife and aesthetics beneficial uses. Even though Idaho's water quality standards state that compliance with general narrative standards is sufficient to show a water body is supporting the wildlife and aesthetic beneficial uses, DEQ conservatively lists most waters in Section 2. The only difference between waters listed in Sections 1 and 2 of Idaho's Integrated Reports is the wilderness status of the waters in Section 1. Idaho lists most waters that support their assessed beneficial uses and comply with all water quality standards in Section 2, below.

Section 2: Waters of the State Attaining Some (most) Standards

Water bodies in Section 2 fully support all beneficial uses that have been assessed. Waters assessed for the 1998 303(d) List that supported their beneficial uses and that were approved by EPA as supporting their uses were carried forward to this section when no data indicated a change in their beneficial uses support status.

Section 3: Waters of the State with Insufficient Data and Information to Determine if Any Standards are Attained.

Water bodies in Section 3 meet two criteria:

a) No data indicated an impairment of beneficial uses and
b) Not enough data existed at the time of assessment to determine that standards have been met.

Section 4: Impaired or Threatened for One or More Standards but Not Needing a TMDL

Section 4 has three subsections:

a) Water bodies with completed and approved TMDLS – called 4a
b) Water bodies expected to meet standards – called 4b (Idaho does not use this section in its Integrated Reports)
c) Water bodies impaired by pollution but not pollutants

Section 5: TMDL Needed

Section 5 of the Integrated Report is equivalent to the 1998 303(d) list, except that it does not contain waters impaired by non-pollutants such as flow alteration or habitat modification (these are listed in Section 4c). Water bodies listed in Section 5 must have been listed on the 1998 303(d) list or since been determined to be impaired using procedures outlined in the Water Body Assessment Guidance. DEQ must demonstrate good cause for not including water bodies in Section 5 that were on previous 303(d) lists.

An individual assessment unit may be classified in more than one category. For instance, an assessment unit could be classified in Sections 1 or 2 or Section 3. If the water is impaired or if water quality standards are not being met, it could be in sections 4 and/or 5. For example, if a water body is listed as impaired due to temperature and flow alteration, it would be listed in Section 5 for temperature and in Section 4c for flow (flow is not considered a pollutant).

In addition to listing the water quality status of Idaho's water bodies, the Integrated Report also contains:

- A delineation of the assessment units based on the National Hydrography Dataset
- A description of the progress made toward assessing all Idaho surface waters
- A description of the basis for the status determinations
- A description of additional monitoring that may be needed to determine water quality standard attainment status, and, if necessary to support development of TMDLs for each pollutant/assessment unit combination
- Schedules for additional planned monitoring
- Schedules for TMDL development reflecting the priority ranking of each pollutant assessment unit combination

D.3 - Model Information and Disclosures

This section discloses the assumptions and limitations associated with the following models used in the Myrtle HFRA project analysis.

- WATSED
- Equivalent Clearcut Area (ECA)
- Watershed Erosion Prediction Project (WEPP)
  - Disturbed WEPP
  - WEPP Road
  - GeoWEPP
  - WEPP FuME (Fuel Management Effects)
- Road Drainage Structure Assessment

Soil erosion by water is a complex process resulting from the interactions among a number of factors including weather patterns, soils properties, topography, the influences of surface vegetation, and the spatial distribution of the disturbances. Natural variability is a dominant characteristic of each of these factors, which makes predicting soil erosion rates difficult. The models (described in detail below) aid in the analysis of erosion prediction following fire, logging, and road disturbances, and cumulative watershed effects.

The modeling results were not the sole source of information for making resource decisions and were not the only tools utilized for analysis of watershed responses and erosion potential. These modeling results were incorporated with other information, such as: 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; validation of the model using data for major geomorphic groups present on the Forest; and professional judgments by water and soils related specialists, based on education and experience, and who have made and documented conditions and observations in the analysis area; and knowledge of hydrologic processes and local existing conditions.

D.3-A WATSED

On the Idaho Panhandle National Forests, sediment yield is generally modeled using the R1/R4 Sediment Guides (USDA 1981) and the WATBAL Technical User Guide (Patten 1989). The version calibrated for the Idaho Panhandle National Forests is known as WATSED. 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), and the expected sediment load modifications over time. The estimate of additional loading is expressed as a percent of the "natural" sediment load (i.e., historic mean load prior to significant development activities), which is based on the history of disturbances and average climate patterns in the watershed. In this analysis, the existing condition represents the year 2004 and 2005, 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 not intended or 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 2000, 1999, and 1999b).

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 and integrate a vast and 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 2004, 2002, 2001, 2000, 1999, and 1999b) 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 is to provide 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.

WATSED estimates certain watershed processes that are usually primary and pertinent to cumulative effects on watershed responses, such as fuels reduction, roads, and fire (and their pertinent modifying factors including age and recovery, location in the watershed, harvest intensity and extent, logging and site prep methods; and road design). The model incorporates response curves and lookup tables generated from more intensive process models (i.e., Lief and Brink) and with statistical analyses of locally derived empirical data.

The model serves as an appropriate and useful tool to address cumulative effects of forest management activities in forested mountain watersheds similar to northern Idaho and western Montana. However, it does not analyze, nor was it intended to analyze, all activities (particularly those not associated with forestry and forest management) or specific individual events. Therefore, the model should be used with other available methods and models, inventories and surveys, monitoring results, information sources, professional experiences and judgment to develop inferences, conclusions, and recommendations for management. The primary intended use is to compare alternatives, not as precise predictions of actual individual (event-based) outcomes. For example, when WATSED predicts a 4% increase in sediment or peak flow, it is really no better than saying that the effects are negligible. Such small increased are not normally perceivable in the field and well within a normal range of values.

> Models provide one set of information to the technical user, who along with knowledge of the model (including its limitations), other models, data analysis, experience and judgment must integrate information from all of those sources to make the appropriate findings and conclusions.
>
> The primary intended use of WATSED is to compare alternatives, not to make precise predictions of actual individual (even-based) outcomes.

The watershed response model, WATSED, used on the Forest is designed to address the cumulative effects of fuels reduction operations, roads, and fire. It does not attempt to analyze the effects of grazing, or of mining (other than vegetation removal and road construction), or other non-forest practices. It does not attempt to simulate individual or episodic storm events or the event-based response to individual events. Mass erosion response to land management activity is represented in WATSED whose estimates are calibrated using measured data that include a combination of all watershed processes. WATSED was designed to objectively compare relative differences among alternatives in terms of changes in trend, risks, and regimen; rather than to predict precise sediment and water yields that might occur as a result of stochastic events or non-forest related actions. The model does not try to simulate individual drought or flood years. The model does not simulate individual climatic events including the occasional invasion of the region by warm moist air masses in the winter, sometimes called "rain-on-snow." It does, however account for those events in the model's calibration when the phenomena are part of the long-term climatic record in the region.

WATSED processes are generally specific to landtypes. The Forest has measured and determined the driving erosion and slope stabilities of the mapped landtypes on the Forest, and has used that information to calibrate the model and interpretations. All slope characteristics and activity data input to WATSED are stratified by landtype. Field verification at the project-level may identify unusual conditions that are not typical of certain landtypes; and that information should be acknowledged and adjusted for in the analysis or in the specialist's professional conclusions and interpretations.

Models are not designed to produce precise solutions; rather they are tools intended to provide a method to objectively compare relative differences among alternatives.

WATSED incorporates the concepts of the R1/R4 Sediment Guides, which focus on slope erosion, sediment delivery, and slope hydrology processes. It estimates the water and sediment likely to be delivered to the main channel of a study watershed

as modified by forest management and practices within the watershed, including the headwater stream channels. However, the routing of sediment and water through the main channel is limited to broadly based regional curves. No main channel hydrologic or hydraulic processes are modeled directly (e.g. main channel erosion).

D.3-B Equivalent Clearcut Area (ECA)

ECA output/data was derived from the WATSED model (Patten). Equivalent Clearcut Area (ECA) analysis is a tool used to index the relationship between vegetation condition and water yield from forested watersheds. The basic assumptions of the procedure are that removal of forest vegetation results in water yield increases and that ECA can be used as an index of these increases. Depending on the interaction between water yield, sediment yield, and stream channel conditions, such increases could have impacts on stream channels.

ECA is a measure of the relative spatial extent of vegetation removed in a watershed through wildfire, road construction, timber harvest or certain other events that result in canopy removal. It is usually expressed as a percent of the watershed area (Belt, 1980). The ECA index takes into account the initial percentage of crown removal and the recovery through regrowth of vegetation since the initial disturbance occurred.

For purposes of this assessment, ECA will be used to index changes in canopy openings, through time, based on wildfires, fuels reduction and roading disturbances. Within the habitat types being treated under this project, the time frame for complete ECA recovery to occur is estimated to be 65 to 85 years (USDA Forest Service, 1974). Existing and new roads are considered as permanent openings in the ECA model. Decommissioned roads are considered as openings, so road decommissioning projects do not contribute to reductions in ECA until vegetation has recovered.

Belt (1980) concluded that the ECA procedure is a rational tool for evaluation of hydrologic impacts of forest practices. The WATSED model, described below, was used to generate ECA information for this project. Various ECA thresholds of concern have been in use in the Northern Region since the 1960s (Gerhardt, 2000). Early guides recommended a limit of 20-30 percent ECA within a watershed (Haupt, 1967).

D.3-C Water Yield and Peak Flow Analysis

Water yield increases were modeled through use of the WATSED model (Patten). There are a number of physical factors that determine the relationship between canopy conditions and water yield. Interception, evapotranspiration, shading effects and wind flux affect the accumulation and melt rates of snow packs and how rainfall is processed. Additional factors affecting water yield include compacted surfaces due to roads, skid trails, and landings.

Peaks flows in the project area are nearly always associated with spring snowmelt, at times accompanied by rainfall. See rain-on-snow section.

Concern over water yield changes relative to stream channel condition has focused on smaller headwater catchments. Research has demonstrated instantaneous peak flow increase up to 34 percent and maximum daily flow increases up to 87 percent, resulting from road construction and fuels reduction in small catchments (King, 1989). Recent observations have suggested that channel erosion from these streams may be contributing to increased bedload sediment in the 3rd order receiving channel (Gerhardt, 2002).

To understand changes and fluctuations with historic water yield and peak flow conditions, peak flows were modeled using WATSED. It is evident that peak flows are not static, but dynamic following disturbances. Following fires it is evident that peak flows are higher than background rates. Historically, when stand replacing fires removed the forest vegetation, water yield values rose sharply, then gradually declined to baseline condition (Patten, 1989). Research in the region has shown that causes of some peak flows are also associated with less frequent mid-winter rain-on-snow events and spring rain-on-snow events (MacDonald and Hoffman 1995). Their research showed that spikes were usually higher and over a shorter duration than what is currently modeled. WATSED cannot predict peak flows from these events because the timing and magnitude are unpredictable; they do not occur on an annual basis and are dependent on certain climatic conditions such as air temperature, intensity and duration of precipitation, rain-on-snow elevations, and snowpack characteristics (Berris and Harr 1987). However, it can be assumed that Myrtle Creek has been subjected to larger peak flows than what is modeled through WATSED. The Myrtle Creek drainage is a snowmelt-dominated stream, where peak flows are generated during the spring melt periods.

D.3-D Watershed Erosion Prediction Project (WEPP)

WEPP is a physically-based soil erosion model that describes the processes that cause erosion. WEPP considers site-specific information on climate, texture, ground cover, and topographic settings (Elliot et al. 1997, 2001, 2004). WEPP was used to estimate average annual erosion, sediment yield (in tons per year) and sediment delivery to streams, for each land management unit under baseline conditions and the proposed vegetation treatment.

WEPP Limitations

The accuracy of predicted values from WEPP is, at best, within plus or minus 50 percent. True erosion rates are highly variable due to large variations in local topography, climate, soil properties, and vegetative properties, so predicted values are only a single estimate of a highly variable process. This model has the following limitations:

- Uniform climate used.
- Not for channel sediment processes.
- Does not model gullying or landslides.

WEPP Components

The following four components of the model were used to determine the total sediment yield and delivery in the project area:

- Disturbed WEPP for hillslope erosion predictions related to management actions,
- Road:WEPP for road erosion predictions,
- GeoWEPP for hillslope erosion predictions and cumulative effects predictions related to fire, and
- WEPP: FuME (Fuel Management Erosion), a culmination of all three programs described above.

D.3-D.1 Disturbed WEPP

Disturbed WEPP is designed to predict sediment yield from hillslopes. The project area was subdivided into numerous elements according to proposed vegetation treatment and fuels reduction methods, harvest methods, and topographic divides (Elliot et al. 1997, 2001, 2004). The Disturbed WEPP model allows a hillslope to be divided into segments with similar soils, vegetation type, slope and canopy cover, called overland flow elements. Disturbed WEPP assumes there are two Overland Flow Elements (OFEs) – Upper and Lower, or Treated and Untreated.

Limitations

- These are hillslope (site-specific) tools, not (overall) watershed tools.
- Has limited user inputs and output information.
- Generally, the predicted erosion rate is likely to be within about plus or minus 50 percent of the mean. This range of variability is due as much to natural variability in the ecosystem as it is to errors in the modeling assumptions. Changes in any of the input conditions will results in changes in predicted sediment yields.

D.3-D.2 WEPP:Road

WEPP:Road is an interface to the WEPP model that allows users to describe road erosion and sediment delivery. It determines effects of road construction or modifications. An important feature of the model is its ability to predict the amount of sediment delivered to a stream and account for the sediment transport, distance and gradient. WEPP:Road allows the user to specify the characteristics of the road in terms of climate, soil and gravel addition, local topography, drain spacing, road design and surface condition, and ditch condition. WEPP:Road has three Overland Flow Elements (OFEs) – Road, Fillslope, and Forest.

Limitations

- These are hillslope (site-specific) tools, not (overall) watershed tools.
- Has limited user inputs and output information.
- Generally, the predicted erosion rate is likely to be within about plus or minus 50 percent of the mean. This range of variability is due as much to natural variability in the ecosystem and driving elements, as it is to errors in the modeling assumptions. Changes in any of the input conditions will results in changes in predicted sediment yields.

D.3-D.3 GeoWEPP

The Geo-spatial interface for the Water Erosion Prediction Project (GeoWEPP) is a GIS-driven graphical user interface. GeoWEPP utilizes readily available digital geo-reference information from publicly accessible internet sources such as the U.S. Geological Survey digital elevation models, topographical maps, and land use data, as well as Natural Resources Conservation Service soils maps. GeoWEPP is used for Burned Area Emergency Response (BAER), and for Cumulative Watershed Effects. The assessment results are mapped as a relative measure to a tolerable soil loss or Target value (T).

Limitations

- Results are for a single (dominant) soil and land use in each subcatchment.
- Results are only as good as the Digital Elevation Models (DEMs), soils, and management data availability.
- One climate dataset per watershed.
- No impoundments.
- Resolution of data (watershed boundary, subcatchment areas/hillslopes, profile creation) is variable.
- Does not calculate or include slope stability.

D.3-D.4 WEPP FuME

WEPP: FuME is an interface to the WEPP model developed to assist with analyzing soil erosion rates associated with fuel management activities. The interface estimates background erosion rates, and predicts erosion associated with mechanical thinning, prescribed fire, and the road network. The interface uses the Water Erosion Prediction Project (WEPP) model to predict sediment yields from hillslopes and road segments to the stream network. The WEPP FUME interface carries out erosion prediction runs for seven forest conditions: Undisturbed mature forest, wildfire, prescribed fire, thinning, no-traffic roads, low-traffic roads, and high-traffic roads. The climate, soil texture, topography, road density, wildfire cycle, prescribed fire cycle and thinning cycle are specified by the user.

Limitations

- Sediment predictions are for surface erosion only.
- Resolution of data (watershed boundary, subcatchment areas/hillslopes, profile creation) is variable.
- Does not calculate or include slope stability.

D.3-E Road Drainage Structure Inventory and Assessment

Road drainage structures (e.g. culverts) at stream crossings are common sites of ongoing or potential erosion and sediment sources. Failures occur when debris flows plug culverts and either concentrate water over the tops of road fills or divert water down the road or ditch and onto hillslopes unaccustomed to concentrated overland flow. Both scenarios produce large concentrations of sediment, which can scour the receiving channel bed and banks adding to the total sediment delivery. This detrimentally affects water quality and habitat for aquatic organisms.

Road drainage crossings were inventoried to assess erosional hazards and risks to aquatic ecosystems, using the *Methods for Inventory and Environmental Risk Assessment of Road Drainage Crossings* (Flanagan et al, 1998). Crossings were analyzed by collecting site-specific data organized into four categories:

- Culvert Hazard - the likelihood of culvert capacity being exceeded and potentially failing;
- Fill Hazard – the likelihood of the stream crossing fill failing;
- Consequences – the erosion effects of culvert failure, and;
- Impacts – the effects of culvert failure on downstream resources.

Factors in each category were given scores then weighted based on importance. Using the Environmental Risk Score and professional judgment, stream-crossing sites were identified as high, medium and low priority sites (or high, medium, and low erosion risk).

Limitations

- Limited analysis by the amount and type of field data collected.
- Analysis and output heavily linked to input variables, thus highly variable.
- Will not predict when the culvert would fail (just the likelihood or potential impacts if the culvert fails).

D.4 - Channel Morphology Definitions

D.4-A Bank Erosion Hazard Index (BEHI)

This is a semi-quantitative assessment of the susceptibility of stream banks to erode based on the root density, bank height, bankfull height, bank angle and the surface protection (vegetation). Five measurements (Bank Height/Bankfull Height Ratio, Root Depth/Bank Height Ratio, Stream Bank Angle, Root Density, Vegetative Cover) are taken at a minimum of five points on a reach. Like channel stability, this rating is used to supplement more quantitative data.

D.4-B Channel Stability Evaluation

This was developed by Pfankuch (1975) as a channel condition inventory process. It provides a consistent, qualitative assessment of conditions one could observe along river reaches. It is a means of rating the reach to get an overall picture of the condition of the channel, and the "stability" of a stream channel as depicted by 17 parameters. These parameters are occularly estimated along the reach and a score is derived. This method is not as robust as the more quantitative measurements, but is quick to do and has been in use since the 1970s. It is used to supplement the other measurements when determining function. The Pfankuch stability rating chart is used, and the score is stratified by Rosgen stream type.

D.4-C Entrenchment Ratio

This ratio is the vertical containment of a river and the degree to which it is incised in the valley floor. It helps to describe how "deep" the channel is. This is a non-dimensional parameter (floodplain width/bankfull width) describing the relationship between a stream channel and its floodplain. Entrenchment Ratios have implications for energy dissipation and channel erosion. An Entrenchment Ratio less than 1.4 is highly entrenched, while an Entrenchment Ratio greater than 2.2 is slightly entrenched (Rosgen 1996). Entrenchment Ratios within the same class depict similar conditions with respect to stream function. For example, Entrenchment Ratios of 2.3 and 2.9 may seem different numerically, but from a function point of view both describe slightly entrenched channels and can be considered similar.

D.4-D Gradient

Gradient is the slope of the channel water surface. This is a measure of how steep a stream is, described in percent (%). If a stream has a 3% gradient it drops 3 feet for every 100 feet of stream length. Gradient has implications for channel erosion and sediment. Rosgen classifies streams greater than 4% as being steep gradient and those less than 2% as being low gradient.

D.4-E Particle Size Distribution

This characteristic describes the type of channel material that is present. It tells us the size of the material, whether it contains bedrock, boulders, cobbles, gravel, sand, or silt. This is a measure of the stream's substrate, or sediment size distribution. Rosgen Pebble Count procedures involving 100+ pebbles are sampled in each reach to determine particle size distribution. "D50" is the point on the particle size curve that depicts the entire range of sediment sizes in a given reach. A D50 of 30 means that 50% of the stream bed is particles greater than 30mm, and 50% is less than 30mm. Particle sizes on the lower end of the curve (D5-D10) are of interest to those concerned with fine sediments in a stream channel.

D.4-F Sinuosity

This is the ratio of stream length to valley length. It can also be described as the ratio of valley slope to channel slope. It is the measure of the number of bends, curves and meanders in a stream channel compared to a straight channel. This is a non-dimensional parameter (stream length/valley length) describing the "straightness" of a stream. A sinuosity of 2 indicates that the stream is twice as long as the valley (many meanders). Sinuosity has implications for channel erosion and sediment.

D.4-G Width/Depth Ratio

Width/Depth Ration is an index value that indicates the shape of the channel cross-section. It is a ratio of how wide the channel is at bankfull (in feet) compared to the average depth of the channel at bankfull (in feet). This is a non-dimensional parameter (bankfull width/mean bankfull depth) describing whether a stream is wide and shallow vs. narrow and deep. Rosgen classification states that a W/D ratio <12 is low, while a W/D ratio >12 is high. Width/Depth ratios have implications for sediment transport, water temperature, and fish habitat. Width/Depth ratios are displayed in the cross-section figures.

D.5 - Rosgen Channel Flow Chart

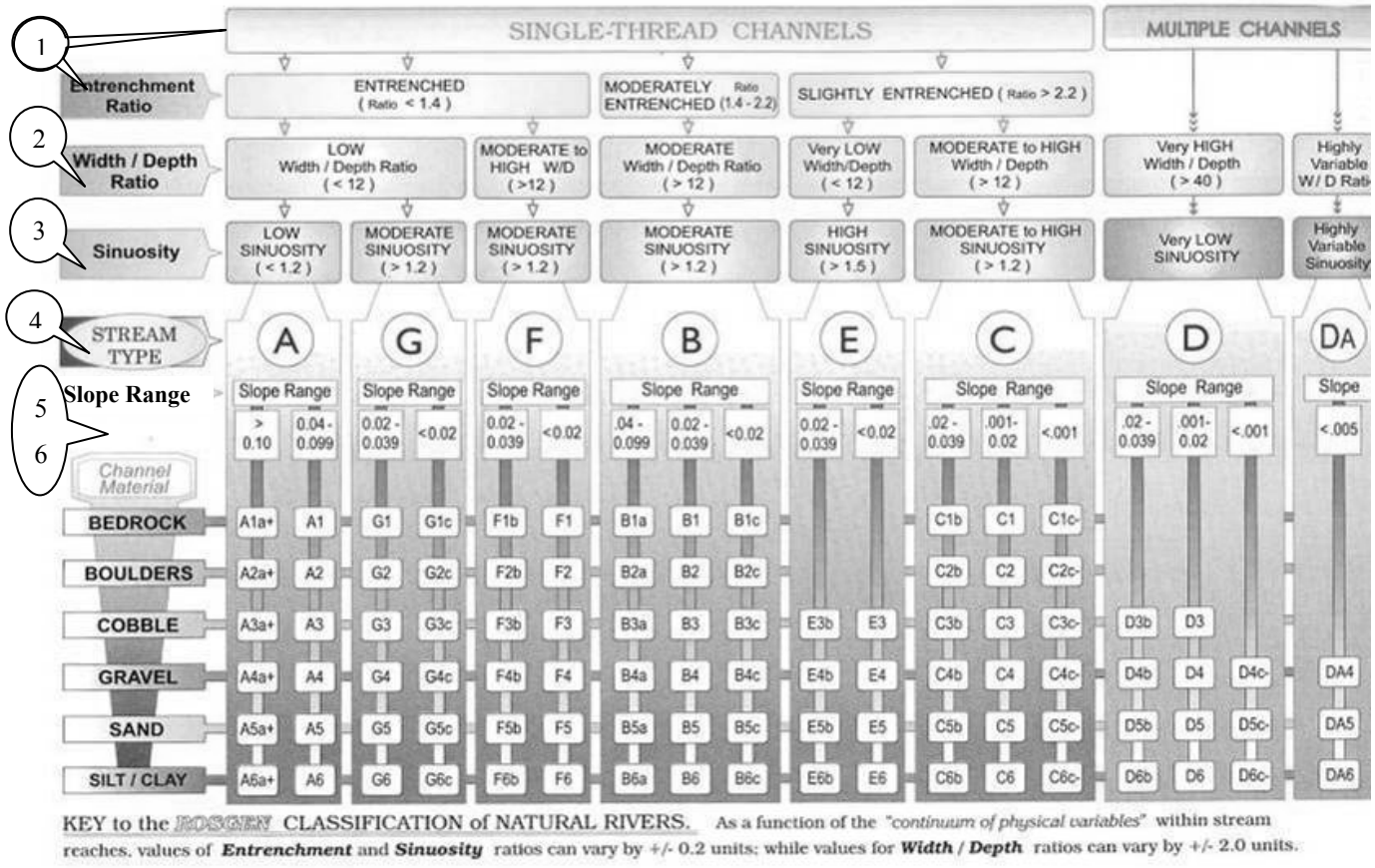
The Rosgen Channel flow chart shown below can be used as a visual aid in understanding the determination of Rosgen stream channels.

Step 1 - determining if a channel is a single-thread or if the stream has multiple channels. Single-thread channels are then broken down by Entrenchment Ratio.

Steps 2 and 3 - for all channels the next characteristics are Width/Depth Ratio, and Sinuosity.

Step 4 - At this point a channel is given a qualitative rating of A, B, C, D, DA, E, F, or G.

Steps 5 and 6 - The next characteristics to be evaluated are Slope Range and Channel Material.



D.6 - Reference Reach Comparison Analysis

Stream survey data are analyzed so that the reach in question ("project" reach) can be compared to a reference reach from a watershed that is of similar characteristics (Rosgen, 1998). Valley bottom width and valley bottom gradient are often the dominant predictors of identifying a comparable reference reach (Bengeyfield, 1999), with drainage area being the least robust of the three parameters (Bengeyfield, 2003), but not always. Other parameters are taken into account, as well. The values compared do not need to be exact, just to within a reasonable range, as determined by the knowledge of the area and hydrologic processes.

> Reach: A term used to identify a section of the stream that is being referred to or analyzed.
>
> Reference Reach: An undisturbed or least disturbed reach that shows the desired future condition. This reach is used as a means of comparing other reaches in order to determine the functioning status. It shows the characteristics a properly functioning reach should have.
>
> Valley Bottom Gradient (VBG): the slope of the valley bottom.
>
> Valley Bottom Width (VBW): how wide the valley bottom is.

The concept of using reference reaches is an evolving one, but the method has gained much support, use, and analysis, as shown in recent literature (Bengeyfield, 1999; Rosgen, 1998; Rosgen, 2001). By comparing reference and "project" reaches,

an assessment of the stream's function can be made (Rosgen, 1998; Rosgen, 1999). The reference reach is used as a comparison with the project reach to show the effects of management.

The stream surveys allow a comparison of three independent aspects of stream channel condition:

- stream type parameters
- channel stability evaluation
- bank erosion hazard index

Comparing these three parameters between reference and "project" reaches assures that no single parameter carries a disproportionate amount of weight in the determination of stream function.

Utilizing Information at a Variety of Scales

In order to make informed land management decisions, managers concerned with aquatic resources need information at a variety of scales. "Project level" decisions require fine-scale information relating to specific small watersheds or stream reaches, while planning level decisions require a characterization of broad scale patterns that will influence allocation and scheduling of activities. Quantified reference data can provide a basis for decisions at both scales by defining conditions that would exist in stream channels under the present climate and tectonic regimes in the absence of land management. At finer scales, data from undisturbed reaches can be directly compared with similar managed reaches to determine departures from reference conditions, while at broader scales reference data from a number of reaches can be use to define desired conditions across a region.

Reference Reaches and Project Reaches

The concept of using minimally disturbed sites as references has appeared in the literature in recent years (Dissmeyer, 1993). Recent methodologies for analyzing watershed conditions (USDA 1981, and USDA 1995) recommend the use of reference watersheds as a means of determining the effects of land management. Within each watershed, designated reference reaches, or portions of channels of similar morphology are identified.

Reference reaches are matched with project reaches on the basis of three characteristics, as follows:

- the similarity of their valley bottom gradient,
- valley bottom widths, and
- the drainage area above the reach.

Analyzing the data from the reference data set and project reach stream surveys produces a comparison table. For instance, Rosgen (1996) demonstrated that valley type provides an indication of what the stream channel morphology should be in the absence of disturbance. Bengeyfield (1999) showed the relationship between valley features and drainage area to stream types for southwest Montana. Using a Classification and Regression Tree procedure (Brieman et. al., 1984) and an earlier version of this data set, Bengeyfield used Valley Bottom Gradient, Valley Bottom Width, and Drainage Area to predict Level One stream types (a broad classification based on geomorphic features and valley types). A cross validation procedure showed that E stream types (Rosgen, 1988, Bengeyfield, 1999.), for example, were correctly predicted 89% of the time.

Use of Reference Reaches in Determining Target Levels of Pollutants

In recent years, states have identified Water Quality Limited Segments (WQLS) as impaired water bodies that are in need of restoration in order to meet the requirements of the Clean Water Act. This process is designed to be quantitative, and concentrations of a pollutant are required to be met before the stream designation can be changed. The use of reference conditions is considered to be an acceptable concept for determining target levels of pollutants (Bengeyfield, 1999). Sediment is considered a major pollutant, and reference data depicting channel conditions can help in the determination of a watersheds sediment situation in two ways: 1) by identifying shifts in channel morphology, unstable conditions that are more likely to create and perpetuate sediment sources can be identified, and 2) data from substrate sampling can quantify the amount of sediment that exists in a channel that represents reference conditions. Furthermore, it is recommended that reference conditions be measured across a region to define variability (Frissel et. al., 1986).

Summary

The measurement of a variety of physical parameters in watersheds that are largely undisturbed can be used to define physical stream conditions that reflect the present climate and geologic nature of a region. If these measurements are used as references, land managers can estimate the dimension, pattern, and profile that would be the result of natural processes for stream channels within their area. By measuring the parameters that are used as delineative criteria in the Rosgen classification, stream types can be locally defined.

D.7 - Function Call Information

The following definitions of functionality are taken from the Technical Reference Guide TR-1737-15 (USDA, USDI; 1988).

D.7-A Properly Functioning

The stream reach is properly functioning when there is adequate vegetation, landform, or large woody debris present to:

- Dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality
- Filter sediment, capture bedload, and aid floodplain development
- Improve floodwater retention and ground-water recharge
- Root masses that stabilize banks against cutting action
- Develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production
- Support greater biodiversity

A properly functioning reach usually shows little or no evidence of management effects or impacts. The stream reach typically has little deviation of channel type and parameters when compared to its reference reach thus can even be considered a "reference reach" in certain instances. A properly functioning reach also supports its designated beneficial uses.

D.7-B Functioning-At-Risk

A stream reach is functioning-at-risk when an existing soil, water, or vegetation attribute makes it susceptible to degradation. There is high probability of degradation with a relatively high flow event(s). A functioning-at-risk rating generally carries a downward trend rating with it, and this can be determined either through measurements over time, or from onsite indicators. There is usually deviation of channel type and parameters of the project reach when compared to its reference reach. There is often some evidence of management effects or impacts.

A stream reach can still support its designated beneficial uses and be somewhat stable and still be classified as functioning-at-risk. The functioning-at-risk status indicates that there have been management effects on the reach and the potential for degradation is higher than that of a properly functioning reach. There are very few properly-functioning reaches, because there are few reaches that are untouched from management activities. A functioning-at-risk reach may or may not be stable; and may or may not support its designated beneficial uses.

D.7-C Not-Properly-Functioning

The stream reach is not properly functioning when there is inadequate vegetation, landform, or large woody debris present to dissipate stream energy associated with high flows, and thus is not reducing erosion, improving water quality, etc. There is typically significant deviation of channel type and parameters of the project reach when compared to its reference reach. There is usually evidence of management effects or impacts. A not-properly-functioning reach does not support its designated beneficial uses.

D.7-D Functions and Desired Future Condition

Desired future condition (DFC) is used to describe the future condition of federal forests and rangeland resources that meet management objectives. The desired future functions will allow for a dynamic, regenerating channel and an active connection between the channel and its flood-plain. DFC is a stream that has a properly functioning status, thus, meets the criteria outlined above for Properly Functioning Condition.

Both functioning-at-risk and not properly functioning reaches require a change in watershed condition to move them toward a properly functioning state, whereas it is assumed that a reach that is presently properly functioning has maintained itself under the present conditions, and can continue to do so. Therefore, it is appropriate to group functioning-at-risk and not properly functioning reaches together as areas that need to be considered for management changes, provided land managers are considering the whole watershed as a system.

Developing a management plan that focuses on areas where the present trend needs to be reversed provides a more likely chance that properly functioning reaches will be achieved. Grouping or averaging functioning-at-risk reaches with those that are properly functioning would provide a misleading picture of both the existing condition and the workload needed.

Generally, functioning-at-risk reaches have enough of the attributes of a properly functioning system that they will respond to a change in management and will reverse the downward trend without mechanical treatment. Not properly functioning reaches often require greater investment of time, and money, plus more substantial management changes to begin moving toward a

properly functioning condition. Functioning-at-risk reaches often receive a high priority for treatment/management change because a relatively small investment will yield more timely and positive results.

In order to determine the existing condition of streams, it is necessary to relate the above definitions to the inventory data gathered and the analysis technique of comparing project and reference reaches.

Although all function determinations are made by professional judgment on a site specific basis, determining the function of a reach involves many factors and is not a "cookbook" process.

Some overall principles are generally followed:

1) If a stream has shifted a stream class (E to B for example), its dimension, pattern and profile have changed enough so it does not likely meet the criteria for properly functioning set out in Technical Reference Guide TR-1737-15 (USDA, USDA, USDI, 1988). In these cases, a not properly functioning rating is often given.
2) If a stream is the same stream class as the reference, but there is an appreciable difference in some parameters (both reaches are Es, but reference reach has a width/depth ratio of 3 and project reach has a width/depth ratio of 12), then a trend away from stability exists. These reaches are often rated as functioning-at-risk.
3) Other inventory data (Cumulative Width Distribution, Channel Stability, Bank Erosion Hazard Index, Riffle Stability Index) are used to validate stream type data. The initial function call can either be supported or modified by these additional data. In that way, the function call is not dependent on only one type of data.

D.8 - Road Erosion Risk Criteria

D.8-A High Erosion Risk

Roads that have a combination of the following conditions:

- Designed with ditch lines and culverts, and vegetation is now growing in the roadway, but still have drainage structures.
- Not maintained and cross perennial fish bearing streams.
- Unstable fills (i.e. tension cracks, slumping fills and cut-slopes) within influencing distance of perennial water; undercut slopes on the cutslope side.
- Constructed on highly unstable landtypes.
- Within riparian influence of perennial streams.
- Stacked roads on steep topography that would contribute sediment to stream channels if cascading failure occurred.
- Undersized culverts (not sized for 100 year event) on perennial and ephemeral channels on open drivable road.
- Excessive ditch line erosion on vegetated roads.
- Ditches draining directly to a channel.
- Located above and draining to unstable landforms below the road.

D.8-B Moderate Erosion Risk

Roads that have a combination of the following conditions:

- Tiered on top of one another, out-sloped, outside the influence of perennial water.
- Out-sloped and do not have culverts or ditch lines.
- Out-sloped with failing fills, but outside the influence of perennial water.
- Out-sloped roads outside of perennial stream riparian areas.
- Too few cross-drain culverts.
- Cross-drain culverts with low fill volumes that when they fail will not create mass failure.
- Excessive erosion is widening and deepening the ditch line; thus there is not enough ditch relief.

D.8-C Low Erosion Risk

Roads that have a combination of the following conditions:

- Out-sloped and built to fit with topography of landscape.
- Open, drivable, have drainage structures sized for 100 year event and have adequate road maintenance program.
- Drainage structures have been removed and there are enough cross-drains in the ditch line to decrease volume and velocity of ditch line water transport.
- Roads are currently maintained and are in hydrologically stable condition.

D.9 - Decommissioning Priority for Road and Road Segments in the Myrtle Creek and Snow Creek Watersheds.

The following tables list all roads within the Myrtle Creek and Snow Creek watersheds and describe their ownership (classification), current level of maintenance, any resource issues that may be associated with the road, and the priority for decommissioning the road. The use of an asterisk (*) in the table indicates that no survey was conducted and no decommissioning call made, but resource issues exist.

Table D.1 Road Decommissioning Priorities in Myrtle Creek Watershed

Road	Length	Current Classification	Current Maintenance Level	Resource Issues	Priority
13	*	County	County	*	*
1309	4.65	NFSR	Level 1	Municipal Water Grizzly BMU	High
1309C	1.22	NFSR	Level 1	Municipal Water Grizzly BMU	High
1309UA	2.31	Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
1309UB	0.37	Private	Private	*	High
1309UC	0.46	Private	Private	*	High
1309UE	0.56	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
1309UG	0.52	Private	Private	*	High
13UG	0.68	Private	Private	*	*
18	11.65	County	County	*	*
18UT	1.2	Private	Private	*	*
2190	3.9	NFSR	Level 2	Grizzly BMU	X
2400	1.0	NFSR/ Private	Level 1 & Private	Municipal Water Grizzly BMU	X
2400UA	0.78	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
2405	4.5	NFSR/ Private	Level 1 & Private	Municipal Water Grizzly BMU	High
2405A	3.3	NFSR/ Private	Level 1 & Private	Municipal Water Grizzly BMU	High
2405AUA	0.31	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405AUB	0.15	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405AUC	0.1	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405AUD	0.29	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
2405B	0.1	NFSR	Level 1	Municipal Water Grizzly BMU	High
2405C	1.0	NFSR	Level 1	Municipal Water Grizzly BMU	High
2405CUA	0.82	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405CUB	0.31	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High

Road	Length	Current Classification	Current Maintenance Level	Resource Issues	Priority
2405D	2.1	NFSR	Level 1	Municipal Water Grizzly BMU	High
2405DUA	0.38	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405DUB	0.77	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405DUC	0.6	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405UA	0.74	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405UB	1.17	Private	Private	*	*
2405UC	2.07	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
2405UD	1.02	Private	Private	*	Moderate
2405UE	2.06	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	X
2405UF	0.71	Impassible	Private	*	*
2405UG	1.14	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Low
2405UH	0.43	Private	Private	*	*
2405UI	0.09	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405UJ	0.10	Private	Private	*	*
2405UK	0.10	Private	Private	*	*
2405UL	0.33	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405UM	0.16	Private	Private	*	*
2405UN	0.34	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2405UO	0.18	Private	Private	*	*
2405UP	0.22	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Low
2405UQ	0.09	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	High
2406	2.7	NFSR & Private	Private & Level 2	Municipal Water Grizzly BMU	X
2406A	0.9	NFSR & Private	Private & Level 1	Municipal Water Grizzly BMU	Low
2406AUA	0.87	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate
2406UA	1.11	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate
2406UA	0.34	Private	Private	*	*
2406UB	0.95	Private	Private	*	*
2406UC	0.15	Private	Private	*	*
2406UD	0.40	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate
2406UE	1.91	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate

Road	Length	Current Classification	Current Maintenance Level	Resource Issues	Priority
2408	2.8	NFSR & Private	Level 2 & Private	Municipal Water Grizzly BMU	X
2408UA	0.27	Private	Private	*	*
2409	1.5	NFSR & Private	Level 2 & Private	Municipal Water Grizzly BMU	X
2409UA	1.35	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate/ High
2409UB	1.49	Private	Private	*	High
2409UC	0.69	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate/ High
2409UE	0.48	Private	Private	*	High
2409UG	0.61	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate/ High
2409UH	0.22	Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate/ High
2409UI	0.49	Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Moderate/ High
2411	0.10	NFSR	Level 2	*	Low
2646	0.10	NFSR	Level 2	*	Low
633	11.7	NFSR & Private	Level 2 & Private	Municipal Water Grizzly BMU	X
633A	1.3	NFSR & Private	Level 2 & Private	Municipal Water Grizzly BMU	Moderate
633AUA	0.85	Unclassified	FS & Undetermined	Municipal Water Grizzly BMU	Moderate
633C	0.5	NFSR	Level 1	Municipal Water Grizzly BMU	X
633D	0.1	NFSR	Level 1	Municipal Water Grizzly BMU	Low
633E	0.9	NFSR	Level 1	Municipal Water Grizzly BMU	High
633UA	1.31	Private/ Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	High
633UB	0.2	Private	Private	*	High
633UC	0.29	Private	Private	*	*
633UD	0.42	Unclassified	FS & Undetermined	Municipal Water Grizzly BMU	High
633UE	0.16	Private	Private	*	*
633UF	0.22	Private	Private	*	*
633UG	0.12	Private	Private	*	*
633UH	0.59	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	Moderate
633UI	0.47	Private	Private	*	*
633UJ	0.09	Private	Private	*	*
633UK	0.2	Private	Private	*	*
633UL	0.04	Private	Private	*	*
658	3.02	NFSR & Private	Level 1 & Private	Municipal Water Grizzly BMU	Low

Road	Length	Current Classification	Current Maintenance Level	Resource Issues	Priority
658UA	0.71	Private	Private	*	*
658UB	0.44	Private	Private	*	*
661	8.3	NFSR & Private	Level 2 & Private	Municipal Water Grizzly BMU	X
661A	0.85	NFSR & Private	Level 1 & Private	Municipal Water Grizzly BMU	X
661UA	1.2	Private / Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	X
661UE	0.38	Private	Private	*	*
661UG	0.55	NFSR	FS Undetermined	Municipal Water Grizzly BMU	Moderate
661UI	0.94	Private / Unclassified	Private & FS Undetermined	Municipal Water Grizzly BMU	Low
661UJ	0.57	Private	Private	*	*

*** = Private road, no decommissioning call made, but resource issues exist. No survey conducted.**
X = Road not to be decommissioned, road package needed if used as a haul route, or upgrades needed due to resource concerns.

Table D.2 Road Decommissioning Priorities For Snow Creek Watershed (in the project area)

Road	Length	Current Classification	Current Maintenance Level	Resource Issues	Decommissioning Priority
402	9.5	NFSR	Level 3	Grizzly BMU	X
402C	0.76	NFSR	Level 1 & 2	*	High
402H	1.4	NFSR	Level 1	*	Moderate
402UF	1.01	Private	Private	*	Low/Moderate
402A	1.43	Private/ Unclassified	Private & FS Undetermined	X	Moderate
402UN	0.2	Private	Private	*	*
402UP	0.13	Private	Private	*	*
402UQ	0.14	Private	Private	*	*
402UR	0.64	Private/ Unclassified	Private & FS Undetermined	*	Low
402US	0.28	Unclassified	FS Undetermined	*	Moderate
402UU	0.07	Unclassified	FS Undetermined	*	Moderate
402UV	0.09	Private	Private	*	Low
402UX (A)	0.32	Private/ Unclassified	Private & FS Undetermined	*	Low
402UY	0.07	Unclassified	FS Undetermined	*	Moderate
402UZ	0.47	Unclassified	FS Undetermined	Municipal Water Grizzly BMU	Moderate

*** = Private road, no decommissioning call made, but resource issues exist. No survey conducted.**
X = Road not to be decommissioned, but road package needed if used as a haul route, or upgrades needed due to resource concerns.

D.10 - D.10 – Stream Survey Analysis

D.10-A Introduction

Channel morphology in project subwatersheds has been altered through two primary processes: sediment deposition and channel encroachment. Sediment deposition has occurred in areas subjected to roading and fuels reduction. Channel encroachment has occurred where roads and fuels reduction have taken place adjacent to streams and their floodplains.

Please refer to section D.6 for in-depth explanation of using reference reach comparisons for stream reach analysis.

Throughout the individual reach sections, the channel morphology is displayed in a table that allows for the comparison of the 2005 survey to a specific reference reach, as well as "typical" reference criteria. The data shows how much this specific reach has deviated from a reference reach condition and how far it is from a desired future condition (DFC) (see Appendix D.7 for further explanation of DFC and function status calls). Function status condition calls are per reach segment for those specific reach/channel segments and not the entire watershed. The overall watershed function status call is made in the watershed summary section.

A properly functioning reach supports its designated beneficial uses. A functioning-at-risk stream reach can still support its designated beneficial uses. The functioning-at-risk status indicates that there have been management effects on the reach and the potential for degradation is higher than that of a properly functioning reach. There are very few properly-functioning reaches, because there are few reaches that are untouched from management activities. A functioning-at-risk reach may or may not be stable; and may or may not support its designated beneficial uses. A not-properly-functioning reach does not support its designated beneficial uses.

By comparing reference and "project" reaches, an assessment of the stream's function can be made (Rosgen, 1998; Rosgen, 1999). The reference reach is used as a comparison with the project reach to show the effects of management. Reference reaches of the Yaak area on the Kootenai National Forest were used for reference reach comparisons for the Myrtle Creek HFRA Project. The Yaak subbasin reference reach database is better suited, based on similar geology and hydrology, than other available reference reach databases. (Pete Bengeyfield, Personal communication, 2005)

Not all reaches or tributaries were surveyed in 2005. The surveys sites were prioritized and conducted where management activities were proposed. Eight tributaries of Myrtle Creek were not surveyed. Eight reaches of the main channel of Myrtle Creek were surveyed. For Mack Creek, one survey was conducted in 2005 and four were conducted in 2004. For Cooks Creek, four surveys were conducted in 2004. The main channel of Myrtle Creek and Mack Creek were deemed to have the highest priority for analysis due to the locations of the proposed actions relative to the survey reaches.

D.10-B Myrtle Creek Stream Surveys

In 2005, eight stream surveys were conducted along the main channel of Myrtle Creek. The following discussion includes nine reaches of Myrtle Creek (1 through 8 and 1a), and concludes with an overall summary for the main channel.

D.10-B.1 Myrtle Creek Reach 1

Myrtle Creek Reach 1 lies near the mouth of the main channel of Myrtle Creek. It lies within the area burned by the Myrtle Creek Fire in 2003 and classifies as a B3/1a stream type.

The riparian zone vegetation consists of 80% timber and 20% understory vegetation. Tree species identified include cedar, cottonwood, grand fir, Douglas-fir, and larch. Understory vegetation is mainly absent due to impact of fire.

The following photos, taken upstream of Myrtle Creek Reach 1, show typical "B-Channel" characteristics.

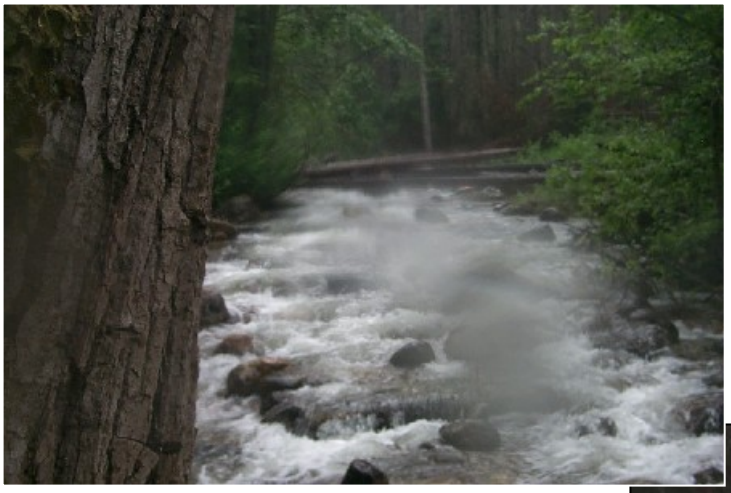


Figure D.1 Upstream – Myrtle Reach 1

Figure D.2 Upstream - Myrtle Reach 1

Table D.3 Measured Parameters of Project Reach 1 - Compared To Reference Reach Characteristics

Properties	Myrtle Creek Reach 1 (2005)	EF Bull Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	5.51	5.84	*
Valley Bottom Width (VBW) (feet)	+281	+195	*
Drainage Area (DA) (square miles)	39.18	11.10	*
Stream Type	B3/1a	B3a	B3a
Entrenchment Ratio	5.7	1.4	1.4 – 2.2
Sinuosity	1.1	1.3	> 1.2
Stream Gradient (%)	4.9	4.5	4.0 – 9.9
Width/Depth Ratio (W/D)	17.5	24.7	> 12
Channel Stability Rating	78 = Fair	*	40 – 60 = Good
Bankfull Width (feet)	49.7	32.0	*
D50 – Mean Particle Size (mm)	147.5 = Large Cobble	191.7 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	141.3**	*	*

***Measure/parameter not collected or calculated * * Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 1 classifies as a B3/1a, while the reference reach is a B3a. The "1" denotes some bedrock control within the reach. Reach 1 shows signs of "C-channel" characteristics, having a high entrenchment ratio. This is a substantial deviation from the reference reach or a B channel in general, as the above table shows. When taking into account the +/- 0.2 factor, the sinuosity of Myrtle Creek Reach 1 still lies within the parameters of the sinuosity for reference reach B's. But, Reach 1 is straighter than what is typical for a B stream type. The stream gradients are nearly identical for the project and reference reaches, both being ranked very high, hence the "a" denotation. The width/depth ratios are moderate to high. The channel stability rating was not collected for the specific reference reach, but was for Myrtle Creek Reach 1, with a rating of 78, which is Fair for a B3. For a typical B reference reach a numerical rating of 40-60 would be considered Good. The bankfull width for Myrtle Creek was higher than the reference reach. Field notes indicate some over-widening of the channel at site-specific locations. Erosion of the stream banks were observed at certain locations within this reach. Some bank failures and the collapse of trees in the main channel were observed (please see Hydrology Project Files). Channel banks showed signs of decreased entrenchment, exposed root-wads, and small bank failures. Myrtle Creek Reach 1 consists of large cobble substrate as does the reference reach.

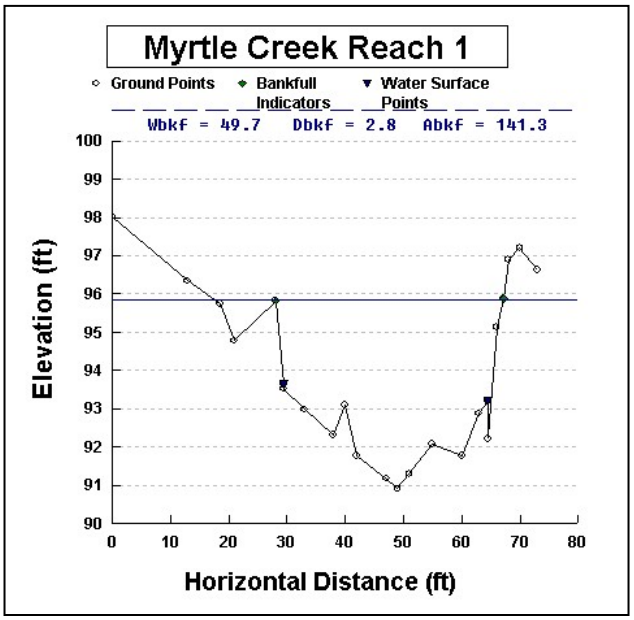


Figure D.3 Cross-section curve for Reach 1.

When reviewing the comparisons between project and reference reaches, the following point should be kept in mind:

The vertical axis on the cross-section graphs is exaggerated. Cross-section widths are commonly 50-100 feet, while depths are generally less than 4 feet. To visually display the stream channel, the scale of the two axes cannot be proportionate. The point is to show the profile and formation of the channel at that reach.

Myrtle Creek Reach 1 cross-section graph shows a slight lowering of banks on both sides. Field notes indicate that this is due to some bank failure.

The particle size distribution graphs are on logarithm scales. The point is to show the particle size composition of the channel at that reach.

Myrtle Creek Reach 1 particle size distribution graph shows a large cobble substrate for 2005. When compared to the 2004 pebble count data, the reach shows a decrease in fines from the previous year. This is most likely due to the continual movement (flush) of fines, due to the fire of 2003, through the system.

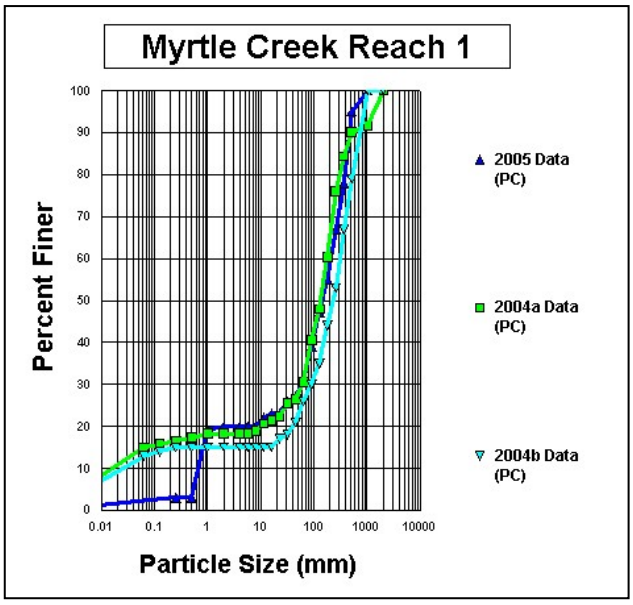


Figure D.4 Particle Size Distribution Curve for Reach 1 2004 vs. 2005

The high entrenchment ratio, fair stability rating, high bankfull width, bank erosion and failures, supports a status call of functioning-at-risk for this site-specific reach. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Most of the dimensions match the reference reach conditions, but even though the stream types are nominally the same, there is some potential for change, which is apparent in the morphology of the reach. Several upstream reaches are unstable (ie. bank failures) due to disturbances (ie. sediment introduction from stacked roads and past fire and timber affects), but this reach isn't significantly unstable; this is due to some bedrock control at this reach of the channel. It is difficult to put a trend call on this reach due to the continued affects

of the wildfires of 2003. Affects of the fire will still be present for several more years. This is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-B.2 Myrtle Creek Reach 2

Myrtle Creek Reach 2 also lies in the area involved in the 2003 Myrtle Creek Fire, towards the mouth of the main channel of Myrtle Creek. It is located upstream from Reach 1, and classifies as a B3/1a stream type.

The riparian zone vegetation consists of 90% timber and 10% understory vegetation. Tree species identified include spruce, cedar, cottonwood, grand fir, and Douglas-fir. Understory vegetation was identified as alder, grasses and forbs. Understory vegetation was highly impacted by the 2003 wildfire and is sparse.

Table D.4 Measured Parameters Project Reach 2 Compared to Reference Reach Characteristics

Properties	Myrtle Creek Reach 2 (2005)	Iron Meadows Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	6.38	6.96	*
Valley Bottom Width (VBW) (feet)	67	155	*
Drainage Area (DA) (square miles)	37.11	11.08	*
Stream Type	B3/1a	B3a	B3a
Entrenchment Ratio	1.6	1.4	1.4 – 2.2
Sinuosity	1.2	1.2	> 1.2
Stream Gradient (%)	5.3	5.8	4.0 – 9.9
Width/Depth Ratio (W/D)	23.0	19.8	> 12
Channel Stability Rating	76 = Fair	*	40 – 60 = Good
Bankfull Width (feet)	41.2	12.1	*
D50 – Mean Particle Size (mm)	185.9 = Large Cobble	128 = Small/Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	73.8**	*	*

***Measure/parameter not collected or calculated. ** Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 2 classifies as a B3/1a, while the reference reach is a B3a. The "1" denotes some bedrock control within the reach. Reach 2 shows some signs of "C-channel" characteristics, such as the main channel splitting into multiple channels (outwash channels) within the reach. The project reach is less entrenched then the reference reach, but is still within the parameters of a B Stream-Type. The stream gradients are very similar for the project and reference reaches, both being ranked high, thus the "a" denotation. The width/depth ratios are comparable and both are moderate to high. The channel stability rating was not collected for the reference reach, but was for Myrtle Creek Reach 2, with a rating of 76, which is Fair for a B3. For a typical B reference reach, a numerical rating of 40-60 would be considered Good. The bankfull width for Myrtle Creek was more than triple the reference reach. This is most likely due to the difference in drainage area size. However, field notes indicate that there is some over-widening of the channel at site-specific locations. Erosion of the stream banks were observed at specific locations within this reach. Bank failures and the collapse of trees in the main channel were observed (please see Hydrology Project Files). Channel banks showed signs of decreased entrenchment, exposed root-wads, and small site-specific bank failures. Myrtle Creek Reach 2 consists of large cobble substrate as does the reference reach.

The following photos were taken in Reach 2; notice the bedrock and boulder control present in the reach.

Figure D.5 Myrtle Creek Reach 2, photo a.

Figure D.6 Myrtle Creek Reach 2, photo b.

The following charts display the cross-section curve and particle size distribution curve for Myrtle Creek Reach 2.

The cross-section graph for Myrtle Creek Reach 2 shows steep banks on both sides of the channel, with some indication of failures, as evident in the bankfull indicators present.

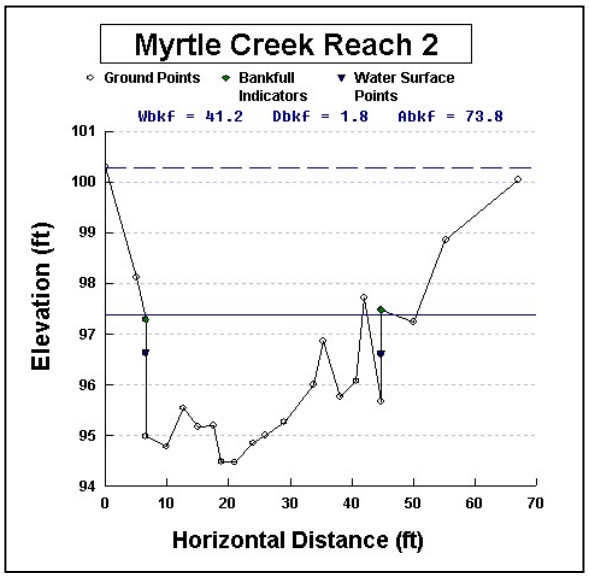


Figure D.7 Cross-section for Reach 2, 2005

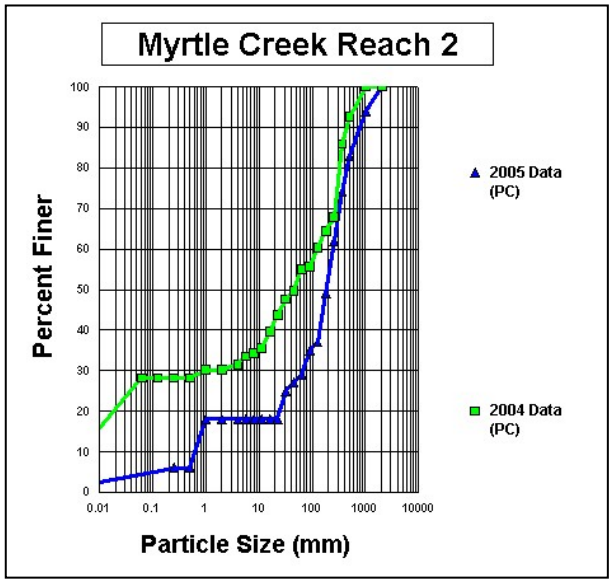


Figure D.8 Particle Size Distribution Curve Reach 2 - 2004 vs. 2005.

Myrtle Creek Reach 2 particle size distribution graph shows a large cobble substrate for 2005. When compared to the 2004 pebble count data, the reach shows significantly more fines in the reach in 2004 than in 2005. This is most likely due to the continual movement (flush) of fines, due to the fire of 2003, through the system.

The fair stability rating, high bankfull width, and bank erosion and failures, supports a call of functioning-at-risk for this site-specific reach. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. There is some bedrock present in this reach, which helps to maintain a more stable system. There is evidence of a debris slide (most likely fire related) that entered the main channel from the origin of this survey (Field Notes 2004). The failure scar is about 6m – 8m wide and 15-20m long. Debris from this slide has entered the main channel and has impacted the banks of the reach and is still actively adding sediment to the main channel at this site. The main channel of Myrtle Creek is able to handle this introduction of sediment and still maintain its beneficial uses. The amount of sediment being generated is not enough to push this site to a non-functioning status. This is just one reach of many that was used to analyze the overall condition of the watershed.

Most of the dimensions match the reference reach conditions, but even though the stream types are nominally the same, there is some instability, which is apparent in the morphology of the reach. This reach has some instability (ie. bank failures) due to disturbances (ie. sediment introduction from roads, fire, and timber affects), but isn't significantly unstable; this is due to some bedrock control at this reach of the channel. It is difficult to put a trend call on this reach due to the continued affects of the wildfire in 2003. Numerous trees have been uprooted in this reach as a result of root damage ensued during the fire (Field notes 2004). Affects of the fire will still be present for several more years.

The following photos show the debris slide entering the main channel in Reach 2.

Figure D.9 Reach 2 Debris slide, photo a.

Figure D.10 Reach 2 Debris slide, photo b.

The following photos of Myrtle Creek Reach 2 show the large cobble and boulders present in the reach. This has helped to maintain the stability of the reach.

Figure D.11 Reach 2 Cobble & Boulders, photo a.

Figure D.12 Reach 2 Cobble & Boulders, photo b.

D.10-B.3 Myrtle Creek Reach 3

Myrtle Creek Reach 3 lies in the area burned by the 2003 Myrtle Creek Fire, downstream of the Yellow Pine Creek confluence. It is located upstream from Reach 2 and classifies as a B3/1a stream type.

The riparian zone vegetation consists of 90% timber and 10% understory vegetation. Tree species identified include spruce, cedar, and fir. Understory vegetation was identified as alder, grasses and forbs found exclusively on the north side of the channel. Understory vegetation was highly impacted by the 2003 wildfire and is sparse.

Table D.5 Measured Parameters of Project Reach 3 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 3 (2005)	Iron Meadows Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	7.59	6.96	*
Valley Bottom Width (VBW) (feet)	63	155	*
Drainage Area (DA) (square miles)	34.30	11.08	*
Stream Type	B3/1a	B3a	B3a
Entrenchment Ratio	1.9	1.4	1.4 – 2.2
Sinuosity	1.1	1.2	> 1.2
Stream Gradient (%)	6.9	5.8	4.0 – 9.9
Width/Depth Ratio (W/D)	12.4	19.8	> 12
Channel Stability Rating	82 = Poor	*	40 – 60 = Good
Bankfull Width (feet)	39.9	12.1	*
D50 – Mean Particle Size (mm)	187.6 = Large Cobble	128 = Small/Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	128.1**	*	*

***Measure/parameter not collected or calculated** Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 3 classifies as a B3/1a, while the reference reach is a B3a. The "1" denotes some bedrock control within the reach. The project reach is slightly less entrenched than the reference reach, but still within the parameters of a B reference reach. When taking into account the +/- 0.2 factor, the sinuosity of Myrtle Creek Reach 3 still lies within the parameters of the sinuosity for reference reach B's, but is straighter than a reference reach B. The sinuosity is moderate to low for both reaches. The stream gradients are high for both the project reach and the reference reach, hence the "a" denotation. The width/depth ratios have a moderate to high rating. The channel stability rating was not collected for the reference reach, but was for Myrtle Creek Reach 3, with a rating of 82, Poor for a B3. For a typical B reference reach a numerical rating of 40-60 would be considered Good. The bankfull width was more than triple for Myrtle Creek Reach 3 than for the reference reach. This is most likely due to the difference in drainage area size and its resultant discharge. However, field notes indicate some slight over-widening of the channel, but not significantly. Myrtle Creek Reach 3 and the reference reach consist of large cobble substrate, thus adding to the stability of the reach.

The next two photos of Myrtle Creek Reach 3 show the bedrock and boulder control present in the reach.

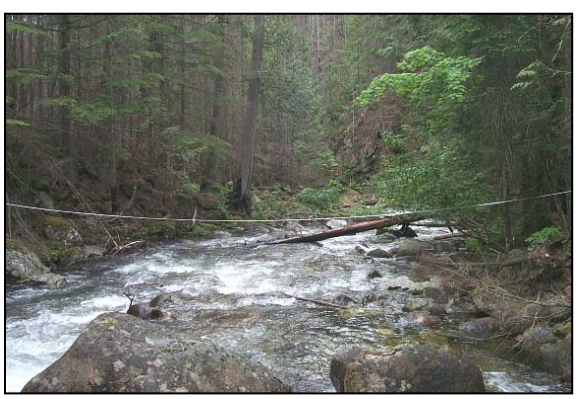


Figure D.13 Reach 3 Bedrock & Boulders, photo a.

Figure D.14 Reach 3 Bedrock & Boulders, photo b.

The next two charts display the cross-section curve and particle size distribution curve for Myrtle Creek Reach 3.

Myrtle Creek Reach 3 cross-section graph shows steep banks on both sides of the channel. Field notes indicate increased entrenchment.

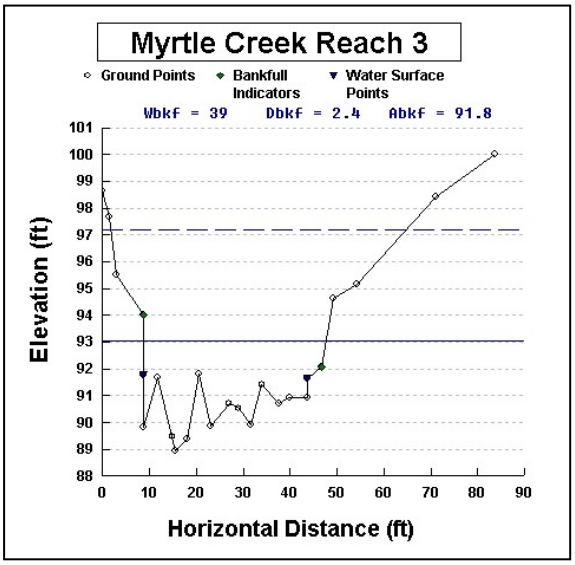


Figure D.15 Cross-section for Reach 3 - 2005.

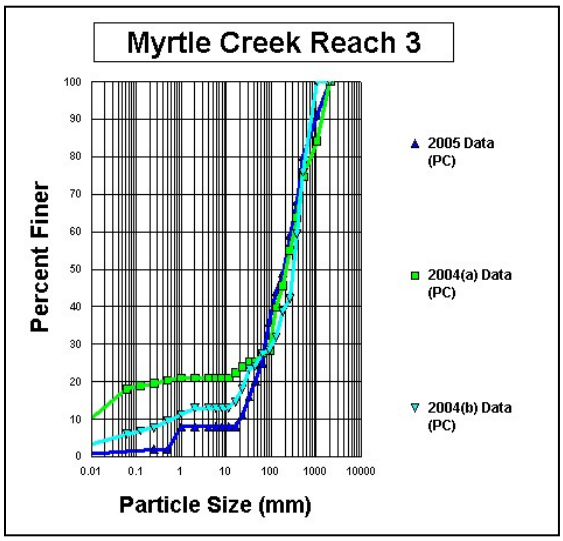


Figure D.16 Particle Size Distribution Curve for 2004 vs. 2005.

Myrtle Creek particle size distribution graph shows a large cobble substrate. When compared to the 2004 pebble count data, the reach showed fewer fines in 2005 than in 2004. This is most likely due to the continued movement of fines, due to the fires of 2003, through the system.

Even though Reach 3 has a poor stability rating, the resultant data, when compared to the reference reach, field notes and observations indicate a somewhat stable reach, and supports the call of properly-functioning. As stated in the function call section of Appendix D, a properly-functioning reach supports its designated beneficial uses. All values (with the exception of the channel stability rating) for Myrtle Creek Reach 3 are within the parameters of a typical B reference reach, and are comparable to the specific reference reach comparison. There is more bedrock present in this reach, which helps to maintain a more stable system. Affects of the fire will still be present for several more years, which are presented as increases in fines in this reach. This is just one reach of many that was used to analyze the overall condition of the watershed.

The following photos of Myrtle Creek Reach 3 show the large cobble and boulder substrate in the reach.

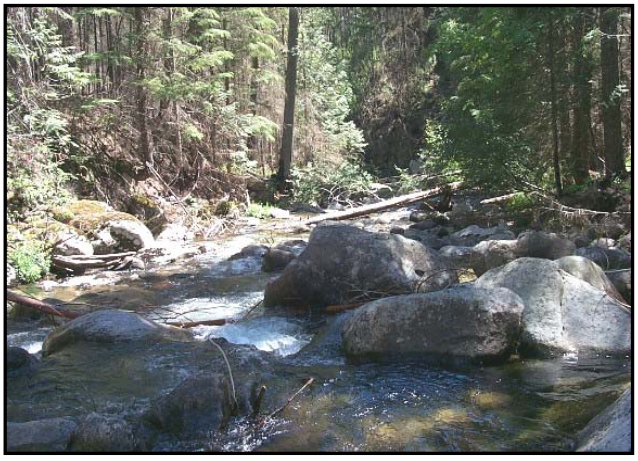


Figure D.17 Reach 3 Substrate, photo c.

Figure D.18 Reach 3 Boulders & Cobble, photo d.

D.10-B.4 Myrtle Creek Reach 4

Myrtle Creek Reach 4 lies upstream of the 2003 Myrtle Creek Fire, towards the B and D units of the proposed management actions. It is located upstream from Reach 3, and classifies as a B3/1a stream type.

The riparian zone vegetation consists of 90% timber and 10% understory vegetation. Tree species identified include Spruce, Fir, Hemlock and Cedar. Understory vegetation was non-existent on the south side of the channels, and sparse on the north side of the channel. Understory vegetation was identified as Alder, grasses, and forbs.

Table D.6 Measured Parameters of Project Reach 4 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 4 (2005)	Iron Meadows Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	7.88	6.96	*
Valley Bottom Width (VBW) (feet)	48	155	*
Drainage Area (DA) (square miles)	31.49	3.18	*
Stream Type	B3/1a	B3a	B3a
Entrenchment Ratio	1.3	1.4	1.4 – 2.2
Sinuosity	1.1	1.2	> 1.2
Stream Gradient (%)	7.0	5.8	4.0 – 9.9
Width/Depth Ratio (W/D)	18.5	19.8	> 12
Channel Stability Rating	61 = Fair	*	40 – 60
Bankfull Width (feet)	37.8	12.1	*
D50 – Mean Particle Size (mm)	90 = Small Cobble	128 = Small Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	77.3**	*	*

***Measure/parameter not collected or calculated. ** Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 4 classifies as a B3/1a, while the reference reach is a B3a. The "1" denotes some bedrock control within the reach. Reach 4 shows signs of "A-channel" characteristics, being much more entrenched than the reference reach, or a B-channel in general. The fact that there is some instability above this reach also indicates that it is the presence of the bedrock that is keeping this reach from being much more unstable. The stream gradients are high for both the project reach and the reference reach, and the sinuosity is moderate for both reaches. The sinuosity of Reach 4 also is also more indicative of a straighter A stream than a B stream. The width/depth ratios are nearly identical with a moderate rating. The channel stability rating was Fair for Myrtle Creek Reach 4, and was not measured for the reference reach. Both Myrtle Creek Reach 4 and the reference reach consist of small cobble substrate. This reach should be a solid B, especially in the presence of bedrock; but there is starting to be a shift towards an A channel, based on entrenchment, grade, and sinuosity.

The following photos of Myrtle Creek Reach 4 show the smaller cobble substrate and bank sloughing present in this reach.

Figure D.19 Reach 4 Substrate, photo a.

Figure D.20 Reach 4 Substrate, photo b.

The next two charts show the cross-section curve and particle size distribution curve for Myrtle Creek Reach 4.

Myrtle Creek Reach 4 cross-section graph shows steep banks on both sides of the channel. Field notes indicate increasing entrenchment.

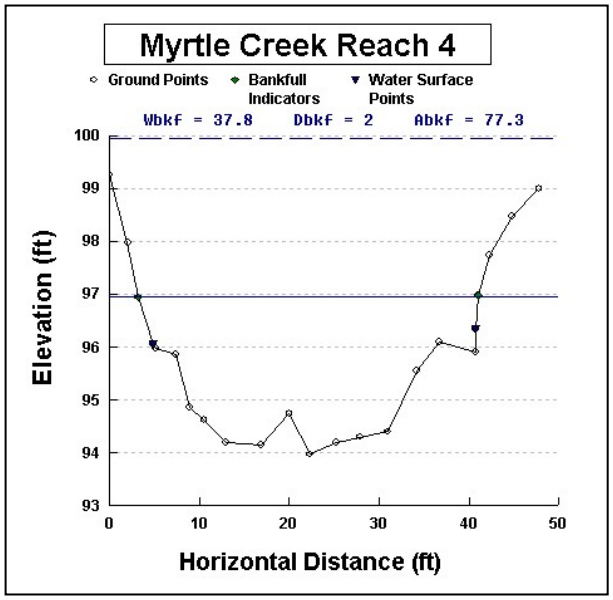


Figure D.21 Cross-section for Reach 4 - 2005

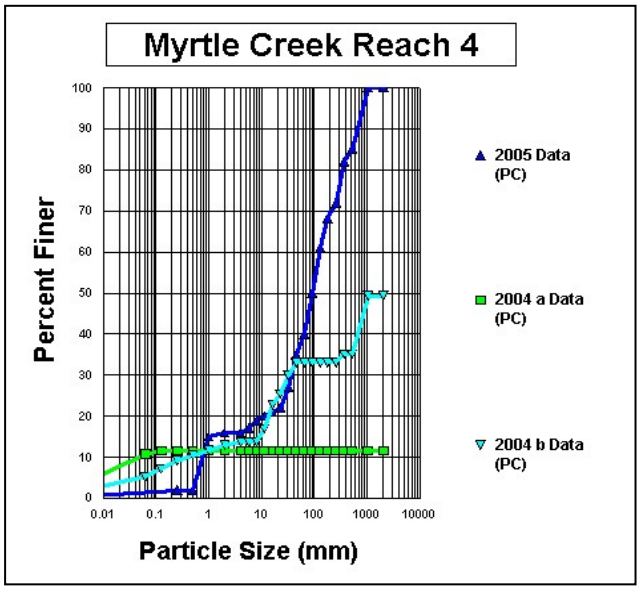


Figure D.22 Particle Size Distribution Curve for 2004 vs. 2006

The Myrtle Creek Reach 4 particle size distribution graph below shows a small cobble substrate. When compared to the 2004 pebble count data, the reach shows fewer fines in 2005 than in 2004. It also shows that more bedrock was measured in 2004 then in 2005. Field notes indicate that this is most likely due to measurement error in 2004.

The shifts in morphology towards more A channel type characteristics with entrenchment, grade, and sinuosity, supports a call of functioning-at-risk. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. There appears to be some bedrock present in this reach, which helps to keep the reach resistant to ongoing in-channel disturbances. This reach still introduces sediment to the main channel, via bank erosion and sediment contribution from Adverse Creek.

Even though the stream types are similar nominally, there is some instability, which is apparent in the morphology of the reach, as indicated by the entrenchment increase. Because this reach is outside of the burn, west of the burn, it is possible to make a clearer call on trend. This reach is borderline stable/downward trend, meaning that there is a higher probability of this reach being affected by management conditions then a reach that is not borderline. It is more sensitive to management actions. The bedrock is the key factor in holding it to its current status. This is most likely due to the affects of increased peak flows in the past. This is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-B.5 Myrtle Creek Reach 5

Myrtle Creek Reach 5 lies in between Mack Creek and Adverse Creek in the middle of the B and D units of the proposed management actions. It is located upstream from reach 4, and classifies as a B3a stream type. The riparian zone vegetation consists of 80% timber and 20% understory vegetation. Tree species identified include Spruce, Larch, and Hemlock. Understory vegetation was comprised of about 80% Alder and 20% grasses, forbs, and various shrubs.

Table D.7 Measured Parameters of Project Reach 5 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 5 (2005)	Iron Meadows Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	6.33	6.96	*
Valley Bottom Width (VBW) (feet)	64	155	*
Drainage Area (DA) (square miles)	29.39	3.18	*
Stream Type	B3a	B3a	B3a
Entrenchment Ratio	1.2	1.4	1.4 – 2.2
Sinuosity	1.1	1.2	> 1.2
Stream Gradient (%)	5.9	5.8	4.0 – 9.9
Width/Depth Ratio (W/D)	23.4	19.8	> 12
Channel Stability Rating	73 = Fair	*	40 – 60
Bankfull Width (feet)	52.0	12.1	*
D50 – Mean Particle Size (mm)	134.5 = Large Cobble	128 = Small Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	115.6**	*	*

***Measure/parameter not collected or calculated ** Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 5 classifies as a B3a, as does the reference reach. Reach 5 shows signs of "A and F channel" characteristics, becoming much more entrenched than the reference reach, or a B-channel in general. This reach should be a solid B, but there is starting to be a shift towards an F or A channel. The fact that there are some unstable reaches above this reach indicates a potential for continued horizontal instability and stream type shifts. The stream gradients are high for both the project reach and the reference reach, and the sinuosity is low to moderate for both reaches, with Reach 5 being straighter than the reference reach. The width/depth ratios are both at a moderate to high rating. The channel stability rating was Fair (73) for Myrtle Creek Reach 5, and was not measured for the reference reach. The bankfull width was significantly higher for Myrtle Creek than for the reference reach. This is most likely due to watershed size and resultant discharge. Erosion of the stream bank was observed at numerous locations within this reach. Small bank failure and the collapse of trees in the main channel were observed (Field Notes 2004). Channel banks showed signs of increased entrenchment, exposed root-wads, and small site-specific bank failures. Myrtle Creek Reach 5 consists of large cobble substrate and the reference reach consist of small cobble substrate.

These photos of Myrtle Creek Reach 5 show a shallow, wide channel with small and large cobbles present.

Figure D.23 Reach 5 Substrate, photo a.

Figure D.24 Reach 5 Substrate, photo b.

The two following charts show the cross-section curve and particle size distribution curve for Myrtle Creek Reach 5.

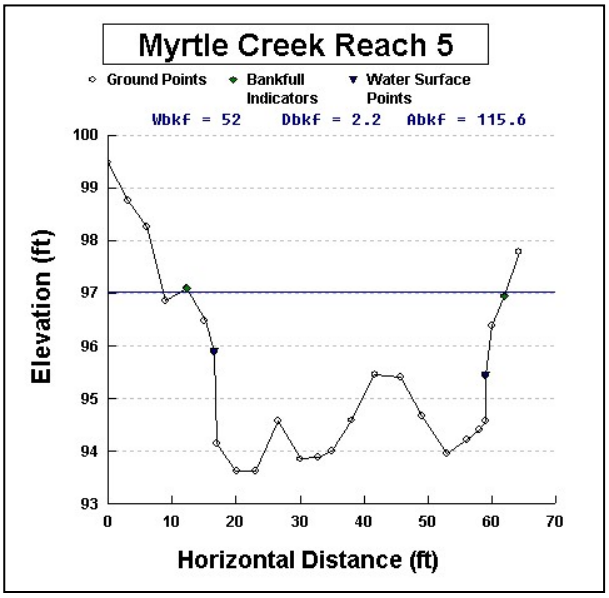


Figure D.25 Cross-section for Reach 5 - 2005

Myrtle Creek Reach 5 cross-section graph shows steep banks on both sides of the channel. Field Notes (2005) also indicate a floodplain bench that is beginning to widen.

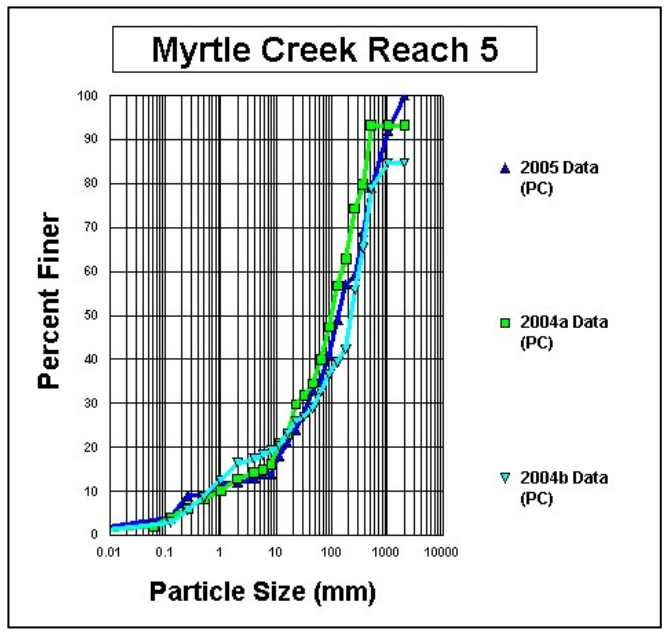


Figure D.26 Particle Size Distribution Curve for 2004 vs. 2005

The Myrtle Creek Reach 5 particle size distribution graph below shows a large cobble substrate. The 2004 pebble data is nearly identical to the 2005 pebble count data for Reach 5. This shows that there has been relatively no change in the past year for particle size distribution at this reach location.

The fair stability rating, high bankfull width, and high entrenchment, supports a call of functioning-at-risk for this reach. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Several of the stream morphology parameters fall outside of the Rosgen Reference Reach characteristics. This reach is mostly likely not at a downward trend, but there is potential for future affects in this particular area, mainly on the entrenchment of the reach. Because this reach is outside of the burn, west of the burn, it is possible to make a clearer call on trend. This reach is borderline stable. This is most likely due to the affects of increased peak flows and sediment introduction in the past, from logging, fires, and roads. This reach is on the path to a slow recovery, as supported by the WATSED model. This is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-B.6 Myrtle Creek Reach 6

Myrtle Creek Reach 6 lies west of Mack Creek and just east of Cooks Creek, above the proposed activity area. It is located upstream from Reach and classifies as a B4c stream type.

The riparian zone vegetation consists of 80% timber and 20% understory vegetation. Tree species identified include Spruce, Fir, Hemlock and Cedar. Understory vegetation was comprised almost entirely of Alder.

Table D.8 Measured Parameters of Project Reach 6 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 6 (2005)	Silver Butte 3 Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	0.27	0.55	*
Valley Bottom Width (VBW) (feet)	80+	760	*
Drainage Area (DA) (square miles)	19.73	35.3	*
Stream Type	B4c	B4c	B4c
Entrenchment Ratio	2.0	1.8	1.4 – 2.2
Sinuosity	1.1	1.1	> 1.2
Stream Gradient (%)	0.2	0.5	< 2.0
Width/Depth Ratio (W/D)	22.4	36.1	> 12
Channel Stability Rating	109 = Poor	*	40 - 64
Bankfull Width (feet)	40.4	25.7	*
D50 – Mean Particle Size (mm)	10.1 = Medium Gravel	55 = Very Coarse Gravel	2 – 64 = Gravels
Cross-Sectional Area (sq ft)	72.8**	*	*

**** Value computed at bankfull for that specific location/reach segment *Measure/parameter not collected or calculated**

Myrtle Creek Reach 6 classifies as a B4c, as does the reference reach. This reach is a B, but there are some morphological characteristics that are indicative of influence. The stream gradients are very low for both the project reach and the reference reach, thus the "c" denotation, and are much closer to C-type characteristics. The sinuosity is low to moderate for both reaches, and is lower than a typical B stream type. The width/depth ratios are both at a moderate to high rating and the channel stability rating was Poor (109) for Myrtle Creek Reach 6. The bankfull width was significantly higher for Myrtle Creek than for the reference reach, even though the reference reach has a higher drainage area than Reach 6. There is also evidence of bar formations along the channel. This is indicative of "C-channel" characteristics, and is due to a lower gradient, widening of the channel and changes in the corresponding flood plain at this reach site. There is influence to this reach from the Cook's Creek tributary. Myrtle Creek Reach 6 consists of medium gravel substrate and the reference reach consists of very coarse gravel substrate.

These two photos of Myrtle Creek Reach 6 show evidence of some over-widening and formations of sand and gravel bars along the reach.

Figure D.27 Reach 6 Over-widening, photo a.

Figure D.28 Reach 6 sand & gravel bars, photo b.

The following two charts show the cross-section curve and particle size distribution curve for Myrtle Creek Reach 6.

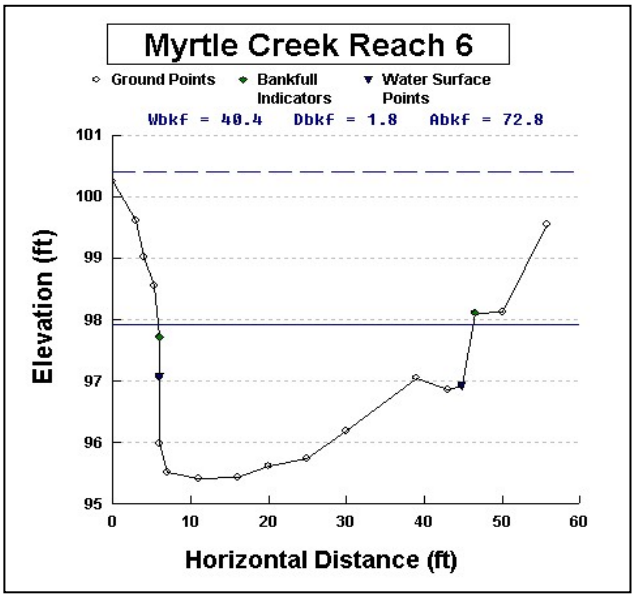


Figure D.29 Cross-section for Reach 6 - 2005

The Myrtle Creek Reach 5 cross-section graph and Field Notes (2005) indicate a floodplain bench that is beginning to widen.

The Myrtle Creek Reach 6 particle size distribution graph below shows a medium gravel substrate. The 2004 data indicates more of a large cobble substrate.

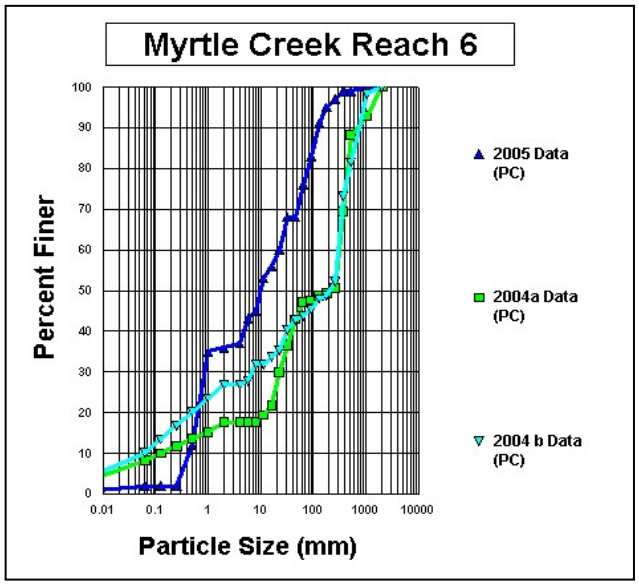


Figure D.30 Particle Size Distribution Curve Reach 6 for 2004 vs. 2005.

This reach is properly-functioning, to functioning-at-risk, with evidence of instability. As stated in the function call section above, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. The

formation of gravel and sand bars along the banks is a "C channel" characteristic, not a B. This reach is mostly likely not at a downward trend, but there is potential for future affects in this particular area, mainly affects to the width of the channel. The affects of the heavily roaded sections above and below this reach, have influenced Reach 6 in the past, and may continue to do so in the future by introduction of increased sediment (if culverts fail, etc). The instability is most likely due to the affects of increased peak flows and sediment introduction from roads. This is just one reach of many that was used to analyze the overall condition of the watershed.

These photos of Myrtle Creek Reach 6 show more evidence of sand and gravel bar formations along the reach.

Figure D.31 Reach 6 sand/gravel bar, photo a.

Figure D.32 Reach 6 sand/gravel bar, photo b.

D.10-B.7 Myrtle Creek Reach 7

Myrtle Creek Reach 7 lies towards the headwaters of the watershed. It is located upstream from Reach 6 and classifies as a B4c stream type.

Large coniferous trees dominate riparian vegetation in this reach and consist of mostly cedar, hemlock and fir trees. Canopy cover is about 80-90%.

Table D.9 Measured Parameters of Project Reach 7 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 7 (2005)	NF of EF Bull Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	0.74	1.08	*
Valley Bottom Width (VBW) (feet)	60	300	*
Drainage Area (DA) (square miles)	9.13	6.84	*
Stream Type	B4c	B3c	B3c
Entrenchment Ratio	1.2	1.4	1.4 – 2.2
Sinuosity	1.0	1.3	> 1.2
Stream Gradient (%)	0.7	0.8	< 2.0
Width/Depth Ratio (W/D)	20.2	29.5	> 12
Channel Stability Rating	92 = Good	55 = Good	40 – 60
Bankfull Width (feet)	32.1	25.6	*
D50 – Mean Particle Size (mm)	38.5 = Very Coarse Gravel	150.7 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	51.1**	*	*

**** Value computed at bankfull for that specific location/reach segment. *Measure/parameter not collected or calculated**

Myrtle Creek Reach 7 classifies as a B4c, while the reference reach classifies as a B3c. This reach is a B, but there are some morphological characteristics that are indicative of influence. There is starting to be a shift towards an "F – stream type" based on entrenchment, gradient, and width/depth ratio. The fact that there are some unstable reaches above this reach indicates a potential for continued entrenchment and stream type shifts. The entrenchment ratio is lower than a B and is more like an F;

the sinuosity is much lower than a B, as well. The stream gradients are very low for both the project reach and the reference reach, (hence the "c" denotation) with Reach 7 being flatter. The width/depth ratio is moderate for Reach 7 and very high for the reference reach, which is indicative of an F-channel type. The channel stability rating was Good (92) for Myrtle Creek Reach 7, and was not measured for the reference reach. Myrtle Creek Reach 7 consists of very coarse gravel substrate and the reference reach consists of small cobble substrate.

These two photos of Reach 7 show evidence of small cobble and gravel bar formations along the bends of the reach. It is also becoming more entrenched, a characteristic of an F-channel.

Figure D.33 Reach 7 Substrate, photo a.

Figure D.34 Cross-section for Reach 7, 2005.

The Myrtle Creek Reach 7cross-section graph shows evidence of increasing entrenchment, losing access to its floodplain, which is more of an "F channel" characteristic than a "B channel". Field Notes (2005) support this observation. The following charts show the cross-section curve and particle size distribution curve for Myrtle Creek Reach 7.

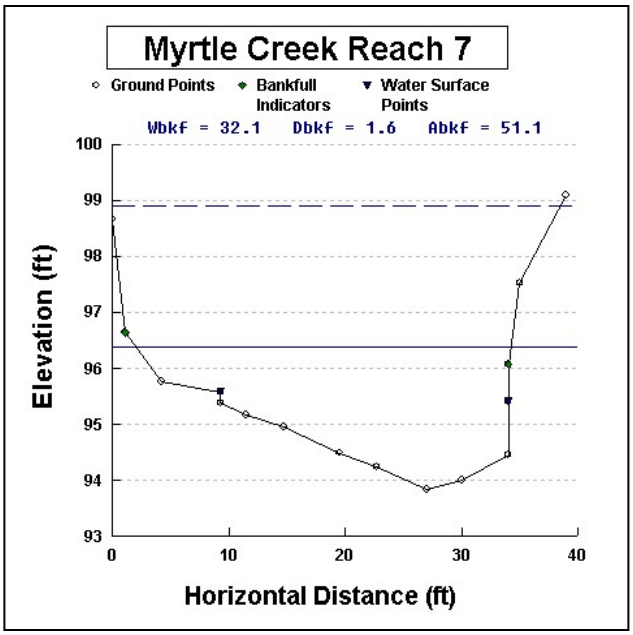


Figure D.35 Cross- section for Reach 7 - 2005.

The Myrtle Creek Reach 7cross-section graph shows evidence of increasing entrenchment, losing access to its floodplain, which is more of an "F channel" characteristic than a "B channel". Field Notes (2005) support this observation.

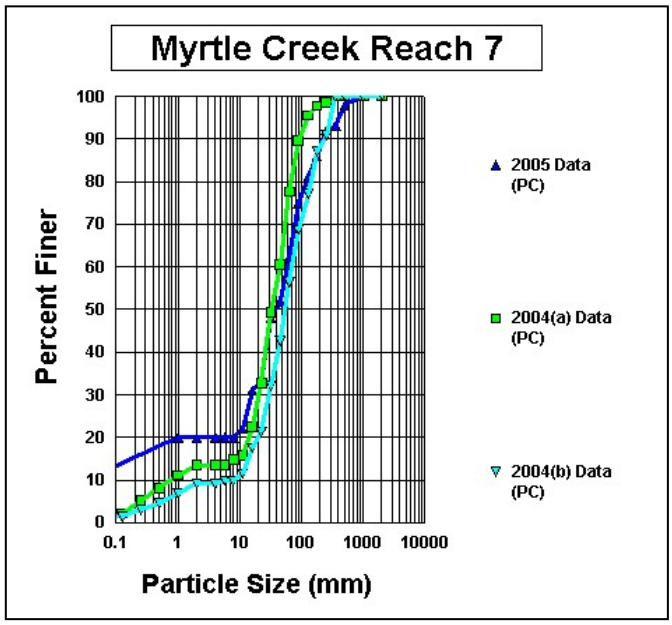


Figure D.36 Particle Size Distribution Reach 7 for 2004 vs. 2005.

The Myrtle Creek Reach 7 particle size distribution graph below shows a very coarse gravel substrate. The 2004 data indicates less fines in the channel, thus an indication of newly introduced fine sediment in 2005.

Slide Creek is a tributary of the main channel in this reach. This tributary sees significant avalanche activity. Avalanche debris originating in Slide Creek, blocked FS road 633 until June 15, 2004. The tributary is a source of large woody debris and sediment to the main channel of Myrtle Creek.

This reach is properly-functioning to functioning-at-risk, with a downward trend; and has evidence of instability. The formation of gravel and sand bars along the banks is a "C channel" characteristic, not a B; and the higher entrenchment, and lower gradient is an "F channel" characteristic. These shifts of morphological parameters indicate instability. This reach is at a downward trend, and there is potential for future affects in this particular area, mainly on the width and entrenchment of the channel. Even though it is borderline on function status, it does not preclude the watershed from supporting its designated beneficial uses. The affects of the heavily roaded sections and timber extractions above and below this reach, have influenced Reach 7 in the past, and may continue to do so in the future if there were to be a large wildfire, road, or culvert failures. These affects would be presented as increased peak flows and sediment introduction from roads and harvesting. This is just one reach of many that was used to analyze the overall condition of the watershed.

The following photos of Myrtle Creek Reach 7 show evidence of sediment introduction along the reach from bank erosion and undercutting.

Figure D.37 Reach 7 bank conditions, photo a.

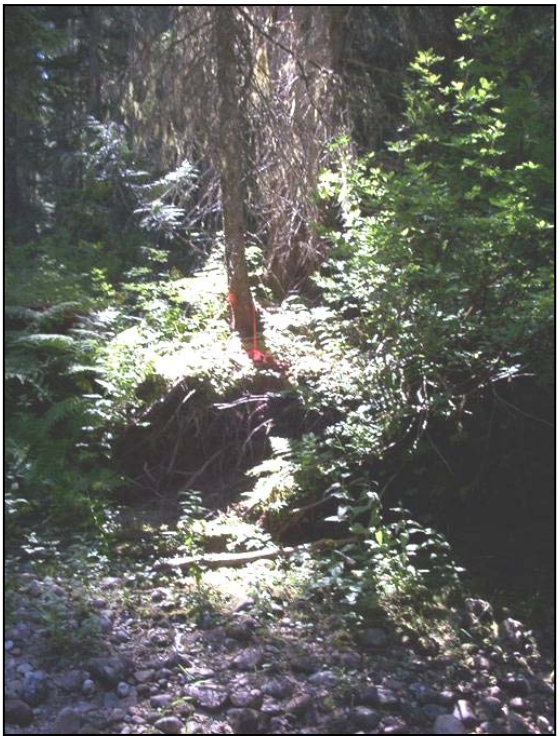


Figure D.38 Reach 7 bank conditions, photo b.

D.10-B.8 Myrtle Creek Reach 8

Myrtle Creek Reach 8 lies in the headwaters of the watershed. It is located upstream from Reach 7 and classifies as an A3a stream type.

The riparian vegetation in this reach is prolific, and is comprised of mainly alder and large coniferous trees. Vegetation grows up to the main channel and in many cases over the channel.

Table D.10 Measured Parameters of Project Reach 8 Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 8 (2005)	Waloven 3 Creek (Yaak Reference Reach)	Rosgen A Reference Reach
Valley Bottom Gradient (VBG) (%)	12.92	10.08	*
Valley Bottom Width (VBW) (feet)	43	211	*
Drainage Area (DA) (square miles)	3.15	1.2	*
Stream Type	A3a+	A3	A3a+
Entrenchment Ratio	1.6	1.3	< 1.4
Sinuosity	1.0	1.0	< 1.2
Stream Gradient (%)	12.8	7.0	> 10.0
Width/Depth Ratio (W/D)	21.0	10.8	< 12
Channel Stability Rating	65 = Good	*	54 – 90 = Good
Bankfull Width (feet)	26.5	11.0	*
D50 – Mean Particle Size (mm)	157.7 = Large Cobble	128 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	33.2**	*	*

***Measure/parameter not collected or calculated. ** Value computed at bankfull for that specific location/reach segment**

Myrtle Creek Reach 8 classifies as an A3a+, while the reference reach classifies as an A3. The "a+" indicates a very high channel gradient. Reach 8 shows evidence of being less entrenched (borderline of an A/B), jut outside of the parameters of an A stream type, and shifting towards a B channel type. The sinuosity is low for Myrtle Reach 8, as well as the reference reach. Reach 8 has a gradient that is higher than the reference reach. The width/depth ratio is moderate for Reach 8 and is much higher than an A in general, thus showing another sign of B characteristics. The channel stability rating was Good (65) for Myrtle Creek Reach 8, and was not measured for the reference reach. The bankfull width was high for Reach 8 and low for the reference reach. Myrtle Creek Reach 8 and the reference reach consist of large cobble substrate.

The following photos of Myrtle Creek Reach 8 show the vegetative and substrate compositions of the reach.

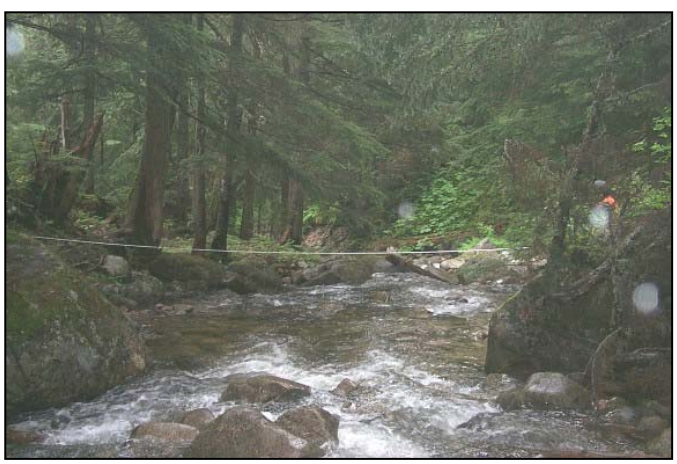


Figure D.39 Reach 8 Composition, photo a.

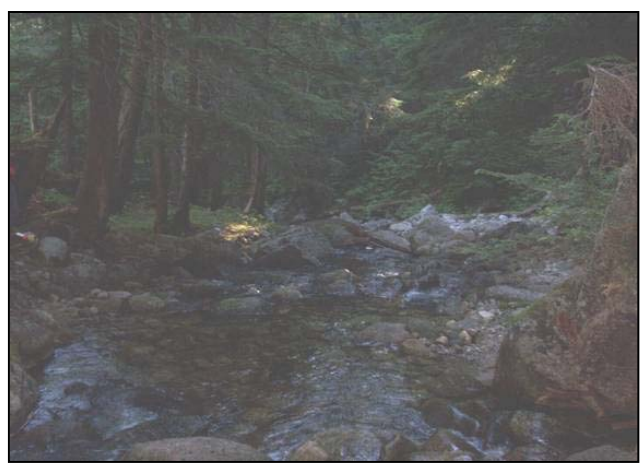


Figure D.40 Reach 8 Composition, photo b.

The next two charts show the cross-section curve and particle size distribution curve for Myrtle Creek Reach 8.

Myrtle Creek Reach 8 cross-section graph on the left shows a lower left bank than the right. Field Notes (2005) indicate a wide floodplain on the left bank and increasing entrenchment ratio.

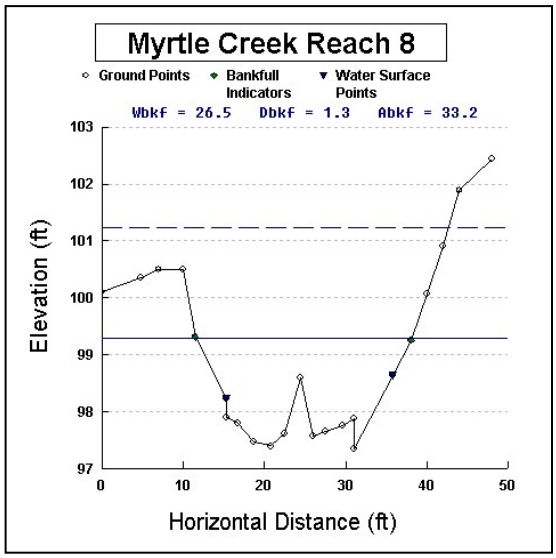


Figure D.41 Cross-section Reach 8 2005.

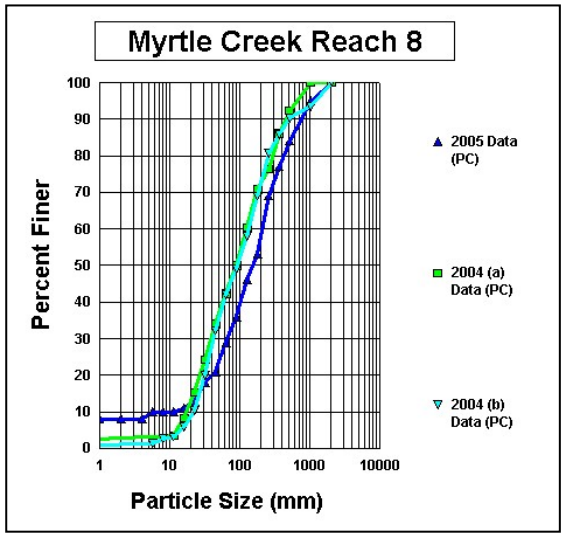


Figure D.42 Particle Size Distribution Curve 2004 vs. 2005.

Myrtle Creek Reach 8 particle size distribution graph on the right shows a large cobble substrate.

This reach is properly-functioning. It is currently supporting its designated beneficial uses. Even so, avalanche chutes and the bare hillslopes above the riparian zone likely result in high-energy runoff, contributing to increased amounts of sediment and organic materials to the main channel, especially during rain-on-snow events. At the present time, the system is able to handle the increased runoff and sediment load. The higher entrenchment ratio value is more of a "B channel" characteristic, not an A, as well as the moderate width/depth ratio. There is potential for future affects in this particular area, mainly on the width/depth ratio and entrenchment of the channel. The affects of the roaded sections and timber extractions above and below this reach, have influenced Reach 8 in the past, although minimally, and may continue to do so in the future if there were to be fire, road failures, or culvert failures in the headwaters. This would cause increased peak flows and sediment introduction. This is jut one of many reaches that was used to analyze the overall condition of the watershed.

These photos of Myrtle Creek Reach 8 show evidence of some chute formations and woody debris introduction

Figure D.43 Reach 8 current conditions, photo a.

Figure D.44 Reach 8 current conditions, photo b.

D.10-B.9 Myrtle Creek Reach 1a

A survey of Myrtle Creek Reach 1a was conducted in 2004. It lies at the very top of the headwaters of the main channel of Myrtle Creek. It was not re-measured in 2005 due to the stability of the reach and its location in relation to the proposed actions. It classifies as an A3a+ stream type.

The riparian zone vegetation is abundant and is dominated by understory vegetation. The vegetation identified consisted mostly of alder with a much smaller percentage of large coniferous trees (65%-35% respectively). Riparian vegetation is growing up and over the main channel.

Table D.11 Measured Parameters of Project Reach 1a Compared to Reference Reach Characteristics.

Properties	Myrtle Creek Reach 1a (2004)	Waloven 3 Creek (Yaak Reference Reach)	Rosgen A Reference Reach
Valley Bottom Gradient (VBG) (%)	16.25	10.08	*
Valley Bottom Width (VBW) (feet)	2	211	*
Drainage Area (DA) (square miles)	3.15	1.20	*
Stream Type	A3a+	A3	A3a+
Entrenchment Ratio	1.3	1.3	< 1.4
Sinuosity	1.0	1.0	< 1.2
Stream Gradient (%)	16.0	7.0	> 10.0
Width/Depth Ratio (W/D)	14.3	10.8	< 12
Channel Stability Rating	*	*	54 – 90 = Good
Bankfull Width (feet)	17.7	11.0	*
D50 – Mean Particle Size (mm)	88.7 = Small Cobble	128 = Large Cobble	64 – 256 = Cobbles

***Measure/parameter not collected or calculated**

Myrtle Creek reach 1a classifies as an A3a+, while the reference reach is an A3. The "a+" denotes a very high gradient. Reach 1a shows a low entrenchment ratio and a very low sinuosity, almost straight, as does the reference reach. The gradient is much higher for Reach 1a then the reference reach, but A's have a much higher range of gradients. The width/depth ratio is borderline low to moderate. The bankfull width for Reach 1a is higher than what is considered common for an A, but it is still within the A parameters. This width is most likely the cause of a small cobble substrate composition instead of boulders. Cross-Section and Particle Size Distribution graphs were unable to be generated for this reach. There is a significant amount of large woody debris within this reach, which is most likely the cause for some of the morphology shifts, such as a higher width/depth ratio. There were no visible signs of erosion, and this reach was recorded as very stable (Field Notes 2004). The information above supports the call of properly functioning for Reach 1a. It is also supporting its designated beneficial uses. This is just one of many reaches that was used to analyze the overall condition of the watershed.

D.10-B.10 Main Channel of Myrtle Creek Summary

The main channel of Myrtle Creek is considered to be in fair to good condition. Stability is good to fair, and 3 of the reaches are properly-functioning 3 of the reaches are functioning-at-risk, and 2 of the reaches are borderline properly-functioning to functioning-at-risk. Riparian vegetation is abundant in most areas. A substantial amount of logging and road building have taken place in this watershed in the past. Tree stumps from the earliest logging operation were seen well within the riparian zone, in some places within a few meters of the main channel. This past logging evidence was when there were no Best Management Practices (BMPs) in effect. Several small clearings left over from more recent logging operations, on private property, were in close proximity to the riparian zone. This feature was noticed in many of the reaches in private property. Skid trails are still accessible and logged clearings are still open with some brush vegetation present. This system shows signs of a catchment that is mildly impaired. Stream bank stability varied throughout the main channel, and for the most part, while erosion of banks and sediment transport occurs in these reaches, the system is able to accommodate and contain the energy and materials. The 2003 Myrtle Creek wildfire had a substantial impact on the sediment being delivered into the main channel (see project file BAER Report). The affects of the fire of 2003 will still be visible for several more years.

D.10-C Cooks Creek Stream Surveys

In 2004, four stream surveys were conducted along the main channel of Cooks Creek, and are discussed below. Due to the protocol of the data collection for that year, graphs were unable to be generated and specific reference reach comparisons were not made. Instead the reach morphology and characteristics were compared to a "typical Rosgen reference reach" for each specific stream type. This is another approach to reference reach comparisons that is used when protocol differences are in effect. The supporting information for the function status calls for Cooks Creek are heavily weighted on field observations and reports, as opposed to quantitative field data.

D.10-C.1 Cooks Creek Reach 1

Cooks Creek Reach 1 lies at the headwaters of Cooks Creek. It classifies as an A4a+ stream type.

Table D.12 Measured Parameters of Project Reach 1 Compared to Rosgen Reference Reach Parameters.

Properties	Cooks Creek Reach 1 (2004)	Rosgen A Reference Reach
Stream Type	A4a+	A4a
Entrenchment Ratio	1.4	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	10.0	> 10+
Width/Depth Ratio (W/D)	5.0	< 12
Channel Stability Rating	*	60 – 95 = Good
D50 – Mean Particle Size (mm)	6.1 = Fine Gravel	2 – 64 = Gravel

***Measure/parameter not collected or calculated**

Cooks Creek Reach 1 was classified as an A4a+ reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio, sinuosity, stream gradient, width/depth ratio and mean particle size (D50) are all within the parameters of a typical Rosgen A4 stream.

Cooks Creek Reach 1 is properly functioning. .Stability within this reach was considered excellent, and riparian vegetation was abundant. The reach was dominated by understory vegetation consisting almost entirely of alder with a much smaller percentage of large coniferous trees (75% - 25% respectively). No visible signs of erosion were noted. There was a significant amount of large woody debris present in Reach 1. Although Reach 1 is considered stable, it has more potential to be impacted by management activities because the particle size distribution contains a higher ratio of silts, sands and gravels. This is just one of many reaches that was used to analyze the overall condition of the channel and watershed.

D.10-C.2 Cooks Creek Reach 2

Cooks Creek Reach 2 lies downstream of Reach 1 and near a road crossing. It classifies as a B3a stream type.

Table D.13 Measured Parameters of Project Reach 2 Compared to Rosgen Reference Reach Parameters.

Properties	Cooks Creek Reach 2 (2004)	Rosgen A Reference Reach
Stream Type	A3	A3
Entrenchment Ratio	1.6	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	8.0	4 – 9.9
Width/Depth Ratio (W/D)	9.2	< 12
Channel Stability Rating	*	54 – 90 = Good
D50 – Mean Particle Size (mm)	159.4 = Large Cobble	64 – 256 = Cobble

***Measure/parameter not collected or calculated**

Cooks Creek Reach 2 was classified as an A3 reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio is borderline A/B. It is higher than the reference reach, but when you take into account the +/- 0.2, it falls into a B stream type. Sinuosity is low, stream gradient is moderate to high, and width/depth ratio is low. These properties all fall within the parameters of a typical Rosgen A Reference Reach. Cooks Creek Reach 2 consists of large cobble substrate.

Stability within this reach was considered moderate to low. There was a small hillslope failure occurring where FS road 2400UA crosses the main channel of Cooks Creek due to the pipe failure. While this feature is not sizable, it is actively contributing sediment to the main channel (Field Notes 2004). The most significant contribution of sediment in this reach is caused by a large hillslope failure downstream of the cross section (most likely due to an old bridge failure and ditchline erosion). This exposed area left by the hillslope failure is contributing sediment into the main channel.

Riparian vegetation is prolific in this reach and is comprised mainly of alder and large coniferous trees (70% to 20% respectively). Tree species identified include Douglass Fir and Spruce. The remaining 10% of riparian vegetation is comprised of ferns and Devils Club. A significant amount of large woody debris was recorded in this reach. The numbers of aggregates seen in this reach increased dramatically from Reach 1. Bank stability throughout this reach is fair to poor. The information from Cooks Creek Reach 2 supports the call of functioning-at-risk. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. This is just one of many reaches that was used to analyze the overall condition of the channel and the watershed.

D.10-C.3 Cooks Creek Reach 3

Cooks Creek Reach 3 lies downstream of Reach 2 and towards the mouth of the channel. It classifies as an A2a+ stream type.

Table D.14 Measured Parameters of Cooks Creek Project Reach 3 Compared to Rosgen Reference Reach Parameters.

Properties	Cooks Creek Reach 3 (2004)	Rosgen A Reference Reach
Stream Type	A2a+	A2a+
Entrenchment Ratio	1.3	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	14.0	> 10.0
Width/Depth Ratio (W/D)	14.4	< 12
Channel Stability Rating	*	38 – 43 = Good
D50 – Mean Particle Size (mm)	558.3 = Medium Boulder	256 - 2048 = Boulder

***Measure/parameter not collected or calculated**

Cooks Creek Reach 3 was classified as an A2a+ reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio and sinuosity both fall within the parameters of an A-channel type. The stream gradient is high, thus the a+ denotation. The width/depth ratio is higher than an A channel, but close when you take into account the +/- 2.0 factor. Reach 3 consists of medium boulder substrate.

Cooks Creek Reach 3 is properly-functioning. Stability within this reach was considered fair. The boulders present have kept this reach resistant to ongoing in-channel disturbances. Large coniferous trees dominate the riparian vegetation in this reach. Trees constitute 85% of riparian vegetation, and were identified as Cedar, Hemlock, and Fir trees. Canopy cover is about 80% - 90%. Understory vegetation in this reach is comprised of grasses, forbs, and shrubs. There is less woody debris in this reach than in the other reaches. This is just one of many reaches used to analyze the overall condition of the channel and watershed.

D.10-C.4 Cooks Creek Reach 4

Cooks Creek Reach 4 lies downstream of Reach 3 and just above the confluence of Cooks Creek and Myrtle Creek. It classifies as a B3a stream type.

Table D.15 Measured Parameters of Project Reach 4 Compared to Rosgen Reference Reach Parameters.

Properties	Cooks Creek Reach 4 (2004)	Rosgen B Reference Reach
Stream Type	B3a	B3a
Entrenchment Ratio	1.8	1.4 – 2.2
Sinuosity	1.1	> 1.2
Stream Gradient (%)	4.0	4.0 – 9.9
Width/Depth Ratio (W/D)	14.1	> 12
Channel Stability Rating	*	40 – 60 = Good
D50 – Mean Particle Size (mm)	100.5 = Small Cobble	64 - 256 = Cobble

***Measure/parameter not collected or calculated**

Cooks Creek Reach 4 was classified as a B3a reach. When comparing that to a typical B Rosgen Reference Reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio lies well within the parameters of a B channel. The sinuosity is borderline A/B, but falls within a "B" when you take into account the +/- 0.2 factor. The stream gradient is a high gradient, thus the "a" denotation. The width/depth ratio is typical of a B channel, and the D50 shows that Reach 3 consists of small coble substrate.

Cooks Creek Reach 4 is properly functioning. Riparian vegetation in this reach is roughly 50% understory vegetation and 5% timber. Timber species include Douglas Fir, Alpine Spruce, Larch, and Cedar. Understory vegetation is comprised almost exclusively of alder, grasses, and forbs. Stability within this reach was considered fair to good. There is less woody debris in this reach than in the other reaches. This is just one of many reaches used to analyze the overall condition of the channel and watershed.

D.10-C.5 Cooks Creek Summary

Cooks Creek is considered to be in good condition. Stability is good to fair, and 3 of the reaches are properly functioning and 1 reach is functioning-at-risk. Riparian vegetation is abundant in most areas. Logging and road building have taken place in this watershed in the past. Tree stumps from the earliest logging operations were seen well within the riparian zone, in some places within a few meters of the main channel. This logging evidence from the past was when there were no Best Management Practices (BMPs) in effect. Stream bank stability varied throughout the channel, and for the most part, while erosion of banks and sediment transport occurs in these reaches, much of it is natural and the system is able to accommodate and contain the energy and materials.

D.10-D Mack Creek Stream Surveys

Four surveys were conducted in Mack Creek in 2004 and one in 2005. They are discussed below as: Reach 1 (2004), Reach 1 (2005), Reach 2, Reach 3, and Reach 4. Due to the protocol of the data collection for the year 2004, graphs were unable to be generated and specific reference reach comparisons were not made. Instead the reach morphology and characteristics were compared to a "typical Rosgen reference reach" for each specific stream type. This is another approach to reference reach comparisons that is used when protocol differences are in effect. In 2005, due to protocol additions, Mack Creek Reach 1a was able to be compared to a specific reference reach. The supporting information for the function status calls for Mack Creek are heavily weighted on field observations and reports, as opposed to quantitative field data.

D.10-D.1 Mack Creek Reach 1 (2005)

Mack Creek Reach 1 (2005), upstream of the confluence of Mack Creek and Myrtle Creek, classifies as a B3a stream type.

Table D.16 Measured Parameters of Project Reach 1 (2005) Compared to Reference Reach Parameters.

Properties	Mack Creek Reach 1 (2005)	Waloven 3 Creek (Yaak Reference Reach)	Rosgen A Reference Reach
Valley Bottom Gradient (VBG) (%)	15.86	10.08	*
Valley Bottom Width (VBW) (feet)	18	211	*
Drainage Area (DA) (square miles)	1.97	1.2	*
Stream Type	A3a+	A3	A3a+
Entrenchment Ratio	2.1	1.32	< 1.4
Sinuosity	1.0	1.04	< 1.2
Stream Gradient (%)	15.4	7.0	> 10.0
Width/Depth Ratio (W/D)	8.2	10.8	< 12
Channel Stability Rating	47 = Good	*	54 – 90 = Good
Bankfull Width (feet)	8.4	11.0	*
D50 – Mean Particle Size (mm)	69.2 = Small Cobble	128 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	8.7**	*	*
BEHI – (Bank erosion Hazard Index)	36.2 = High	*	*

***Measure/parameter not collected or calculated.** Value computed at bankfull for that specific location/reach segment**

Mack Creek Reach 1 (2005) classifies as an A3a+, while the reference reach is an A3. Reach 1 (2005) shows a less entrenched channel than the reference reach, or an A channel in general, shifting more towards a B channel type. The sinuosity for both reaches is low. The stream gradient is very high for the reach, hence the "a" denotation. The width/depth ratio of Mack Creek

Reach 1 (2005) is lower than the reference reach, as is the bankfull width. The channel stability is Good (47) for Mack Creek Reach 1 (2005) and was not measured for the reference reach. Both reaches are composed of cobble substrate, with Reach 1 being small cobble, and the reference reach consisting of large cobble. BEHI was measured for Mack Creek Reach 1 (2005) and indicates a high (36.2) bank erosion hazard potential.

The following two charts show the cross-section curve and particle size distribution curve for Mack Creek Reach 1 (2005).

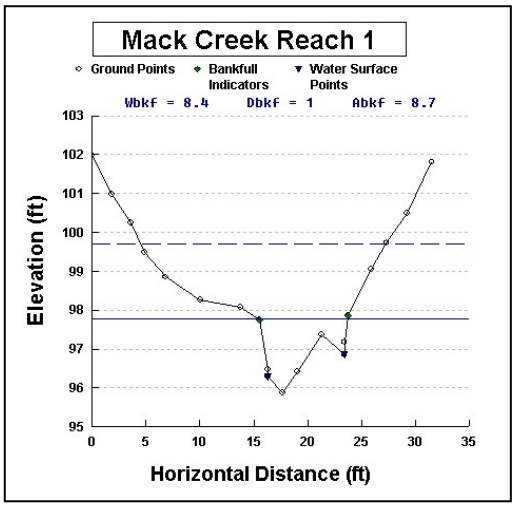


Figure D.45 Cross-section for Mack Creek.

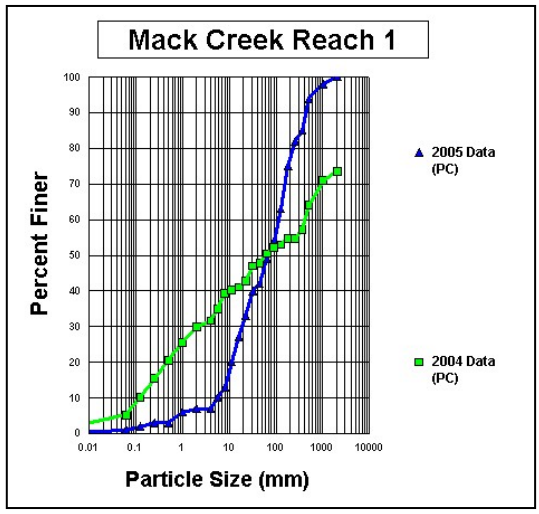


Figure D.46 Particle Size Distribution Curve Mack Creek Reach 1 (2005) - 2004 vs. 2005.

Mack Creek Reach 1 (2005) cross-section graph shows steep slopes on both sides of the channel. The channel confined. The Mack Creek Reach 1 (2005) particle size distribution graph shows a small cobble substrate. When compared to the 2004 pebble count data, the reach shows a decrease in fines from the previous year.

The high entrenchment ratio, high BEHI, and very steep banks, supports a call of functioning-at-risk. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Even though the stream types are the same nominally, there is some instability, which is apparent in the entrenchment ratio of the reach. Several upstream reaches are unstable due to disturbances and gradient, which have an effect downstream on this reach. Mack Creek Reach 1 (2005) has a high amount of sediment availability, which also contributes to the instability of the reach. This is just one reach out of many that was used to analyze the overall condition of the channel and watershed.

D.10-D.2 Mack Creek Reach 1 (2004)

Mack Creek Reach 1 (2004) lies towards the headwaters of Mack Creek. It classifies as an A3a+ stream type. Riparian vegetation is about 80% coniferous trees (cedar, hemlock, and firs) and 20% grasses, forbs, and shrubs (ferns, alder, and devil's club). There is a thick layer of moss on the ground, which helps with some bank stability close to the channel.

Table D.17 Measured Parameters of Project Reach 1 (2004) Compared to Reference Reach Parameters.

Properties	Mack Creek Reach 1 (2004)	Rosgen A Reference Reach
Stream Type	A3a+	A3a+
Entrenchment Ratio	1.5	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	10.0	> 10.0
Width/Depth Ratio (W/D)	18.2	< 12
Channel Stability Rating	*	54 – 90 = Good
D50 – Mean Particle Size (mm)	90.0 = Small Cobble	64 – 256 = Cobble

***Measure/parameter not collected or calculated**

Mack Creek Reach 1 (2004) was classified as an A3a+ reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio is higher than an A, but still falls within the parameters of an A stream type when you take into consideration the +/- 0.2 factor. Sinuosity and gradient are comparable to that of an A reference reach. The width/depth ratio, on the other hand, is much higher than a typical Rosgen A stream type.

Field notes (2004) indicate that when the stream channel increases in slope, the channel substrate increases in size. Mack Creek Reach 1(2004) is functioning-at-risk. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Stability within this reach was considered fair. There were some visible signs of erosion along the raw bank sections of the channel. Reach 1(2004) has a slight potential to be impacted by management activities because the particle size distribution decreases further downstream. This is just one reach of many that was used to analyze the overall condition of the channel and watershed.

D.10-D.3 Mack Creek Reach 2

Mack Creek Reach 2 lies in the middle of the Mack Creek main channel. It classifies as an A3 stream type. Riparian vegetation is about 90% coniferous trees (cedar, hemlock, firs) and 10% grasses, forbs, & shrubs (ferns, alder, devils club).

Table D.18 Measured Parameters of Project Reach 2 Compared to Rosgen Reference Reach Parameters.

Properties	Mack Creek Reach 2 (2004)	Rosgen A Reference Reach
Stream Type	A3	A3
Entrenchment Ratio	1.3	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	9.0	4 – 10+
Width/Depth Ratio (W/D)	13.1	< 12
Channel Stability Rating	*	60 – 95 = Good
D50 – Mean Particle Size (mm)	234.4 = Large Cobble	64 – 256 = Cobble

***Measure/parameter not collected or calculated**

Mack Creek Reach 2 was classified as an A3 reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio, sinuosity, and stream gradient, and D50 are all within the parameters of a typical Rosgen A3 stream. When you take into consideration the +/- 2.0 factor for the width/depth ratio the width/depth measurement for Reach 2 still fits for the criteria for an A channel.

Mack Creek Reach 2 is currently properly functioning. Field notes (2004) indicate that there was little large woody debris present. Stability within this reach was considered fair. There were some visible signs of erosion along the raw banks of the channel, but these were site specific. Reach 2 has a potential to be impacted by project activities due to the steep banks and erosion potential. This is just one of several reaches that was used to analyze the overall condition of the channel and watershed.

D.10-D.4 Mack Creek Reach 3

Mack Creek Reach 3 lies towards the mouth of the Mack Creek main channel. It classifies as an A2a+ stream type. Riparian vegetation is about 85% coniferous trees (cedar, larch, spruce, firs) and 15% grasses, forbs, shrubs (alder, cow parsnip, grades, moss, and lichen). Canopy coverage is about 85%.

Table D.19 Measured Parameters of Project Reach 3 Compared to Rosgen Reference Reach Parameters.

Properties	Mack Creek Reach 3 (2004)	Rosgen A Reference Reach
Stream Type	A2a+	A2a+
Entrenchment Ratio	1.2	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	25.0	> 10+
Width/Depth Ratio (W/D)	17.3	< 12
Channel Stability Rating	*	60 – 95 = Good
D50 – Mean Particle Size (mm)	928.2 = Medium Boulder	256 – 2048 = Boulder

***Measure/parameter not collected or calculated**

Mack Creek Reach 3 was classified as an A2a+ reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio and sinuosity, and D50 are all within the parameters of a typical Rosgen A2 stream. The gradient is much steeper than a typical A, hence the a+ denotation. The width/depth ratio is higher than what is commonly found in an A channel, and is much more indicative of an F-channel or B-channel.

Mack Creek Reach 3 is functioning-at-risk. As stated in the function call section above, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Field notes (2004) indicate that there was significant amount of large woody debris present. Stability within this reach was considered fair to low. There were some visible signs of erosion along the raw banks of the channel. Reach 3 has a potential, although minor, to be impacted by management, even with mitigation measures, due to the increased steepness of the banks, increased incision of the channel, and large floatable woody debris available. This width/depth ratio is on the high end, thus evidence of affects from previous activity. This is just one of several reaches used to analyze the overall condition of the channel and watershed.

D.10-D.5 Mack Creek Reach 4

Mack Creek Reach 4 lies just above the confluence of Mack Creek and Myrtle Creek. It classifies as an A3a+ stream type. Canopy cover is about 80%. Riparian vegetation is about 90% coniferous trees (cedar, hemlock, spruce, and larch) and 10% grasses, forbs, and shrubs (ferns, alder, devils club, grasses and wild flowers). There is a thick layer of moss and lichen covering the ground and rocks along the stream channel.

Table D.20 Measured Parameters of Project Reach 4 Compared to Rosgen Reference Reach Parameters

Properties	Mack Creek Reach 4 (2004)	Rosgen A Reference Reach
Stream Type	A3a+	A3a+
Entrenchment Ratio	1.8	< 1.4
Sinuosity	1.0	< 1.2
Stream Gradient (%)	16.0	> 10.0
Width/Depth Ratio (W/D)	7.1	< 12
Channel Stability Rating	*	54 – 90 = Good
D50 – Mean Particle Size (mm)	137.7 = Large Cobble	64 – 256 = Cobble

***Measure/parameter not collected or calculated**

Mack Creek Reach 4 was classified as an A3a+ reach. When comparing that to a typical A Rosgen reference reach, as the table above shows, you can see where the numerical characteristics lie. The entrenchment ratio is much higher than an A channel. This shows that the reach is becoming less entrenched, more indicative of a B channel. The sinuosity, gradient, and width/depth ratio are all indicative of a Rosgen A stream type.

Mack Creek Reach 4 is functioning-at-risk. As stated in the function call section of Appendix D, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. Stability within this reach was considered fair to poor. The decreasing entrenchment is a major factor in the function-at-risk call. Field Notes (2004) indicate that there were substantial amounts of large woody debris present in the reach, and is impacting the channel morphology. The woody debris is catching sediment and causing aggradation in the channel. This is just one of several reaches used to analyze the overall condition of the watershed.

D.10-D.6 Mack Creek Summary

Mack Creek is considered to be in fair to poor condition. Stability is moderate to low, and only 1 of the reaches is properly-functioning and 4 of the reaches are functioning-at-risk. Riparian vegetation is abundant in most areas. This system shows signs of a catchment that is impaired. Stream bank stability varied throughout the channel; bank failures and sediment erosion and transport occurs along several of these reaches. This system is flashy and typically transports influxes of sediment and woody debris. Overall the channel appears to becoming less entrenched trending away from natural conditions.

D.10-E Myrtle Creek Watershed Summary

This summary includes the main channel of Myrtle Creek, Cooks Creek and Mack Creek. As a whole, the Myrtle Creek watershed is functioning-at-risk. Stability is good to fair, and seven of the reaches are properly-functioning, nine of the reaches are functioning-at-risk, and two of the reaches are borderline properly-functioning to functioning-at-risk. It is still able to meet its designated beneficial uses, and will continue to unless a catastrophic event were to happen (e.g. 100 year flood, stand

replacing fire, numerous road and culvert failures). The bedrock and boulders present in the channel have helped to maintain some stability in several of the reaches.

Logging and road building have taken place throughout the management history of the Myrtle Creek watershed. Relic stumps from the earliest logging operations can still be seen well within riparian areas, and in some cases within a few meters of the stream channel. In several reaches of Myrtle Creek within private land, there still remains small clearings and old skid trails within close proximity to the riparian area from past logging operations. However, these logging practices occurred before the advent of BMPs. Logging practices have since changed and provide for better protection of aquatic resources. With the implementation of BMPs and other mitigation practices, such as INFS, timber harvesting can occur, even in impaired watersheds, without detrimentally contributing to the watershed condition. In some instances the use of new management practices can actually improve watershed conditions and aid in the recovery of impaired areas. In the case of the Myrtle Creek watershed, the improvements and recovery would come from road decommissioning, culvert improvements, and road surface improvement. The Myrtle Creek drainage exhibits signs of a mildly impaired watershed. Stream bank stability varies throughout the channel and although the erosion of banks and sediment transport occurs in some reaches, the system has been able to accommodate and contain the resulting energy and material and will continue to unless a catastrophic event were to happen (e.g. 100 year flood, stand replacing fire, numerous road and culvert failures).

The following table summarizes the stream type and function call for each reach that was surveyed in the main channel of Myrtle Creek, Cooks Creek and Mack Creek. The table includes the designated reach number, latest year surveyed, the existing stream type and function call for each reach..

Table D.21 Summary of Existing Stream Type & Function Call for Surveyed Reaches.

Watershed	Stream	Reach	Year Surveyed	Existing Stream Type	*Function Call
Myrtle Creek	Main Channel Myrtle Creek	#1	2005	B3/1a	Functioning-At-Risk
		#2	2005	B3/1a	Functioning-At-Risk
		#3	2005	B3/1a	Properly-Functioning
		#4	2005	B3/1a	Functioning-At-Risk
		#5	2005	B3a	Functioning-At-Risk
		#6	2005	B4c	P-F-C to F-A-R
		#7	2005	B4c	P-F-C to F-A-R
		#8	2005	A3a+	Properly-Functioning
		#1a	2005	A3a+	Properly-Functioning
	Cooks Creek	#1	2004	A4a+	Properly-Functioning
		#2	2004	A3	Functioning-At-Risk
		#3	2004	A2a+	Properly-Functioning
		#4	2004	B3a	Properly-Functioning
	Mack Creek	#1	2005	A3a+	Functioning-At-Risk
		#1	2004	A3a+	Functioning-At-Risk
		#2	2004	A3	Properly-Functioning
		#3	2004	A2a+	Functioning-At-Risk
		#4	2004	A3a+	Functioning-At-Risk

*** P-F-C = Properly Functioning Condition F-A-R = Functioning-At-Risk NPF = Not Properly Functioning**

D.10-F Snow Creek Stream Surveys

In 2005, three stream surveys were conducted along the main channel of Lower Snow Creek. They are discussed below as Reaches 1, 2, and 3.

D.10-F.1 Snow Creek Reach 1

Snow Creek Reach 1 lies in the headwaters of the main channel of Snow Creek and is above the project boundary area. Reach 1 classifies as a B3a stream type.

The riparian zone vegetation consists of varied aged Douglas-fir, hemlock, cedar, and some ponderosa pine. Understory vegetation consisted of grasses, shrubs, ands forbs. Large amounts of woody debris were present in the reach.

Table D.22 Measured Parameters of Project Reach 1 Compared to Reference Reach Characteristics.

Properties	Snow Creek Reach 1 (2005)	E. Fork Bull Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	4.37	5.84	*
Valley Bottom Width (VBW) (feet)	64	195	*
Drainage Area (DA) (square miles)	19.1	11.1	*
Stream Type	B3a	B3a	B3a
Entrenchment Ratio	1.9	1.38	1.4 – 2.2
Sinuosity	1.0	1.30	> 1.2
Stream Gradient (%)	4.2	4.49	4.0 – 9.9
Width/Depth Ratio (W/D)	18.6	24.7	> 12
Channel Stability Rating	79 = Poor	43 = Good	40 – 60 = Good
BEHI – Bank Erosion Hazard Index	20.1 = Moderate	*	*
Bankfull Width (feet)	33.5	32.0	*
D50 – Mean Particle Size (mm)	85.7 = Small Cobble	192 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	60.3**	*	*

***Measure/parameter not collected or calculated** Value computed at bankfull for that specific location/reach segment**

Snow Creek Reach 1 classifies as a B3a stream type, as does the reference reach. Field notes indicate signs of instability in certain areas of the reach. The entrenchment ratio is well within the parameters of a B, even though it is slightly higher than the reference reach. The sinuosity of Reach 1 is lower than a typical B stream type, indicating a straighter channel, more of an "A stream type" characteristic. The stream gradients are nearly identical, and both indicate a high gradient, hence the "a" denotation. The width/depth ratios are rated high for this channel type. The channel stability rating is Poor (79), and the BEHI is moderate, indicating bank erosion is present. The bankfull widths of Reach 1 and the reference reach are comparable and considered high. Both reaches consist of cobble substrate.

The following photos of Snow Creek Reach 1 show the large amounts of woody debris present and available in the reach.

Figure D.47 Reach 1 – woody debris, photo a.

Figure D.48 Reach 1 – woody debris, photo b.

The following charts show the cross-section curve and particle size distribution curve for Snow Creek Reach 1. The cross-section graph (below) shows steep banks on the left side of the channel, with a bankfull bench on the right side of the channel. The particle size distribution graph (on the right) shows a small cobble substrate.

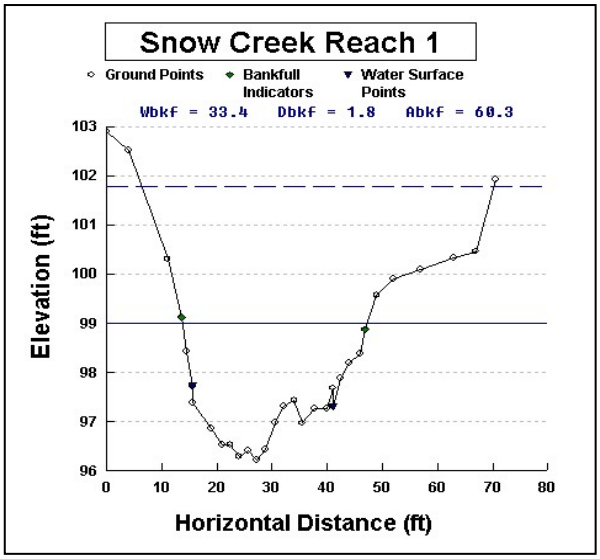


Figure D.49 Cross-section for Reach 1, 2005.

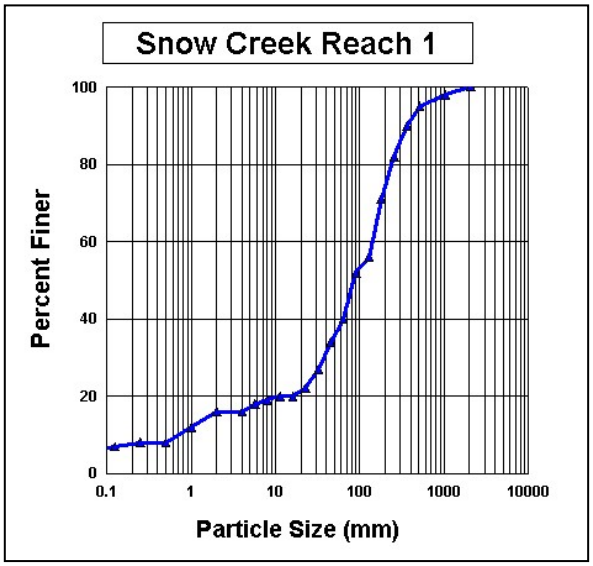


Figure D.50 Particle Size Distribution Curve for Reach 1 2005.

Snow Creek Reach 1 is properly-functioning, but is not highly stable. There is potential for this reach to become functioning-at-risk. It is sensitive to management effects and large events. Even though the stream types are nominally the same there is some instability, which is apparent in the morphology of the reach. This is evident by the low sinuosity, widening of the reach, moderate BEHI rating, poor channel stability rating, and field notes indicating cutting of the banks around large woody debris. The high influx of large woody debris in the reach contributes to the introduction of sediment into the channel, the instability, and the potential for morphological changes. This is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-F.2 Snow Creek Reach 2

Snow Creek Reach 2 lies downstream of Reach 1, and is just below Unit G11 of the proposed management action. Reach 2 classifies as a B3a stream type. The riparian zone vegetation consists of varied aged Douglas Fir, Hemlock, Cedar, and some Ponderosa Pine. Understory vegetation consisted of grasses, shrubs, ands forbs. Large amounts of woody debris was present in the reach.

Table D.23 Measured Parameters of Project Reach 2 Compared to Reference Reach Characteristics.

Properties	Snow Creek Reach 2 (2005)	E. Fork Bull Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	4.83	5.84	*
Valley Bottom Width (VBW) (feet)	50	195	*
Drainage Area (DA) (square miles)	15.68	11.1	*
Stream Type	B3a	B3a	B3a
Entrenchment Ratio	1.8	1.4	1.4 – 2.2
Sinuosity	1.1	1.3	> 1.2
Stream Gradient (%)	4.5	4.5	4.0 – 9.9
Width/Depth Ratio (W/D)	13.5	24.7	> 12
Channel Stability Rating	84 = Poor	43 = Good	40 – 60 = Good
Bankfull Width (feet)	27.5	32.0	*
D50 – Mean Particle Size (mm)	118.5 = Small Cobble	192 = Large Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	56.2**	*	*

***Measure/parameter not collected or calculated** Value computed at bankfull for that specific location/reach segment**

Snow Creek Reach 2 classifies as a B3a, as does the reference reach. The entrenchment ratio is well within the parameters of a B, even though it is higher than the reference reach. The sinuosity of Reach 2 is lower than the parameters of a typical B reference reach, indicating a straighter channel. The stream gradients are nearly identical, and are rated as high, hence the "a" denotation. The width/depth ratio is lower than the reference reach and the channel stability rating is Poor (84). The bankfull width of Reach 2 is comparable to the reference reach and is considered to be moderate for a B channel. Reach 2 consists of small cobble, while the reference reach consists of large cobble substrate. Field notes indicate signs of instability in certain places; such as widening of the channel in certain spots where there is either mass failure present or significant amount of large woody debris, causing the channel to cut around it.

Photos of Snow Creek Reach 2. In photo a, notice the woody debris availability. In photo b, notice the pistol butting of the trees on the slope - evidence of mass failure higher up the channel slopes.

Figure D.51 Reach 2 woody debris, photo a.

Figure D.52 Reach 2 pistol butting on slope, photo b.

The following charts show the cross-section curve and particle size distribution curve for Snow Creek Reach 2.

The cross-section graph below shows a steep bank on the right side of the channel, with a much lower bank on the left side of the channel. Field notes (2005) indicate some bank failures along this section of the channel. The particle size distribution graph (right) shows a small cobble substrate.

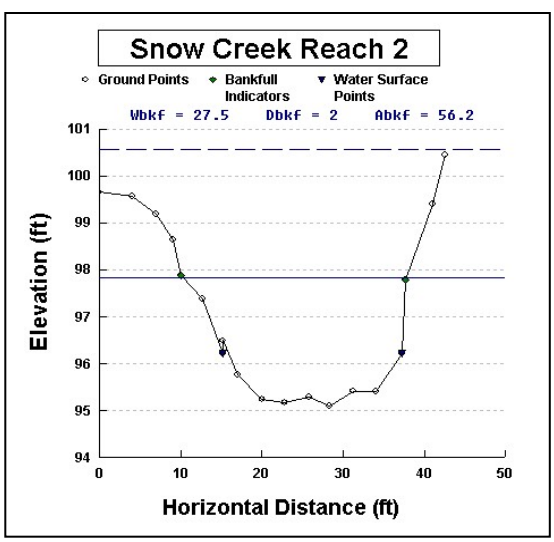


Figure D.53 Cross-section for Reach 2 – 2005.

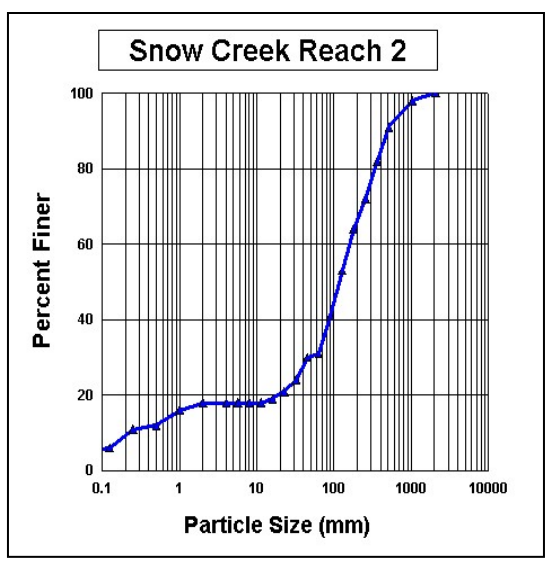


Figure D.54 Particle Size Distribution Curve - Reach 2, 2005.

Even though the stream types are nominally the same, there is some instability which is apparent in the morphology of the reach. The low sinuosity, wide reach, and poor channel stability rating, are just some of the indications that support the call of functioning-at-risk for this site-specific reach. As stated in the function call section above, a functioning-at-risk status does not preclude the watershed from supporting its designated beneficial uses. The influx of large woody debris in the channel also contributes to the introduction of sediment into the channel, the instability, and the potential for morphological changes. Field notes indicate several small mass failures or slumps along the banks of the channel, as well as higher up the side slopes.

The main channel of Snow Creek is currently able to handle this introduction of sediment. The amount of sediment being generated has not been enough to push this site to a non-functioning status. This is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-F.3 Snow Creek Reach 3

Snow Creek Reach 3 lies downstream of Reach 2, and is just below Units G3 and G4 of the proposed management action. Reach 3 classifies as a B3 stream type.

The riparian zone vegetation consists of varied aged Douglas Fir, Hemlock, Cedar, and some Ponderosa Pine. Understory vegetation consisted of grasses, shrubs, ands forbs. Large amounts of woody debris were present in the reach.

Table D.24 Measured Parameters of Project Reach 3 Compared to Reference Reach Characteristics.

Properties	Snow Creek Reach 3 (2005)	Himes 7 Creek (Yaak Reference Reach)	Rosgen B Reference Reach
Valley Bottom Gradient (VBG) (%)	3.44	3.0	*
Valley Bottom Width (VBW) (feet)	50	480	*
Drainage Area (DA) (square miles)	4.70	5.60	*
Stream Type	B3	B3	B3
Entrenchment Ratio	1.7	1.7	1.4 – 2.2
Sinuosity	1.0	1.3	> 1.2
Stream Gradient (%)	3.4	2.3	2.0 – 3.9
Width/Depth Ratio (W/D)	15.0	16.4	> 12
Channel Stability Rating	84 = Poor	*	40 – 60 = Good
BEHI – Bank Erosion Hazard Index	45.5 = Very High	*	*
Bankfull Width (feet)	30.0	12.7	*
D50 – Mean Particle Size (mm)	80.7 = Small Cobble	64 = Small Cobble	64 – 256 = Cobbles
Cross-Sectional Area (sq ft)	59.9**	*	*

***Measure/parameter not collected or calculated.** Value computed at bankfull for that specific location/reach segment**

Snow Creek Reach 3 classifies as a B3, as does the reference reach. The entrenchment ratio is within the parameters of a B, but field notes indicate that it is beginning to become much more entrenched, with the potential to shift towards an A or F channel type. The sinuosity of Reach 3 is lower than what is typical of a B stream, thus indicating a straighter reach, which is more characteristic of an A channel. The stream gradients are similar, and both are rated average. The width/depth ratios are comparable, both having a moderate rating. The channel stability rating is Poor (84), and the BEHI rating is very high for this reach. This is most likely due to the large amount of large woody debris in the channel and mass failure presence and potential. The bankfull width of Reach 3 is higher for Snow Creek than for the reference reach even though Reach 3 has a smaller VBW then that of the reference reach. This may be due to widening of the channel in certain spots where there is either mass failure present or significant amount of large woody debris, causing the channel to cut around it. Reach 3 consists of small cobble, as does the reference reach.

The following photos are of Snow Creek Reach 3. The photo on the right is evidence of mass failures present in the reach, which is contributing sediment to the channel.

Figure D.55 Reach 3, photo a.

Figure D.56 Reach 3, photo b showing evidence of mass failures.

The following charts show the cross-section curve and particle size distribution curve for Snow Creek Reach 3. The cross-section graph below left shows steep banks along both sides of the channel. Field notes (2005) indicate some bank failures along this section of channel and increased entrenchment. The particle size distribution graph (right) shows a small cobble substrate.

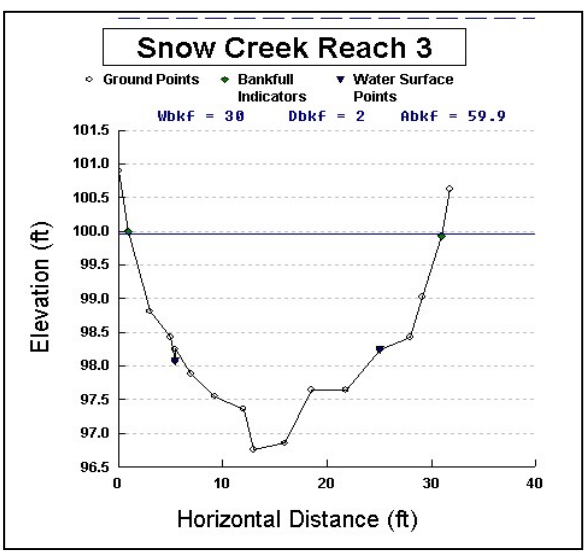


Figure D.57 Cross-section Reach 3 2005.

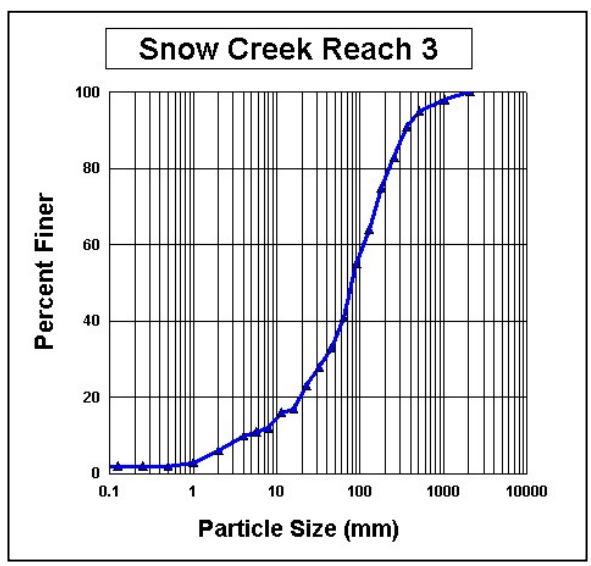


Figure D.58 Particle Size Distribution Curve Reach 3 2005.

Snow Creek Reach 3 is currently not-properly-functioning. Even though the stream types are the same nominally, there is a high degree of instability, as indicated by the low sinuosity, the over-widened reach, poor channel stability and very high BEHI rating. The influx of large woody debris in the channel also contributes to the introduction of sediment into the channel, the instability, and the potential for morphological changes. Field notes indicate several small mass failures or slumps along the

banks of the channel, as well as higher up the side slopes. As stated in the function call section earlier in this appendix, a not-properly functioning status usually does not meet its designated beneficial uses. But as previously stated this is just one reach of many that was used to analyze the overall condition of the watershed.

D.10-G Snow Creek Watershed Summary

The main channel of Snow Creek is considered to be in fair to poor condition. Stability is fair to poor, and the three reaches range from properly-functioning, to functioning-at-risk, to not-properly-functioning. Logging and road building have taken place in this watershed in the past (See Chapter 3 – Existing Condition). Tree stumps from the earliest logging operation were seen well within the riparian zone, in some places within a few meters of the main channel. Several small clearings left over from logging operations are still present. Skid trails are still accessible and logged clearings are still open with some brush vegetation present. Stream bank stability varied throughout the main channel. However, these logging practices occurred before the advent of BMPs. Logging practices have since changed and provide for better protection of aquatic resources.

With the implementation of BMPs and other mitigation practices, such as INFS, fuels reduction can occur, even in impaired watersheds, without contributing detrimentally to the watershed condition. In some instances the use of new management practices can actually improve watershed conditions and aid in the recovery of impaired areas. In the case of the Snow Creek watershed the improvements and recovery would come from road decommissioning, culvert improvements, and road surface improvements. The Snow Creek drainage exhibits signs of an impaired watershed. The watershed is degraded and is poor to moderate in habitat quality and aquatic organism support (DEQ 2002). Large woody debris is abundant in most areas. As a whole, the Snow Creek Watershed is functioning-at-risk.

The following table summarizes the stream type and function call for each reach that was surveyed in Snow Creek. The table includes the designated reach number, latest year surveyed, the existing stream type and function call for each reach.

Table D.25 Summary of Existing Stream Type & Function Call for Surveyed Reaches

Watershed	Stream	Reach	Year Surveyed*	Existing Stream Type	Function Call
Snow Creek	Snow Creek	#1	2005	B3a	Properly-Functioning
		#2	2005	B3a	Functioning-At-Risk
		#3	2005	B3	Not-Properly-Functioning

*** Indicates year of latest survey if more than one has been conducted.**

D.11 - Aquatic Trend Analysis

D.11-A Introduction to Trend Analysis

To assess the expected trend in aquatic habitat condition, from the variety of influences both quantitative and qualitative, the activities and their expected contribution to aquatic condition are summarized in several tables below. The table is a summary of the expected influence of the alternatives on the aquatic conditions in the Myrtle and Snow Creek watersheds. Deep Creek was not analyzed due to the size, locations, and prescriptions proposed and the resulting low potential for effects. Various activities are considered with respect to the variety of aquatic processes that they potentially affect.

The contribution to the overall aquatic condition is estimated in the following terms:
positive influence (denoted by "+") where the activity is expected to contribute to an improvement in condition, or

a negative influence (denoted by "-") where the activity is expected to contribute to degradation in aquatic condition.

The amount of influence a specific activity is expected to have on the overall aquatic condition (either positive or negative) is represented by a three-level ranking, as follows:
High (H), activities that are expected to have a significant effect at the watershed scale (considering both scope and magnitude).

Moderate (M), activities that are expected to have a significant local effect (i.e. at the subwatershed scale), but not result in a significant effect at the watershed scale.

Low (L), activities rated "Low" are expected to have only a negligible effect both at the subwatershed and watershed scale.

The watershed hydrology processes potentially affected by an activity are listed in the following Trends Analysis tables (Myrtle Creek, Myrtle Creek Summary, Snow Creek and Snow Creek Summary). Where this project is not expected to have an influence on conditions, a □ symbol was used within the tables to indicate No Ranking. A specific activity's expected contribution on aquatic condition is considered in terms of both short-term and long-term. Short-term influence is judged to be the immediate results of implementing the activity, generally expected to be a 5-10 year timeframe. Long-term influence is judged to be the influence the activity will have on aquatic condition as a result of changes in processes and resource conditions that will over time result in changes in aquatic habitat condition. The timeframe for this influence is greater than 10 years.

As stated in Chapter 2, Alternative 3 (described on the previous page) was not analyzed in detail; therefore only the trends analysis was conducted for Alternative 3; it is included in the following tables.

Alternative 3: (see Chapter 2 for more information)
Approximately 2800 acres of fuels reduction treatments.
Approximately 2 miles of temporary road construction.

D.11-B Trend Analysis – Myrtle Creek

NOTE: To aid the reader in understanding the table and comparing the short term and long term expected effects, the columns that display short term effects are lightly shaded while the columns displaying long term effects are clear (no shading).

Table D.26 Aquatic Trend Analysis – Myrtle Creek, Alternatives 1, 2, 3 and 5

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	□	**-L**	**-L**	**+L**	**-M**	**-L**	□	**-L**
	Mass Failure Risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	**-L**	**-L**	**+L**	**-M**	□	□	**-L**
	Solar heating	Riparian shade	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	□	□	□	□	**-M**	**-L**	□	□
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	□	□	**-M**	□	□	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian shade	Riparian condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	□	**-L**	**-M**	**+L**	**-M**	□	**-L**	□
	Mass failure risk	Pulse Sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	**-L**	□	**+L**	□	□	□	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□

Table D.26 Continued. Aquatic Trend Analysis – Myrtle Creek, Alternatives 1, 2, 3 and 5.

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	□	□	□	□	**-M**	**+L**	□	□
	Mass failure risk	Pulse sediment		□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	□	□	**-L**	**+L**	□	□
	Fish Passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian Shade	Riparian Condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	□	**-L**	**-L**	**+L**	**-M**	□	□	**-L**
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	**+L**	**+L**	**-L**	**+L**	□	□
	Fish passage	Habitat availability	□	□	**+L**	**+L**	**+L**	**+L**	**+L**	□

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D.11-B.1 Effects of Future Road Decommissioning Opportunities in Myrtle Creek

Review and assessment of roads throughout the watersheds lead to a priority ranking for decommissioning roads that have associated resource concerns. The Proposed Action (Alternative 2) and Alternative 5 included only road management activities described in Chapter 2, other roads that have been given a decommissioning priority are considered future opportunities. The expected effects of implementing those future opportunities are shown in the following table as "Alt 2 Plus Future Opportunities."

Table D.27 Aquatic Trend Analysis – Myrtle Creek, Alternative 2 Plus Future Opportunities

Action	Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	**-L**	**+L**
	Mass Failure Risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**-L**	**+L**
	Solar heating	Riparian shade	□	□
	LWD Recruitment	Potential LWD	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	□	□
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□
	Fish passage	Habitat availability	□	□
	Riparian shade	Riparian condition	□	□
	LWD Recruitment	Potential LWD	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse Sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□
	Fish passage	Habitat availability	□	□
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**-M**	**+M**
	Fish Passage	Habitat availability	□	□
	Riparian Shade	Riparian Condition	□	□
	LWD Recruitment	Potential LWD	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	**-M**	**+M**
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	**+M**	**+M**
	Fish passage	Habitat availability	**+M**	**+M**

See Chapter 2 concerning the decommissioning of Road 402-C (in Snow Creek watershed), which would be approximately 1 mile total length; and decommissioning Road 1309-UA (in Myrtle Creek watershed), which is also approximately 1 mile long.

Table D.1 displays the road decommissioning priorities in the Myrtle Creek watershed and Table D.2 displays the priorities in the Snow Creek watershed. Roads other than Road 1309-UA and 402-C are considered as Future Opportunities.

The expected **short-term effects** of the Myrtle HFRA project on aquatic condition in Myrtle Creek are fairly balanced between positive and negative influences.

The factors contributing to a short-term reduction in aquatic condition are principally related to the sediment pulse generated from the implementation of the action. They are:

- temporary re-opening of Road 402-C
- fuels reduction treatments
- road decommissioning
- road reconstruction and improvement
- culvert replacement

The temporary re-opening of Road 402-C is judged to be the largest contributor to this influence, followed by the fuels reduction activities, road decommissioning, and road reconstruction and improvement, and culvert replacement..

The factors contributing to an immediate short-term improvement in aquatic condition are related to the reduction in chronic sediment and improvement in the hydrologic process from the following activities:

- culvert upgrades and road decommissioning,
- road reconstruction and improvement, and
- soil restoration.

The immediate improvements in habitat accessibility from culvert upgrades and road decommissioning are judged to be the largest contributors to this improvement.

The expected **long-term effects** of the Myrtle HFRA project on aquatic condition in the Myrtle Creek watershed are all positive.

Activities contributing to the positive long-term effects are:

- road decommissioning
- culvert upgrades
- road improvements
- soil restoration

The road decommissioning and improved habitat accessibility from the culvert upgrades are judged to be the largest contributors to long-term improved aquatic conditions.

Chronic sediment would be reduced and hydrologic processes would be improved by the following activities, which would contribute to the expected improvement:

- road decommissioning
- road improvement
- soil restoration.

The amount of the improvement associated with this group of activities is rated low due to the amount of this work proposed with this project (see Alternative 2 and 5 descriptions in Chapter 2) with respect to the remaining amount of degraded mainstem habitat, roads and compacted soils in the Myrtle Creek watershed. These will continue to contribute negatively to these aquatic processes.

D.11-C Effect Pathways and Trend Analysis Summary – Myrtle Creek

As seen in the above table, the various processes (such as surface erosion or riparian shade) are each potentially affected by more than one activity (action). The activities affecting the process can be grouped by what is called an "effect pathway." For example, the effect pathway for surface erosion includes fuels reduction, temporary road construction, road reconditioning and improvement, road decommissioning, and stream crossing improvement. However, the effect pathway for riparian shade includes fewer activities – temporary road construction and road decommissioning. The effect pathways can be used to summarize the H, M, and L ratings shown in the above tables by assigning a value (Low =1, Moderate = 2, and High =3) to the ranking for each individual activity that is part of the specific pathway . The values are either positive for a positive influence, or negative for a negative influence.

The following table summarizes the alternatives by the effect pathway and includes the total value for the alternative in general. This provides one more means to compare the long-term trend differences between alternatives.

The numeric values in the Aquatic Trend Summary are calculated by tallying the total effect in each pathway; thus there are values other than 1, 2, or 3. Using surface erosion for an example, the summary for Alternative 2 in the long-term would be calculated by adding the value for surface erosion effect of each of the following: fuels reduction (+1) plus temporary road

construction (0), plus road reconditioning and improvement (+1), plus road decommissioning (0), plus stream crossing improvement (+1), which equals +3. By using the same formula for each of the effect pathways, then adding those results, the overall total would be +7 for the long-term effects of Alternative 2.

Table D.28 Aquatic Trend Summary – Myrtle Creek

Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Surface Erosion	Pulse & Chronic Sediment	0	-3	-4	3	-10	-1	-1	-2
Mass Failure Risk	Pulse sediment	0	0	0	0	0	0	0	0
Infiltration, runoff, peaks	Hydrologic process	0	-2	2	3	-6	2	0	-1
Riparian Shade	Riparian shade	0	0	0	0	0	0	0	0
LWD Recruitment	Acting LWD	0	0	0	0	0	0	0	0
Fish passage	Habitat availability	0	0	1	1	1	1	1	0
Habitat Quality	Channel Dimensions	0	0	0	0	0	0	0	0
TOTAL		**0**	**-5**	**-1**	**7**	**-15**	**2**	**0**	**-3**

The No Action Alternative and Alternative 5 suggest no change in the short term, but a slight negative trend in the long term related to fire risk associated with untreated stands, as well as their effects on the current road system. Alternatives 2 and 5 includes approximately 96 acres of treatment which has minor overall negative affects due to size, location of fuels reduction treatments. Alternatives 2 and 3 suggest a short term negative affect, followed by long term improving trend. Alt 3 has more negative short term impacts, and less long term improving trend, due to more temporary road building.

Table D.29 Aquatic Trend Summary – Myrtle Creek, Alternative 2 Plus Future Opportunities

Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Surface Erosion	Pulse & Chronic Sediment	-7	7
Mass Failure Risk	Pulse sediment	0	0
Infiltration, runoff, peaks	Hydrologic process	-1	5
Riparian Shade	Riparian shade	0	0
LWD Recruitment	Acting LWD	0	0
Fish passage	Habitat availability	2	2
Habitat Quality	Channel Dimensions	0	0
		-6	**14**

Alternative 2 plus the future opportunities for improvement projects, suggests a short-term negative effect, followed by a greater long term improving trend than either Alternative 1, 2, or 3. The increased amount of both short term negative trend and long term improving trends ~~in Alternative 2~~, are largely a result of the greater amount of road decommissioning in the future opportunities.

D.11-D Trend Analysis – Snow Creek

Table D.30 Aquatic Trend Analysis – Snow Creek

Action	Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	□	-L	-M	□	-M	-L	-L	□
	Mass Failure Risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	-L	-M	□	-M	□	-L	□
	Solar heating	Riparian shade	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	□	□	-L	□	-M	□	-L	□
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	-L	□	-L	□	-L	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian shade	Riparian condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	□	-L	-M	□	-M	□	-M	□
	Mass failure risk	Pulse Sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	-L	-L	□	□	□	-L	□
	Fish passage	Habitat availability	□	□	□	□	□	□	□	□
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	□	□	-L	+L	-M	+L	-L	+L
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	+L	+L	+L	+L	+L	+L
	Fish Passage	Habitat availability	□	□	□	□	□	□	□	□
	Riparian Shade	Riparian Condition	□	□	□	□	□	□	□	□
	LWD Recruitment	Potential LWD	□	□	□	□	□	□	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	□	-L	-L	+L	-M	+L	-L	+L
	Mass failure risk	Pulse sediment	□	□	□	□	□	□	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□	+L	+L	+L	+L	+L	+L
	Fish passage	Habitat availability	□	□	+L	+L	+L	+L	+L	+L

Table D.31 Aquatic Trend Analysis – Snow Creek, Alternative 2 Plus Future Opportunities

Action	Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Fuels Reduction	Surface Erosion	Pulse & Chronic Sediment	-M	+L
	Mass Failure Risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	-M	+L
	Solar heating	Riparian shade	□	□
	LWD Recruitment	Potential LWD	□	□
Temporary Road Construction	Surface erosion	Pulse & Chronic Sediment	-L	+L
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	-L	
	Fish passage	Habitat availability	□	□
	Riparian shade	Riparian condition	□	□
	LWD Recruitment	Potential LWD	□	□
Road Reconditioning and Improvement	Surface erosion	Pulse & Chronic Sediment	-M	+L
	Mass failure risk	Pulse Sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	□	□
	Fish passage	Habitat availability	□	□
Road Decommissioning	Surface erosion	Pulse & Chronic Sediment	-M	+M
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	+M	+M
	Fish Passage	Habitat availability	□	□
	Riparian Shade	Riparian Condition	□	□
	LWD Recruitment	Potential LWD	□	□
Stream Crossing Improvement	Surface erosion	Pulse & Chronic Sediment	-M	+M
	Mass failure risk	Pulse sediment	□	□
	Infiltration, runoff, peaks	Hydrologic process	+M	+M
	Fish passage	Habitat availability	+M	+M

D.11-D.1 Expected Short-term and Long-term Consequences in Snow Creek

The expected short-term consequences of the Myrtle HFRA project on aquatic condition in Snow Creek are fairly balanced between positive and negative influences.

The factors contributing to a short-term reduction in aquatic condition are principally related to the sediment pulse generated from the implementation of the following activities:

- temporary re-opening Road 402-C,
- road decommissioning,

- road reconstruction and improvement,
- culvert replacement, and
- fuels reduction,

The temporary re-opening of Road 402-C, road reconditioning and improvements (Alternative 2 = approximately 29 miles, Alternative 5 = approximately 22 miles), are judged to be the largest contributor to this influence, followed by the fuels reduction activities, and road decommissioning (approximately two miles in Alternative 2 and 5).

The factors contributing to an immediate short-term improvement in aquatic condition are related to the reduction in chronic sediment and improvement in the hydrologic process from the following activities:

- road decommissioning,
- road reconstruction and improvement,
- and soil restoration.

The immediate improvements in habitat accessibility from culvert upgrades and road decommissioning are judged to be the largest contributors to this improvement.

The expected long-term consequences of the Myrtle HFRA project on aquatic condition in the Snow Creek watershed are all positive.

The road decommissioning and improved habitat accessibility are the result of the culvert upgrades. These upgrades are judged to be the largest contributor to long-term improved aquatic conditions.
The following activities also contribute to the expected reduction in chronic sediment and expected improved hydrologic process:

- road decommissioning,
- road improvement, and
- soil restoration

The amount of the improvement associated with these activities is rated low due to the amount of this work being completed with this project with respect to the remaining amount of degraded mainstem habitat, roads and compacted soils in the Snow Creek watershed. Without changes, these conditions will continue to contribute negatively to these aquatic processes.

D.11-E Effect Pathways and Trend Analysis Summary – Snow Creek

As explained in the earlier discussion of effect pathways and trends in the Myrtle Creek discussion, the various processes (such as surface erosion or riparian shade) are each potentially affected by more than one activity. The activities affecting the process can be grouped by what is called an "effect pathway." The following table summarizes the alternatives by the effect pathway and includes the total value for the alternative in general. This provides one more means to compare the short and long-term trend differences between alternatives.

Table D.32 Aquatic Trend Summary – Snow Creek, Alternatives 1, 2, 3, and 5.

Process Affected	Characteristic Indicator	Alt 1 Short Term	Alt 1 Long Term	Alt 2 Short Term	Alt 2 Long Term	Alt 3 Short Term	Alt 3 Long Term	Alt 5 Short Term	Alt 5 Long Term
Surface Erosion	Pulse & Chronic Sediment	0	-3	-7	2	-10	1	-6	2
Mass Failure Risk	Pulse sediment	0	0	0	0	0	0	0	0
Infiltration, runoff, peaks	Hydrologic process	0	-2	-2	2	-1	2	-1	2
Riparian Shade	Riparian shade	0	0	0	0	0	0	0	0
LWD Recruitment	Acting LWD	0	0	0	0	0	0	0	0
Fish passage	Habitat availability	0	0	1	1	1	1	1	1
Habitat Quality	Channel Dimensions	0	0	0	0	0	0	0	0
TOTAL		**0**	**0**	**-5**	**-8**	**5**	**-10**	**4**	**-6**

The following table summarizes the trends that are predicted for Alternative 2 plus implementation of the activities identified as future opportunities (see Tables D.1 and D.2, and footnotes #6 and #7 under Table D.26).

Table D.33 Aquatic Trend Summary – Snow Creek, Alternative 2 Plus Future Opportunities.

Process Affected	Characteristic Indicator	Alt 2 Plus Future Opportunities Short Term	Alt 2 Plus Future Opportunities Long Term
Surface Erosion	Pulse & Chronic Sediment	-9	7
Mass Failure Risk	Pulse sediment	0	0
Infiltration, runoff, peaks	Hydrologic process	1	5
Riparian Shade	Riparian shade	0	0
LWD Recruitment	Acting LWD	0	0
Fish passage	Habitat availability	2	2
Habitat Quality	Channel Dimensions	0	0
TOTAL		**-6**	**14**

D.11-F Summary of Effects in Snow Creek

Alternative 1 (No Action) in Snow Creek suggests no change in the short term, but a slight negative trend in the long term related to fire risk associated with untreated stands, as well as their effects on the current road system.

Alternatives 2 and 5 are similar prescriptions in the Snow Creek watershed, with Alternative 5 treating approximately 422 less acres than Alternative 2. (The major difference in the action alternatives is within the Myrtle Creek watershed portion.) Alternatives 2, 3 and 5 suggest a short term negative affect, followed by long term improving trend.

Alternative 2 plus the future opportunities for improvement projects, suggests a short-term negative effect, followed by a greater long term improving trend than the other alternatives without the future opportunities. The larger amount of improving trend in Alternative 2 plus the future opportunities occurs in large part as a result of the greater amount of road decommissioning, when both the currently proposed and future opportunities are considered.

Appendix E -- Old Growth

The Bonners Ferry Ranger Districty typically reserves Appendix E of our Environmental Impact Statements for discussion, maps and other information concerning the old growth resources. However, for the Myrtle Creek HFRA project, the old growth section has been incorporated in the main body of the FEIS. The information is located along with the Vegetation sections in Chapters 2, 3 and 4.

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Appendix F -- Response To Comments

Introduction

This appendix contains the substantive comments received on the Draft EIS (DEIS) for the Myrtle Creek HFRA Project and the agency's responses to those comments. The full comments (letters, records of phone calls or personal visits, e-mails and faxes or other formats) are part of the public record and are included in the Myrtle Creek HFRA project file located at the Bonners Ferry Ranger Station.

Public review of the DEIS and the following substantive comments did not disclose new issues or need for new significant analysis. Chapter 1 of the FEIS discusses other changes between the release of the Draft EIS and Final EIS, including analysis of Alternative 5.

How to read this appendix:

Comments are organized into the following categories:

- F-1. Project Goals
- F-2. Aquatics (Watershed/Hydrology and Fisheries)
- F-3. Fire and Fuels
- F-4. Old Growth
- F-5. Soils
- F-6. Historic Range of Variability
- F-7. Roadless Areas
- F-8. Wildlife
- F-9. Miscellaneous

Comments are displayed in italicized text and designated by the resource category (such as **F.1 Project Goals**), followed by a number for the individual comment (**F.1-a**). The agency's response is designated as **Response** and appears in non-italicized text style.

For example:

F.1-a Comment:
The KVRI Board is in strong support of the project. …
Response: Thank you for your support. …..

F.1 - Project Goals

F.1-A Comment:

The KVRI Board is in strong support of the project. The Board support includes the caveat that photo monitoring of old growth stands be conducted before and after the project in order to determine effectiveness of management tools and provide for an adaptive feedback loop.

Response: Thank you for your support. Monitoring for the project (including the old growth photo monitoring) is explained in Chapter 2 of the Draft and Final EIS.

F.1-B Comment:

Please be advised that member Tribes of the Upper Columbia United Tribes (UCUT) fully support the proposed Myrtle Creek Project. We are aware of the Kootenai Tribe's active participation in the development of the Myrtle Creek Healthy Forest Restoration Act Project, and the advantages of reduced sediment and improved water quality in the Myrtle Creek Watershed.

Response: Thank you for your support.

F.1-C Comment:

I strongly support the work proposed on the Myrtle Creek HFRA Project. I believe you have addressed both the NEPA and the ESA requirements. My one concern is that more acres are not being treated and there are many acres that need treatment. So much salvage is going to waste.

Response: Thank you for your support. Chapter 2 of the FEIS describes the collaboration and other considerations used to develop the Proposed Action (Alternative 2) and the other alternatives. It also summarizes the effects of each alternative.

F.1-D Comment:

The EPA supports decommisioning roads that have a risk of sediment delivery to Myrtle Creek. In addition, EPA appreciates the steps that the Forest Service took to involve the public, local government agencies and the Kootenai Tribe in the creation of the draft EIS. We have assigned a rating of LO (Lack of Objections) to the draft EIS.

Response: Thank you for your support.

F.2 - Aquatics (Watershed/Hydrology and Fisheries)

F.2-A Comment:

The DEIS shows priority rankings for road decommissioning that have been analyzed in this DEIS and in the Myrtle-Cascade FEIS. The likelihood of road decommissioning not done in a timely manner even though included within a second NEPA document is a concern. Please explain – why is that? The analysis in this DEIS (as well as the previous FEIS) is muddled by the uncertainties of proposed genuine restoration, which is exacerbated with the certainty of ecosystem degradation via logging, road construction and log hauling.

Response: Budgetary constraints and Forest priorities are considered when determining scheduling and locations of road decommissioning. Given that Myrtle Creek is the municipal watershed for the City of Bonners Ferry, it is a high priority on the IPNF to have this work done as funds become available. For example, some funding has been received through the Resource Advisory Committee (RAC) to decommission brushed in roads that are a risk to the water quality in White Pine Creek drainage (a tributary to Myrtle Creek) are scheduled to be decommissioned in 2007 (Project File document).

F.2-B Comment

The DEIS doesn't quantitatively disclose the ongoing impacts of the roads on all ownerships in the Myrtle Creek and Snow Creek watersheds – roads that the Proposal wouldn't decommission or maintain, even though they are a chronic source of watershed damage.

Response: The DEIS and FEIS took into account the impact of all roads (regardless of ownership) when running the models (FuME, WATSED, GeoWEPP, Disturbed WEPP, Road WEPP). It also took them in account when prioritizing and recommending which ones are to be decommissioned (DEIS Chapter 3.2, Chapter 4.2). Problem roads that are not going to be decommissioned with this project were taken into account, hence the prioritization of future opportunities on other roads. See FEIS Chapter 4 and Appendix D for further information. Alternative 2 includes road improvements on approximately 29 miles of roads that will be used as haul routes and Alternative 5 includes improvements on approximately 22 miles.

F.2-C Comment:

The DEIS does not adequately disclose the ongoing "press disturbance" of sediment from past management activities, on fish habitat and fish populations. Measures of sediment impacts such as cobble embeddedness are not disclosed. Discussion of population trends of native fish, in response to past management actions, are likewise not scientifically adequate.

The DEIS does not clearly indicate if viable populations of native trout have been maintained in the project area. The degraded fisheries conditions noted in the DEIS clearly show that the desired effects on water quantity and fish habitat have not taken place. Deposits of sediment, along with bedload scour, streambed instability, and stream bank erosion have seriously and adversely affected water conditions and fish habitat in Snow Creek, Myrtle Creek and tributaries. The water temperature problems that currently exist will be further impacted with the planned logging activities.

Response: Past activities have caused sediment deposits and stream bank erosion in certain sections of Snow Creek, Myrtle Creek and their tributaries. (DEIS sections 3.3-A.8, 3.3-A.20 and FEIS Chapters 3 and 4 and Appendix D). Much of this is site specific, though, and overall these creeks have been stable enough to have withstood these past management actions without permanently adversely affecting water quality. With the bedrock and boulder content on several of the reaches surveyed, streambed stablity is fair to good. (DEIS 3.3-A.14, 3.3-A20, and FEIS Chapters 3 and 4 and Appendix D).

F.2-D Comment:

The Fry Emergence Standards were designed into the Forest Plan to address cumulative effects of management activities such as logging, roadbuilding, etc. The Forest Plan amendment to remove the Fry Emergence Standards does not result in a sound

methodology to determine or consider those cumulative effects, therefore the FONSI for the Fry Emergence Standard amendment was illegal. The Fry Emergence Standards and monitoring requirements are fully applicable, (even though ignored by the FS) for the purposes of the Myrtle Creek HFRA analysis.

Response: 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 (IPNF 2005). 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 INFS 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 for fry emergence success were accurate or precise. (FEIS, Appendix B Fisheries Report)

The FONSI for the Fry Emergence Amendment to the Forest Plan is not under consideration with this project.

F.2-E Comment:

The fact that the impacts of the recent fire are ongoing are another reason the IPNF ought to be light-handed in these watersheds. The DEIS does an extremely poor job of disclosing the sensitized nature of the watersheds, due to the recent fire. (See, for example Beschta et al., 1995 and Beschta et al., 2004.)

Response: Both the DEIS and FEIS include the effects of the 2003 Myrtle Creek Fire in the descriptions of the existing conditions of the resources, and in the discussion of cumulative effects to the resources. In this Final EIS, the discussion of effects to the watershed are located in sections 3.2 and 4.2. The Burned Area Emergency Rehab (BAER) reports prepared for the Myrtle Creek Fire are available in the project files. The Beschta papers you reference deal with wildfire and salvage logging and other post fire treatments. The Myrtle HFRA project is not a fire salvage and no vegetation treatments of any kind are scheduled in the burned area.

F.2-F Comment:

The IPNF is wasting a great opportunity to inform and participate in a timely TMDL process (and perform its duties under the Clean Water Act), given it's overzealous focus on logging as watershed restoration. Following the IPNF's Iron Honey project experience, it's too bad the IPNF remains some of the few "true believers" in the "logging for watershed health" paradigm.

Response: The DEIS explained, in great detail, the TMDL process (DEIS 3.2-B, Appendix D). In this Final EIS, the TMDL process is also discussed in Chapter 3. As explained, the IPNF was involved in the process. A Kootenai River Subbasin Assessment and development of TMDLs has been conducted through a joint effort of the Idaho Department of Environmental Quality, the Environmental Protection Agency, and the Kootenai Tribe of Idaho (IDEQ, et. al. 2005). The IPNF participated in the process with technical input and representation on the Kootenai Valley Resource Initiative (KVRI) TMDL Working Group. This comprehensive analysis determines whether water bodies meet state water quality standards and support beneficial uses, or if additional pollution controls are needed.

The Myrtle HFRA is not a watershed restoration project. The focus is on clean water and fuels reduction treatments that will help protect the watershed from the effects of catastrophic fire.

F.2-G Comment:

Note that "Turbidity associated with heavy storm water runoff with sediment from land disturbances is the greatest threat to water quality (DEQ 2000)." (DEIS at 3-65.) Clearly, Myrtle Creek is experiencing increases in turbidity from the recent fire and from logging and roads. Thus, it seems clear that the greatest threat to water quality and drinking water would be more logging that reduces canopy levels and further increases in impermeable soils via skidding and construction of landings and roads. Illogically, this is precisely what the IPNF is fixated to do. Further, each of the models used in the DEIS for water quality is able to "model" effects of such storm water events.

Response: Myrtle Creek does experience increases in turbidity from the recent fires and from logging and roads. This decreases as each year passes, and has signficantly decreased since the 2003 fire. The water quality does meet DEQ and EPA standards for drinking water and the City of Bonners Ferry monitors this (DEIS section 3.3-A.15 and FEIS Chapter 3, section 3.3). It was found that the greatest threat to water quality was the roads that are in poor condition and the future threat of culvert failures (DEIS 4.2-C and FEIS Chapter 4). The DEIS and FEIS also disclosed the models used and the predicted effects of the proposed management actions and alternatives. The model results support the conclusion that the fuels reduction treatments will have no significant detrimental effects to the water quality. The Myrtle Creek HFRA Project does meet EPA and DEQ laws and regulations for the protection of water quality.

F.2-H Comment:

The IPNF assumes that the implementation of BMPs will sufficiently mitigate any water quality problems that would result. The FS assumes the BMPs will protect the aquatic systems in the watersheds. This assumption is flawed as is attested by the degraded fisheries conditions that already exist. Consequently, this assumption by the FS is flawed and violates the CWA, Idaho Code, and IDAPA.

Response: The Forest Service does not claim the BMPs will fully protect the aquatic systems. They are one of many items and design features that will be used to protect the aquatic systems (see Chapter 2 Design Features, Mitigation Measures and Estimated Effectiveness). BMPs, as defined by the State of Idaho, are the practice or combination of practices determined to be the most effective and practicable means of preventing or reducing non-point pollution (DEIS, 2.9-B, 2.10-B, Appendix C and FEIS Chapter 3, section 3.2, and Appendix C). BMP monitoring is conducted annually by the Forest to validate the implementation and effectiveness of BMPs associated with land management activities. Monitoring results are used to adapt future management actions where improvements in meeting water quality objectives are indicated. Forest monitoring of BMPs indicates that in most cases they continue to function as expected and are meeting their intent (see IPNF Forest Plan Monitoring Reports 2002, and 2003). The BMPs listed as required design criteria for the Myrtle Creek HFRA project (DEIS sections 2.9-B, 2.10-B, and FEIS section 2.9-B, and 2.10-C and Appendix C) include effectiveness of the BMPs based on research and/or monitoring. The use of BMPs is in compliance with the Clean Water Act, Idaho Code, and Idaho Water Quality Standards.

F.2-I Comment:

The entire issue of BMPs has been repeatedly clouded by the FS. The Lolo NF and Regional Office have admitted that during projects such as this, not all problem sites are restored up to BMP standards (Lolo BMP Memo).

It is erroneous to assume that BMPs will assure water quality will be maintained, if present conditions are in many locations already in violation of the standards. The failure of BMPs is seriously implicated in the scientific literature. Beschta et al. (2004) state:

> *It is perhaps widely accepted that "best management practices" (BMPs) can reduce damage to aquatic environments from roads. Time trends in aquatic habitat indicators indicate, however, that BMPs fail to protect salmonid habitats from cumulative degradation by roads and logging (Espinosa et al. 1997.) Ziemer and Lisle (1993) note a lack of reliable data showing that BMPs are cumulatively effective in protecting aquatic resources from damage.*

Response: As explained in the above response to comment F.2-h, the use of BMPs is not the only way the aquatic systems will be protected. During the Myrtle Creek Working Group collaborative discussions, the recommendations included other watershed improvement activities to address some of the present conditions (FEIS Chapter 2 - Alternative 2 and 5 descriptions, and Chapter 4 – discussion of effects). As explained during the first Working Group tour in the Myrtle Creek watershed, the changes in road construction methods, timber harvest and fuels reductions treatments, and the implementation of BMPs have resulted in great improvements.

F.2-J Comment:

The DEIS refers to the use of the modeling procedures (wildlife, water, etc.), yet if fails to disclose the amount of error inherent in the use of the models for the purposes they are being used. The models have not been verified on the ground here, and therefore it's reasonable, scientifically, for commenters and the public to expect the IPNF to be far more cautious about using such models.

Response:

The DEIS discloses the amount of error inherent in the use of models for each model used (DEIS 3.2-C.3 and FEIS Chapter 3, section 3.2). Several of the models have been verified on the ground. The use of models is pursuant to the Idaho Panhandle National Forests Land and Resource Management Plan (Forest Plan).

Models are not designed to produce precise solutions; rather they are tools intended to provide a method to objectively compare relative differences among alternatives. The results of models are not the sole source of information for making resource decisions and rarely should they be the only tools utilized for analysis of watershed responses. Watershed-related specialists also have local site-specific knowledge of the area, have observed and documented conditions in the analysis area, and have knowledge of hydrologic processes and local existing conditions.

The estimated responses from the models are combined with other sources of information and analyses to help determine the findings of probable effects (DEIS Pp. 3-10 & 11 and Chapter 3, section 3.2). The other information includes items such as the following:

1) locally derived monitoring or monitoring of similar systems;

2) reviews of pertinent scientific literature and reports;
3) reasonably local calibration references for the driving variables use in the models;
4) reference to validation of the model application using data for major geomorphic groups present on the Forest; and,
5) professional judgments by watershed-related specialists based on education and experience.

F.2-K Comment:

Then, based on that data [available data on levels of existing detrimental disturbance within activity areas*] the IPNF will be in a better position to analyze the water yield and other hydrological implications of the various amounts of hydrologically dysfunctioning soils, within each project area watershed and subwatershed, and disclose them to the public. This is also in the R-1 Soil Quality Standards. The models the DEIS uses do not consider compacted soils, for example, for cumulative effects watershed analyses.*

Response: As explained in the discussion of analysis methodologies, the watershed analysis models do consider compacted soils as they relate to roads and other slope disturbances for cumulative effects watershed analyses (DEIS 3.2-C and FEIS Chapter 3, section 3.2). One of the changes between the Draft and Final EIS was the inclusion of the Soil Resource discussion in Chapters 3 and 4. The Chapter 3 analysis of the existing condition includes the existing detrimental disturbance; Chapter 4 discloses the cumulative effects of the past activities combined with the given alternatives (Alt 1, 2 and 5).

F.2-L Comment:

We are concerned over the improvement of approximately 40 miles of existing roads. We would like information on why much of the 40 miles of existing roads that will be used as haul routes are proposed for improvements and maintenance, and are over four miles from treatment units. We would [like] information as the current level of these existing roads, and the level of reconstruction, and the disturbances associated with this maintenance and improvements.

Response: The DEIS statement that approximately 40 miles of existing roads would be used as haul routes was an error. We apologize for the mistake. The FEIS has corrected that information to approximately 29 miles of haul routes under Alternative 2, and 22 miles of haul routes under Alternative 5. These roads would be improved by receiving "roadside and surface maintenance, etc.", which is road reconditioning. The greatest benefit would be realized through the improvement and upgrading of the high-risk culverts, which would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures. The status of these roads, their ownership, and the maintenance level are listed in the FEIS, Table 4.1 and Appendix D. The effects associated with the maintenance and improvements are discussed in Chapter 4 of the DEIS and FEIS.

To further clarify the road management portion of this project, the FEIS contains a map of the haul routes for Alternative 2, the Proposed Action (Map Appendix). By definition a "haul route" is the transportation system that would be used to haul commercially valuable products to the initial processing facility. For instance, Road 633 serves as a portion of the transportation for treatment units in the Myrtle Creek watershed and the distance from Unit B1, for example, down the road to the West Side Road (County Road 18) is all calculated in reaching the total of approximately 29 miles under the Proposed Action. However, that does not necessarily mean that the entire road will need improvements. The watershed/hydrology inventory of the existing conditions identified the site-specific locations and road segments where work would occur.

F.2-M Comment:

The Myrtle Creek DEIS states that skid trail distance would average 100 feet apart on ground-based and cable yarding units, except where the trials converge and as terrain dictates otherwise. This measure would help assure that no more than 15 percent of the activity area would be detrimentally disturbed per Region-1 soil standards. How did Region 1 assess the 15% soil standard measure? How many service landings are proposed on existing classified roads? The DEIS states that "locating landings on existing classified National Forest system roads that area considered designated lands eliminates additional impacts to activity units." We are interested in information regarding the size, location, cumulative area and number of landings in this area.

Response: Landings are proposed on existing classified roads in Myrtle and Snow Creek. A map of the landings and haul routes has been included in the FEIS Map Appendix. The size and area of landings is described in the soils discussion of the FEIS Chapter 4. Roads (and landings) that remain on the landscape for future use are dedicated to the permanent transportation system.

F.2-N Comment:

In June 2006, The City of Bonners Ferry and Boundary County declared local Disaster Emergencies and opened their Emergency Operations Centers. The State Bureau of Homeland Security EOC was activated to a level 3. The Governor issued

a State Disaster Declaration for Boundary County. The Army Corps of Engineers (USACE) has completed an assessment of the status of 100 miles of levee system within the county. They are estimating that 51 miles of the levee has received damage.

Response: The June 2006 disaster emergency declarations and response operations were the consequences of high water in the Kootenai River. Several factors influenced water levels in the river including the winter snow pack, weather in May and June, and the operation of Libby Dam upstream from Bonners Ferry. More information on the 2006 flood event is available from the City of Bonners Ferry, Boundary County Commissioners, the Army Corps of Engineers, Boundary County Extension Service and others involved at the time.

F.2-O Comment:

Because the Bonners Ferry Ranger District does not sample water quality, and the Myrtle Creek watershed is Functioning-at-risk, with 3.1 mi/mi^2 of roads in sensitive land types, a RHCA road density of 2.1 mi/mi^2, and a road density of 2.6 mi/mi^2, we are extremely concerned of the proposed action on the functioning of this watershed.

The City of Bonners Ferry monitors the water quality, not the Bonners Ferry Ranger District (DEIS 3.3-A.15 and FEIS section 3.2). The effects of the proposed action on the functioning status of the watershed is discussed in Chapter 4 of the DEIS (4.2-C, D, and E, FEIS Chapter 4) and summarized in Chapter 2 (FEIS Chapter 2).

F.2-P Comment:

On page 3-1 of the Myrtle Creek DEIS, it states, "The time period for the water yield analysis from project activities is about 50 years. Full recovery for a regeneration harvest to recover to pre-treatment conditions in terms of water yield is considerably longer." Nevertheless, 942 acres of regeneration harvest is proposed using irregular shelterwood and seed tree with reserve tree methods. How will these excessive harvesting prescriptions restore a damaged watershed, and what is "considerably longer" in terms of the water yield analysis?

Response: The Final EIS clarified the time frame that was used for water yield analysis for the fuels reduction (timber harvest) treatments. As stated on page 3-2 of the FEIS, most effects from timber harvest should be evident within 10 years; thus, the time period for water and sediment yield is 10 years. The analysis methodologies, explained in Chapters 3 and 4 of the FEIS, take into account the site specific conditions in the watershed, the proposed project activities and the design criteria that were developed to reduce or avoid negative effects to the resources. These factors can influence the time to recovery. In terms of water yield analysis, scientific references for "considerably longer" vary from 10 to 50 additional years.

The Myrtle HFRA project is not a watershed restoration project (see Chapter 1 discussion of the community goals and the project purpose and need). The focus is on clean water and fuels reduction treatments that will help protect the watershed from the effects of unwanted catastrophic fire. It was never stated that the harvesting prescriptions would restore the damaged watershed. The watershed/hydrology handouts provided at the March 30, 2005 KVRI meeting and the June 30, 2005 KVRI Working Group meeting explained that. It was stated that unless actions were taken within the entire watershed to help reduce effects to the watershed/hydrology (such as upgrading culverts, improving drainage, or decommissioning roads), then from the hydrologic standpoint, the watershed would not be "restored". The Proposed Action (Alternative 2) was developed through the collaborative recommendations of the Working Group and includes actions that will improve some areas and help move the trend in an upward condition (see Chapters 2 and 4 Watershed/Hydrology discussions).

F.2-Q Comment:

There are 62.31 miles of 303(d) listed stream segments in the Myrtle Creek HFRA project area, and yet more logging and road improvements for haul routes are proposed. Did the HFRA collaboration process accurately depict the extensive damage done to the analysis area by previous actions similar to the ones proposed in this DEIS?

Response: The HFRA Collaboration process accurately depicted the existing conditions in the watershed, including effects from previous actions. Field trips were taken to the area and Working Group meetings included discussions of past activities and existing conditions (Project File – Meeting Notes). The actions proposed in this Myrtle Creek HFRA Project are not similar to past actions that had negative effects. Logging systems and operations have improved; laws, regulations, and mitigation measures are more stringent now then they were in the past; and all other resources are held to a higher level of scrutiny and protection.

The use of Best Management Practices became a requirement in the mid-1970s. Since then, turbidity data provided by the City of Bonners Ferry shows a significant decline in the May-June monthly averages for turbidity (measured in NTUs). For example, in 1959 the value for May was 10.211 NTUs (no record is available for June, 1959). In 1960, May's value was 12.209 NTUs and June's was 25.173 NTUs. Through the decade of the 1960s, the highest reading was 25.173 in June, 1960; the lowest value was 5.954 in May, 1966. For June 1974, the value was 13.933. In 1979 and 1980, the four monthly averages were all less than 1.0 NTUs (varying from a high of 0.651 to a low of 0.458 NTUs).

This chart, provided by the City of Bonners Ferry Water Department, displays the Raw Water Turbidity (measured in NTUs) from 1960 through 1989. The year 1974 contains a notation of being a flood year. Measurements were taken during the months of May and June.

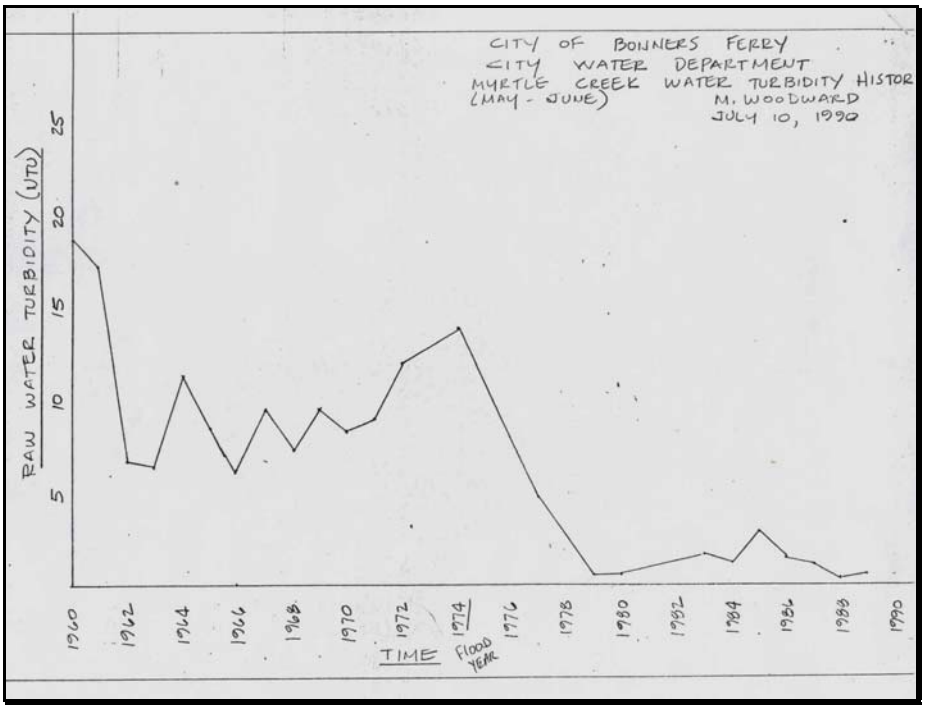

Figure 1.1 Myrtle Creek Raw Water Turbidity Measurements – 1960 through 1989

F.2-R Comment:

On page 3-7, the Myrtle Creek HFRA DEIS states "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." However, 28% of Myrtle Creek is within the rain-on snow zone, and again, is already functioning at risk.

Response: Approximately 28 percent is in the rain-on-snow zone; conversely, approximately 72 percent of Myrtle Creek is not within the rain-on-snow zone. On page 3-18 of the DEIS (FEIS Chapter 3, section 3.3) the rain-on-snow discussion states that rain-on-snow is part of the natural processes within the Selkirk Mountains. It goes on to say that the dominant channel forming and sediment transport events in the Myrtle Creek watershed are associated with spring runoff (rather than rain-on-snow episodes). Myrtle Creek is stable and resilient because it developed in response to the variability of the climatic processes and the dominant geology of the basin – the predominance of cobble and boulder in some reaches, and some bedrock control in other reaches. Myrtle Creek is currently classified as Functioning at Risk; however, there are no detrimental effects to the support of the beneficial uses for the stream, including its use as the source of drinking water for the City of Bonners Ferry.

WATSED was not designed to evaluate all hydrologic/watershed functions as explained in the DEIS and FEIS Chapter 3, section 3.2. Its primary use is for sediment yield analysis; the estimated responses are combined with other sources of information and analyses to help determine probable effects. Other methods of analyses used to estimate in-channel and stream bank erosion included the Water Erosion Prediction Project Models (WEPP). Disturbed WEPP for hillslope erosion, Road: WEPP for road erosion, GeoWEPP for hillslope erosion and cumulative effects related to fire, and WEPP: FuME for analysis of soil erosion rates associated with fuel management activities (DEIS 3.2-C3, 3.2-C4). Channel morphology, including erosion of stream channels, was assessed through a combination of surveys and inventories in the Snow Creek and Myrtle Creek watersheds as described in Chapter 3 (FEIS section 3.2). Increases in sediment and peak flows as a result of rain-on-snow or other stochastic events were evaluated thru the use of models (FEIS Chapter 3 and Appendix D). It is important to keep in mind that no single method, or combinations of methods, provides a definitive assessment of stream function and that the final analysis will be based on professional judgment of the existing data as well as the results of modeling.

As explained in response to Comment F-2.j above (page F-4), the DEIS discloses the amount of error inherent in the use of models for each model used (DEIS 3.2-C.3 and FEIS section 3.2). Several of the models have been verified on the ground. The use of models is pursuant to the Idaho Panhandle National Forests Land and Resource Management Plan (Forest Plan).

Models are not designed to produce precise solutions; rather they are tools intended to provide a method to objectively compare relative differences among alternatives. The results of models are not the sole source of information for making resource decisions and rarely should they be the only tools utilized for analysis of watershed responses. Watershed-related specialists also have local site-specific knowledge of the area, have observed and documented conditions in the analysis area, and have knowledge of hydrologic processes and local existing conditions.

The estimated responses from the models are combined with other sources of information and analyses to help determine the findings of probable effects (DEIS Pp. 3-10 & 11 and FEIS section 3.2-D). The other information includes items such as the following:

1) locally derived monitoring or monitoring of similar systems;
2) reviews of pertinent scientific literature and reports;
3) reasonably local calibration references for the driving variables use in the models;
4) reference to validation of the model application using data for major geomorphic groups present on the Forest; and,
5) professional judgments by watershed-related specialists based on education and experience.

F.2-S Comment:

On page 3-8, the DEIS continues stating, "The watershed response model, WATSED, used on the forest is designed to address the cumulative effects of timber harvest operations, roads, and fire. It does not attempt to analyze the effects of grazing, or of mining (other than vegetations removal and road construction), or other non-forest practices…Models are not designed to produce precise solutions; rather they are tools intended to provide a method to objectively compare relative differences among alternatives." Without multiple alternatives, it is difficult to discern "relative differences" in proposed treatments within this HFRA project. We would like to see a full evaluation of the cumulative effects of other non-forest practices.

Response: From the beginning of this project, the Working Group discussed several varied ways of meeting the community goals for the municipal watershed, as explained in Chapter 2 of the FEIS. The proposed action (Alternative 2) was developed through the collaborative process. November 30, 2004 meeting discussed several different management proposals. These were evaluated, analyzed, and modeled, and discussed at the January 25, 2005 meeting. Then at the March 30, 2005 meeting more changes were evaluated and discussed. Multiple proposals (alternatives) were discussed and evaluated at these various KVRI Myrtle Creek Working Group meetings. The DEIS analyzed the alternative that was recommended through the collaborative process (Project File Working Group minutes). In response to comments on the DEIS, Alternative 5 was analyzed in greater detail and documented in the Final EIS. See Chapter 2 for more information concerning other alternatives that were considered but eliminated from further analysis.

Because this is a municipal watershed there are no other non-forest practices in the watershed. There is no grazing, nor mining. All other disturbing activities were analyzed using other methodologies. Models, such as Disturbed WEPP, can be used to analyze any non-forest activities if they are present in a project area.

F.2-T Comment:

On page 3-9 of the DEIS, it states "The accuracy of predicted values from WEPP is, at best, within plus or minus fifty percent. The WEPP was only conducted in Mack Creek and Lower Myrtle Creek. Why was the WEPP only conducted in these areas, and how useful are these predicted values when the accuracy is within plus or minus fifty percent?

Table 3-6 displays the existing condition for sediment for Myrtle Creek, (percentages are above the natural condition). Upper Myrtle Creek at 47%, Yellow Pine Creek at 41%, Mack Creek at 16%, Lower Myrtle Creek at 20% and the entire Myrtle Creek watershed at 33% above natural condition. Why wasn't the model used in areas with higher percentages of sediment?

Response: WEPP was conducted wherever management actions were proposed, not only in Mack Creek and Lower Myrtle Creek. The statement is referring to the watershed sections delineated to run WATSED in Myrtle Creek. These sections were given the name "Mack Creek and Lower Myrtle Creek", but they include Adverse Creek, and models were run throughout those named sections, as well as in Snow Creek. If you go to the Snow Creek section, is states that WEPP models were run there as well (DEIS 3-71 and FEIS section 3.3)). As discussed and recommended during the Myrtle Creek Working Group meeting on November 30, 2004, the models were used in the areas where management actions are proposed, regardless of the percentage of sediment being generated in that designated section. The results of this analysis were presented to the Myrtle Creek Working Group at the January 25, 2006 KVRI meeting. (Myrtle Creek Working Group minutes, project file)

Mother Nature cannot be modeled with high precision, which is why we don't solely rely on models. Other methods of analyses were used to estimate in-channel and stream bank erosion, knowing that WATSED does not evaluate everything (DEIS 3.2-C3, 3.2-C4 and FEIS section 3.3).

As explained in response to comment F.2-j above, models are not designed to produce precise solutions; rather they are tools intended to provide a method to objectively compare relative differences among alternatives. The results of models are not the

sole source of information for making resource decisions and rarely should they be the only tools utilized for analysis of watershed responses. Watershed-related specialists also have local site-specific knowledge of the area, have observed and documented conditions in the analysis area, and have knowledge of hydrologic processes and local existing conditions.

The estimated responses from the models are combined with other sources of information and analyses to help determine the findings of probable effects (DEIS Pp. 3-10 & 11 and FEIS section 3.2). The other information includes items such as the following:

1) locally derived monitoring or monitoring of similar systems;
2) reviews of pertinent scientific literature and reports;
3) reasonably local calibration references for the driving variables use in the models;
4) reference to validation of the model application using data for major geomorphic groups present on the Forest; and,
5) professional judgments by watershed-related specialists based on education and experience.

F.2-U Comment:

The DEIS states "Upper Myrtle Creek is most likely elevated in sediment due to logging and road activities in 1983, 1996, and 2000. Yellow Pine Creek is most likely elevated in sediment due to road and logging activities in 1983 and 2000. Mack Creek is most likely elevated in sediment due to logging activities in 2004. Lower Myrtle Creek is most likely elevated in sediment due to the fire and salvage activities in 2003 and 2004. An estimated 1667 tons of sediment erosion is being generated annually from all of the Myrtle Creek watershed."

It also states several small clearings are left over from more recent logging operations in close proximity to the riparian zone of Snow Creek. This was noticed in all the reaches of Snow Creek and skid trails and logged clearings are still open. Snow Creek is considered fair to poor condition for morphology, catchment is impaired and several mass failures were recorded.

About 6028 acres within the Myrtle HFRA project area are past National Forest timber sales, and a considerable amount of harvest and road construction has occurred on private, corporate and BLM land. How is the Forest Service able to discern the affects of these proposed actions without full analysis of these actions across the landscape?

Response: The Hydrology and Fisheries sections of the DEIS and FEIS discuss the cumulative effects of the Myrtle HFRA project in conjunction with an extensive list of past, present, and reasonably foreseeable activities (DEIS, pp. 4.2D, Appendix B.2-F.1 and FEIS section 4.2). Private landowners have no duty or obligation to report past or potential harvests on their land to the Forest Service. However, based on aerial photographs, discussions with the private landowners, and records held by the Idaho Department of Lands, the Forest can make assumptions about past and probable future harvests. This information was included in the WATSED runs and the list of reasonably foreseeable activities. Thus, the Forest Service is able to discern the affects of the proposed actions, and the analysis has taken into account these past actions across the landscape in documenting the cumulative effects of the proposed action and alternatives.

F.2-V Comment:

The cumulative effects of on-forest and off-forest activities are not adequately considered. Environmental analysis should include the contributions to sediment delivery and flow alteration on lands intermixed within the project area. This is necessary to adequately estimate and disclose the cumulative impacts of the proposed treatment on aquatic resources, including channel form, water quality, fish habitat, and fish populations.

Response: Existing condition takes into account activities on private land (DEIS 4-8 and FEIS section 4.2). Environmental analysis does include the contributions to sediment delivery and flow alteration on lands intermixed within the project area. All roads are disclosed, as well as their ownership, classification and maintenance level (DEIS 4.2-D and FEIS section 4.2). Past harvest activities are disclosed (Figure 3.76 and FEIS Chapter 3 and Map Appendix). All activities, regardless of their location, must be taken into account when running the models. This was also discussed in the cumulative effects section of the DEIS and FEIS section 4.2.

F.2-W Comment:

The few forested areas that appear to be still intact in Lower Myrtle Creek are in roadless areas and the Myrtle DEIS proposes extensive regeneration logging in them. According to Appendix A, 13.7% (681 acres – the D units and G8, G10, E3 and E8) of the Kootenai Peak Roadless area will be impacted and .5% (457 acres – the B units which are all regeneration units) of the much larger Selkirk Roadless Area will be logged. Appendix A treats the logging in roadless areas as though it is a non-issue. We believe that the logging proposed in these roadless areas will adversely impact the few areas in the Myrtle watershed that are ecologically intact and has the potential to further degrade water quality rather than protect it. This should be addressed in the FEIS.

Response: The water quality of Myrtle Creek is of utmost concern and is the focus for this project, as Myrtle Creek is the municipal watershed for the City of Bonners Ferry. The project will comply with EPA and DEQ standards for the protection of drinking water. Water quality would not be degraded due to the fuels reduction treatments proposed in the roadless areas. The model results show the impact would be minimal, not adverse. The Myrtle HFRA Project and past, present, and reasonably foreseeable actions would also result in a net decrease in sediment delivery within the Myrtle Creek watershed, thus improving water quality. The decommissioning of existing roads would aid in reducing sediment yields over the long term. The greatest benefit would be realized through the improvement and removal of the high-risk culverts, which would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures. In addition, Best Management Practices (BMPs) would be implemented and all activities would be designed to protect water quality. Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act. DEIS Chapter 2: 15-18, Chapter 3, Chapter 4, and Appendix C. FEIS Chapter 2 and Appendix C

F.2-X Comment:

Given the direct and indirect effects of this project, coupled with the speculative road obliteration to be carried out at some point in the future, we question compliance with forest and state water quality standards. Specifically with regards to anti-degradation direction, we do not feel confident that the proposed mitigation measures will adequately result in a net decrease of sediment and other aquatic parameters in the near future. In this case, we encourage you to carry out restoration activities in advance in order to ensure net beneficial effects to stream conditions.

Response: As stated in the response to the prior comment, the water quality of Myrtle Creek is of utmost concern, as it is the municipal watershed for the City of Bonners Ferry. The project will comply with EPA and DEQ standards for the protection of drinking water. The model results support the statement of minimal impacts. The Myrtle HFRA Project and past, present, and reasonably foreseeable actions would also result in a net decrease in sediment delivery within the Myrtle and Snow Creek watersheds, thus improving water quality.

The decommissioning of existing roads (identified and prioritized in FEIS, section 4.2 and Appendix D) would aid in reducing road density and sediment yields over the long term. The greatest benefit would be realized through the improvement and removal of the high-risk culverts, which would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures. In addition, Best Management Practices (BMPs) would be implemented and all activities would be designed to protect water quality. Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act. As Idaho DEQ points out, Idaho Code (IDAPA 58.01.02.054 Section 04) allows for pollutant trading in creeks with approved TMDLs as long as the total load remains constant or decreases (IDEQ 2006).

The FEIS states that the proposed road improvements, decommissioning (and making hydrologically inert), culvert removals and replacements, resurfacing haul routes, etc. will reduce sediment entering the creeks in the long-term. Some road improvements would be funded through the timber sale contracts, and some of the funding would be secured through other means (such as appropriated dollars). The project is in compliance with the Clean Water Act and the State of Idaho water quality standards. DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, and Appendix C and FEIS Chapters 2, 3 and 4 discussions of watershed/hydrology – section 4.2.

F.2-Y Comment:

The DEIS acknowledges that the existing road network has negatively impacted the watershed and that a fire would multiply these effects. Instead of taking a logical approach of reducing the currently unsustainable road system, the Forest Service plans include logging, constructing 1 mile of temporary road, reconstructing 40 miles of road and decommissioning only 1 mile of existing road.

Response: Approximately 0.6 miles of Road 402 C would be reopened (DEIS 4-4 and FEIS section 2.7), not a full mile. After operations are completed, the entire length (approximately one mile) would be decommissioned (see FEIS Map Appendix). The DEIS identified "roadside and surface maintenance, etc." for approximately 40 miles of existing roads that will be used as haul routes; this number was an error. Under Alternative 2 the actual mileage is about 29 miles of haul routes; and the project would not be reconstructing, but conducting "roadside and surface maintenance, etc.", which is road reconditioning. Under Alternative 5, there would be reconditioning on approximately 22 miles of haul routes.

The EIS also analyzed and prioritized significant amounts of future opportunities for road decommissioning in a majority of the Myrtle Creek watershed and in certain areas of the Snow Creek watershed. The decommissioning of existing roads would aid in reducing road density and sediment yields over the long term. The greatest benefit would be realized through the improvement and removal of the high-risk culverts, which would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures. The FEIS states that the proposed road improvements, including decommissioning (and making hydrologically inert), culvert removals and replacements, resurfacing haul routes, etc. would

reduce sediment entering the creeks in the long-term. Some road improvements would be funded through the timber sale contracts (specifically, decommissioning Road 402C which is approximately 1 mile long, and the reconditioning of the roads used as haul routes), and some of the funding will be secured through other means (such as appropriated dollars). This project also analyzed the effects of decommissioning Road 1309-UA. Following release of the Draft EIS, Resource Advisory Committee (RAC) funding was made available for priority roads west of Mack Creek in the Myrtle Creek watershed. DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, and Appendix C and FEIS section 4.2.

F.2-Z Comment:

Previous management activities have resulted in excessive road densities throughout our National Forests, including the Idaho Panhandle National Forests. This density compromises the project area's ability to support wildlife and fish by promoting further human disturbance, fragmenting habitat, accelerating sedimentation, and encouraging OHV use. The United States Fish and Wildlife Service Bull Trout Interim Conservation Guidance states that depressed bull trout populations had an average watershed road density of 1.4 miles per square mile and were extirpated with road densities above 1.7 miles per square miles (page 27, BTICG). Furthermore, there is a positive correlation between roads, even temporary ones, and human-caused wildfire ignitions and decreases in Elk Habitat Effectiveness (EHE). Statistics and findings related to human-caused fires and EHE need to be addressed and analyzed.

Additional roads identified as high risk/low value should be decommissioned as part of this project. Numerous roads are rated as having high potential for sediment delivery. Further, many roads indicate resource concerns for Grizzly Bears as well as the municipal watershed.

Response: Alternatives 2 and 5 include decommissioning of Road 402C in the Snow Creek watershed and Road 1309-UA in the Myrtle Creek watershed (FEIS, Chapter 2 page 2-xx). The FEIS also analyzed and prioritized significant amounts of future opportunities for road decommissioning in a majority of the Myrtle Creek Watershed and in certain areas of the Snow Creek Watershed. The greatest benefit would be realized through the improvement and removal of the high-risk culverts, which would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures.

Some of this benefit is scheduled to be in the near future, as the road/culvert improvements on the roads used as haul routes (Alternative 2, approximately 29 miles; Alternative 5, approximately 22 miles) are slated to be conducted in association with the fuels reduction treatments under the timber sale. The proposed road improvements, including decommissioning (and making hydrologically inert), culvert removals and replacements, resurfacing haul routes, etc. would reduce sediment entering the creeks. See response to Comment F.2-y above concerning the funding and timing of this work. (DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, and Appendix C, and FEIS ssection 4.2 .)

F.2-AA Comment:

INFISH requires that all riparian roads be evaluated. While the DEIS noted riparian road density, overall road density, equivalent clearcut area, etc. it was not clear that roads specifically within riparian areas had been evaluated. The FEIS should clearly show the current and proposed road densities during project implementation for both alternatives, including within 300' RHCAs on perennial, fish-bearing streams, 150-ft RHCAs on perennial, non-fish bearing streams and 100-ft. RHCAs on intermittent streams.

Response: Roads specifically within riparian areas have been evaluated (see project files and FEIS Appendix D). A majority of the roads within the entire cumulative effects area have been evaluated. The maps in the DEIS and FEIS Map Appendix clearly show the roads that have been inventoried and their locations within and outside of the RHCAs. (DEIS 2-10 and FEIS Map Appendix) During project implementation, there would be no change in the current road density. Although 0.6 miles of Road 402-C would be reopened, the full length of the road (approximately 1 mile) would be decommissioned after completion of use. Road 1309-UA (approximately 1 mile) is also proposed for decommissioning. Therefore only a minimal/no change in overall road density – see Chapter 4 for more information.

However, reasonably foreseeable actions (future opportunities listed in FEIS section 4.2 and Appendix D) would result in a net decrease in road density within the Myrtle and Snow Creek watersheds. Some road improvements or decommissioning would be funded through the timber sale contracts (see response to Comment F.2-y), and some of the funding would be secured through other means (such as appropriated dollars). Although the future opportunities for road decommissioning are not part of this project, they are reasonably foreseeable/most likely to occur. DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, and Appendix C and FEIS section 4.2.

F.2-BB Comment:

Forty miles of road reconstruction in these drainages is a concern for our organizations. While we understand the role of reconstruction in reducing sediment, we are concerned that many of the road segments may currently be "brushed in" and are

not a significant source of sediment to streams. The location, intensity and purpose of the 40 miles of road reconstruction should be clearly displayed in the FEIS.

Response: The DEIS identifies "roadside and surface maintenance, etc." for approximately 40 miles of existing roads that will be used as haul routes. This number is in error; the actual miles of road are about 29 miles under Alternative 2 and about 22 miles under Alternative 5. The project would not be reconstructing, but conducting "roadside and surface maintenance, etc.", which is road reconditioning or improvement. The map showing the haul routes/roads to be reconditioned is included in the FEIS Map Appendix. The map is also available in the project files. The roads included in the reconditioning are not brushed in, but are existing open roads that would be used as haul routes during project implementation.

To address your comment concerning the brushed in roads, some of the "brushed in" roads are not hydrologically inert. Even if a road appears to be brushed in, it can still be a major contributor of sediment to streams. Brushed in roads often have an road prism that continues to disrupt the hydrology of the watershed, even with large amounts of vegetation present.

F.2-CC Comment:

Due to the significance of roads, we encourage you to provide a section in the FEIS dedicated to road management. Road information was spread out in the DEIS, as well as in the appendix and it was difficult to get a sense for the scope, intensity and purpose of proposed road-related activities.

In fact, it was not until a call was placed to district staff that it was revealed that 1) 9 additional miles of road would be obliterated as part of this project (authorized by the Myrtle-Cascade Timber Sale Decision), and 2) that the only roads analyzed (from a hydrologic standpoint) were the two main roads running up Snow and Myrtle Creek. If road reconstruction will be funded out of the Myrtle Creek HFRA project and will be concurrent, that information must be displayed in the FEIS.

Response: The road management activities have been clarified in the Final EIS. The decommissioning that was identified and analyzed in the Myrtle-Cascade Final EIS is now shown as "Future Opportunities." Budgetary constraints and Forest priorities are considered when determining scheduling and locations of road decommissioning. Given that Myrtle Creek is the municipal watershed for the City of Bonners Ferry, it is a high priority on the IPNF to have this work done as funds become available. For example, some funding has been received through the Resource Advisory Committee (RAC) to decommission brushed in roads that are a risk to the water quality in White Pine Creek drainage (a tributary to Myrtle Creek); they are scheduled to be decommissioned in 2007 (Project File document).

To assess the cumulative overall effects of the Myrtle HFRA project, road analysis was also conducted at the watershed scale for the entire watersheds of Myrtle and Snow Creek (see and FEIS section 4.2 and Map Appendix, the project files, Chapter 3: WATSED, GeoWEPP, and FuME analysis, Chapter 4: WATSED, GeoWEPP, and FuME results). In order to run the models, all roads within the watersheds in question have to be taken into account and included in the model analyses. Site specific road and culvert analysis was conducted throughout the watershed, as well. (see project files). The FEIS refers to the roads in an overall effect to the watershed, and identifies and discusses the road management activities included in Alternatives 2 and 5, and those analyzed as future opportunities. The main roads in Snow and Myrtle Creeks (Roads 402 and 633, respectively) were not the only roads analyzed for this project.

F.2-DD Comment:

The effect of 40 miles of road reconstruction on OHV use is not disclosed or discussed in the DEIS. With significant miles of newly reconditioned roads, there is likely to be an increase in motorized activity. This has the potential to impact wildlife, create additional erosion and sedimentation and disturb non-motorized users. The effect of this road reconstruction and its direct and indirect effects must be adequately disclosed and analyzed.

Finally, the DEIS makes numerous references to future road decommissioning activities. Among these is the reference to Mack Creek on page 4-16, where it says "the future activities associated with road decommissioning, culvert replacement and road obliterations and improvements would, in fact, have a net beneficial effect to these streams…" At page B-47, the DEIS says, "overall reduction in sediment yield and risk of sediment delivery resulting from the decommissioning of roads in the headwaters of Myrtle Creek." At page 4-13, "Future road decommissioning and culvert improvement activities are expected in the Myrtle Creek and Snow Creek watersheds." Without any specificity as to the location of any of this future activity, it is difficult to provide comments.

Response: As stated in response to prior comments, the statement of 40 miles of road reconstruction in the DEIS was an error. The work is more accurately described as road reconditioning and the actual amount would be approximately 29 miles under Alternative 2, and approximately 22 miles under Alternative 5. See Chapter 2 for more information.

Concerning Off Highway Vehicle (OHV) use, in relation to grizzly bear habitat, the following effects are anticipated. The roadside/surface maintenance identified for designated haul routes generally involves minor improvements within the road prism (brushing and blading), and will mostly take place on open roads that are currently popular driving routes. Since an

ambient level of disturbance is presumed to originate from these roads, it is unlikely that improved surface conditions would result in additional displacement. Improvements to restricted roads will not result in increased traffic, as use of these roads during project implementation will be limited to the contractors and administrative purposes, and administrative use will not exceed USFWS guidelines in subsequent years.

The locations of proposed road decommissioning and future opportunities are clearly provided in the DEIS on the Map on page 2-12 and FEIS Map Appendix. All roads within the watershed are ranked and prioritized for road decommissioning and their locations are shown. Road improvements on the haul routes will be tied to the sale of the timber contract and, thus will be conducted in the near future. Specific culverts recommended for improvement or replacement, are listed in the project files and will be specified in the contract.

F.2-EE Comment:

The DEIS references existing conditions in excess of regional soil disturbance standards. At the conclusion of the proposed activities, soil conditions will not have improved. Specifically, regional standards require no more than 15% of an activity area to have detrimentally disturbed soils. In the DEIS, three units will exceed regional standards (page A-21). Additional units will be within several percentage points of exceeding regional standards. This includes the unit where the temporary road will be constructed. We are concerned that even after the temporary road is decommissioned that soil disturbance (compaction, displacement, rutting and erosion) will remain.

Response: Road 402-C (0.6 miles of which will be reopened) will be decommissioned following use, making it hydrologically inert. When done properly, total obliteration has been shown to decrease compaction, rutting, sediment erosion, and runoff and helps to improve and move the watershed to a more stable hydrologic condition (Hickenbottom, 2000).

F.2-FF Comment:

It is important that whatever timber harvest pattern is decided upon, that it will not increase the risk of turbitity that will endanger this public water supply.

Response: The primary purpose and need for this project is to maintain Myrtle Creek watershed as a source of high quality drinking water for the City of Bonners Ferry (FEIS Chapter 1). Water quality will not be degraded due to the proposed project. The water quality of Myrtle Creek is of utmost concern, as it is the municipal watershed for the City of Bonners Ferry. The project will comply with EPA and DEQ standards for the protection of drinking water. The model results support the statement of minimal impacts. The Myrtle HFRA Project and past, present, and reasonably foreseeable actions would also result in a net decrease in sediment delivery within the Myrtle and Snow Creek watersheds, thus improving water quality.

The use of Best Management Practices became a requirement in the mid-1970s. Since then, turbidity data provided by the City of Bonners Ferry shows a significant decline in the May-June monthly averages for turbidity (measured in NTUs). For example, in 1959 the value for May was 10.211 NTUs (no record is available for June, 1959). In 1960, May's value was 12.209 NTUs and June's was 25.173 NTUs. Through the decade of the 1960s, the highest reading was 25.173 in June, 1960; the lowest value was 5.954 in May, 1966. For June 1974, the value was 13.933. In 1979 and 1980, the four monthly averages were all less than 1.0 NTUs (varying from a high of 0.651 to a low of 0.458 NTUs).

This chart, provided by the City of Bonners Ferry Water Department, displays the Raw Water Turbidity (measured in NTUs) from 1960 through 1989. The year 1974 contains a notation of being a flood year. Measurements were taken during the months of May and June.

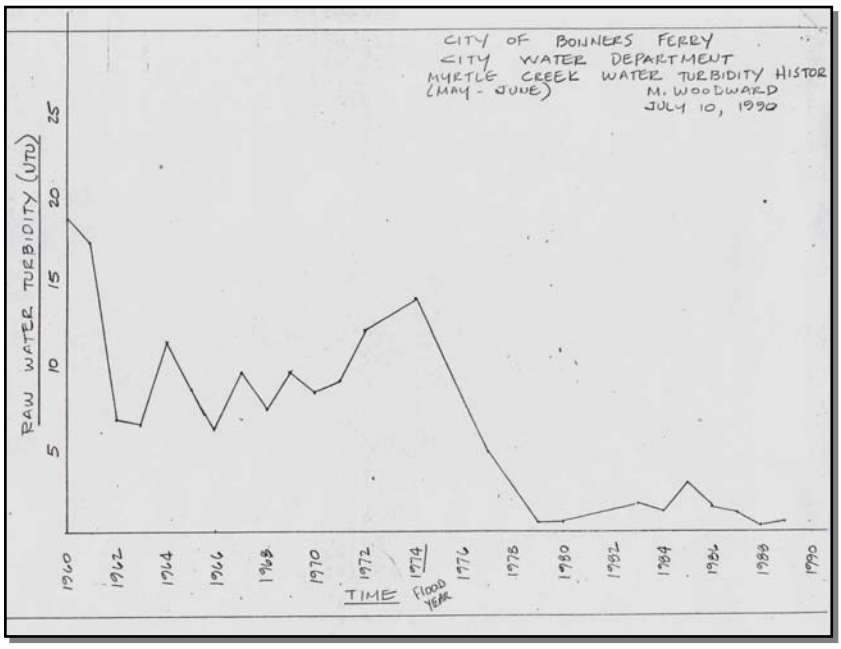

Figure 1.2 Myrtle Creek Raw Water Turbidity Measurements – 1960 through 1989

The decommissioning of existing roads would aid in reducing road density and sediment yields over the long term. The greatest benefit would be realized through the improvement and removal of the high-risk culverts that would improve watershed conditions by reducing the net associated risk of sediment delivery from culvert failures. In addition, Best Management Practices (BMPs) will be implemented and all activities would be designed to protect water quality.

Handbook 2509.22 (Soil and Water Conservation Handbook) outlines BMPs that meet the intent of the water quality protection elements of the Idaho Forest Practices Act. As IDEQ points out, Idaho Code (IDAPA 58.01.02.054 Section 04) allows for pollutant trading in creeks with approved TMDLs as long as the total load remains constant or decreases (IDEQ 2006).

The FEIS states that the proposed road improvements, including decommissioning (and making hydrologically inert), culvert removals and replacements, resurfacing haul routes, etc. would reduce sediment entering the creeks in the long-term. See response to comment F.2-w above concerning the funding and timing of this work. DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, and Appendix C; and FEIS Chapter 4, Appendix D . The project is in compliance with the Clean Water Act and the State of Idaho water quality standards. DEIS Chapter 2: 15-18, Chapter 3.2, Chapter 4.2, Appendix C, and FEIS Chapter 4.

F.3 - Fire & Fuels

F.3-A Comment:

We question the accuracy of the assessment which identified no Condition Class I lands within the entire project area.

Response: Myrtle DEIS page 3-91 and FEIS Chapter 3. There are three Condition Classes each representing a percentage range of departure from reference conditions. Condition Class 1 (0-33% departed), Condition Class 2 (34-66% departed), and Condition Class 3 (67-100% departed). Departure is equally weighted by departure in fire frequency and severity, as well as vegetation departure. For the DEIS - although the assessment didn't reveal any Condition Class 1, the cold/dry subalpine stands (SPFI2) within the analysis area were 34% departed – 1% more departed from a Condition Class 1 rating. More detailed and site-specific information was obtained for Fire Regime Condition Class (FRCC) analysis between the Draft and Final EIS, and some Condition Class 1 stands were identified, including upper subalpine stands. Specifically, the model default reference values for vegetation classes were used in the DEIS.

Site-specific data provided by the District Silviculturist between the Draft and Final EIS for the vegetation classes lowered the percentage departure from natural range for these stands. Fire exclusion has not measurably altered fire return intervals for severe fires in this vegetation group (SPFI2); however, variety in stand structure and fuels that would have been created by occasional mixed severity fires, has likely decreased (Smith and Fischer 1997). Effects of this in the Myrtle HFRA Project Area are increased dominance by seral species and increased continuity of fuels – this has led to a departure in reference vegetative classes. DEIS page 4-27: Fire starts have occurred in stands having historic stand-replacing fire regimes; it was assumed that some of these fires may have burned to a greater extent and with some mixed severity had they not been suppressed – affecting a Condition Class 1 rating in some areas. See FEIS Chapter 4.

F.3-B Comment

It appears that the DEIS relied on broad scientific articles, as opposed to site-specific inventories to evaluate FRCC. Specifically, we question what ecosystem components are threatened in the project area in the event of fire, how a stand replacement fire would be outside of the historic range of variability, and what evidence exists to show that high intensity fires did not burn within dry-site forests in the Selkirk Mountains.

Response: Myrtle DEIS page 3-90 and FEIS Chapter 3. Idaho Panhandle NF GIS vegetation layers were used to identify stand conditions specific to the Myrtle HFRA analysis area and to identify PNVG's and succession class stages necessary for FRCC analysis. In addition, fire history data collected in 1999 by the District Silviculturist for the Myrtle-Cascade EIS was used for fire frequency/severity information. Myrtle DEIS page 4-32 and FEIS Chapter 4.

For the dry-site old-growth stands, the ecosystem components that would be threatened would be the old-growth ponderosa pine and other seral species maintained by frequent low-intensity fire regimes (fire return interval of approximately 38 years on dry-sites in the Myrtle Creek Analysis Area (Behrens, 1999)). Infrequent-severe fire regimes had a component of mixed-severity fires in between stand-replacing events, which would have been affected by fire suppression actions (map of ignitions in these zones Myrtle DEIS page 4-27 and FEIS Chapter 4). Removing the potential for these types of fires may have contributed to changes in a historically varied stand structure that included early-seral species (Smith & Fischer 1997) (thus, early seral species and historic stand structure are the components being threatened by a change in condition class and fire regime). Myrtle DEIS page 3-85 and FEIS Chapter 3.

The establishment and presence of large, old ponderosa pine on dry-sites in the Myrtle Creek HFRA analysis area, which regenerates in small openings and is maintained by low-intensity fires keeping fire-intolerant species under control (Arno &

Fiedler 2005), is evidence of these types of fire regimes occurring in this portion of the Selkirk Mountains. DEIS page 3-90 and FEIS Chapter 3: Smith and Fischer (1997) state that although dry-forests burned most frequently with low-severity fire, mixed and occasional stand-replacing fire occurred as well. However, the comment relates to high intensity fire, which is not the same as high severity fire – the former relates to fire behavior and the latter relates to fire effects. With a maintained grass under pine forest structure (DEIS pages 3-86 and 4-32 and FEIS Chapters 3 and 4), high intensity (fast moving or long flame lengths), low-severity fires may have been common on these dry sites. See response to Comment F.4-a for additional information about dry forest ponderosa pine stands and their fire history.

F.3-C Comment:

We also question the effectiveness of the proposed activities to reduce the occurrence and severity of fires throughout the logged units. The growth of brush, increased wind speeds, and increased solar radiation have the potential to lead to increased fire risk, and/or earlier fire seasons. The DEIS did not clearly address these issues.

Response: Myrtle DEIS pages 4-25 and 4-43 and FEIS Chapter 4. Treatment of surface, ladder, and aerial fuels will not necessarily affect the occurrence of fire starts in the treatment area (risk of fire). Fire ignition depends on many factors including weather (which affects relative humidities and fuel moistures), and the condition of the fuels, including distribution and abundance. One aspect that can be altered by fire managers is the abundance and distribution of fuels. Fires start in the surface fuels - ignitions occur if there is a receptive fuel bed in the surface fuel layer. Transition of surface fire to crown fire is dependant on a fuel ladder and canopy conditions that would support crown fire (see Chapter 4 for more information as to why crown fire is unwanted fire). Therefore, removing fuels can alter fire behavior and the likelihood for crown-fire behavior in the event of a fire start.

DEIS page 4-26 and FEIS Chapter 4: Fire severity is a product of fire intensity and residence time - the time, in seconds, required for the flaming front of a fire to pass a stationary point at the surface of the fuel (the total length of time that the flaming front of the fire occupies one point). Generally, the time is greater in a Fuel Model 10 as compared to a Fuel Model 8 due to the presence of heavy down woody material that contributes to longer burn periods and smoldering (Brown, Reinhardt, Kramer 2003). In regards to the treatment affect on increased winds and solar radiation – this has been addressed in greater detail in the FEIS (FEIS Chapter 4). All of these issues have been addressed to greater detail in the FEIS (FEIS Chapter 4).

F.3-D Comment

Again, while we understand the desire to mitigate the effects of fire on the watershed, we feel that additional measures, in coordination with thinning from below prescription could result in similar results, with far fewer negative environmental impacts.

Response: What additional measures are being suggested? During the Myrtle HFRA Working Group meetings and field trips, the pros and cons of various measures were discussed (Project File – meeting notes). Page 3-116 of the DEIS and FEIS Chapter 3 describes Forest Plan Standards applicable to the general design of the proposed action and treatments. See page 4-43 through 4-45 of DEIS and FEIS Chapter 4 for direct, indirect, and cumulative effects of proposed treatments – basis for treatment design. In coordination with the silvicultural prescriptions, measures such as slashing of sub-merchantable ladder fuels as well as grapple-piling of natural and activity fuels, and pile burning and underburning will be utilized to meet objectives. Chapter 4 describes potential environmental consequences for the alternatives by resource (FEIS Chapter 4).

F.4 - Old Growth

F.4-A Comment:

Group selection cuts from one to five acres in size are proposed in five units (F1, G2, G6, G7, and G9) resulting in multiple large openings within 995 acres. 359 acres of group selection are proposed in the Kootenai Peak IRA, 737 acres of group selection include patches of old growth (units G2, G7, and G9).

For stands associated with the dry forest ecosystem, harvest prescriptions are proposed that will retain an overstory canopy closure of 35-65% and retain a minimum of one patch (about 1/10 acre) of densely vegetated understory per 5 acres across all mature dry-site harvest units. Again, we would like information that includes evidence that 35-65% is scientifically credible for these dry forest ecosystems.

We are concerned over the affects of the proposed treatment within old growth, as the assessment area intersects OGMU 14, OGMU 16, and about 12% of OGMU 18.

We are opposed to the treatments within the identified stands of dry site old growth units (83 acres of allocated old growth and 159 acres of potential old growth) totaling 242 acres are proposed for treatment. Treatment includes small openings 2-3 acres in size.

Response: Old growth was one of the items discussed during the Myrtle Creek Working Group meetings and was the focus of one of the field trips (Project File Meeting Notes). Alternative 2 (the Proposed Action) was developed through the collaboration process and was recommended to the KVRI Executive Board.

As the DEIS states (p.4-42) (and FEIS Chapter 4) Arno and Fiedler (1995) found pre-1900 densities of less than 145 ft^2 of basal area on eight of nine plots and most densities were less than 100 ft^2 of basal area on dry forest habitats similar to those in the Myrtle Creek HFRA project area. These densities equate to canopy closures of about 55-65% using conversion factors developed by Deiter and Allen (1993). Behrens (1999) also estimated pre-1926 densities of less than 70 ft^2 in a dry forest old growth stand in Myrtle Creek. This equates to less than 50% canopy closure. The DEIS also points out in Chapter 3 (p. 3-111) (and FEIS Chapter 3) that Habeck (1990) reported total pre-1900 densities of trees larger than three inches diameter at breast height (DBH) averaged 43 trees per acre (TPA). In order to exceed 100 ft^2 of basal area all of these trees would have to exceed 20 inches (DBH). Habeck (1993) reported pre-1901 basal areas of about 30 ft^2 on these dry forest types. This would equate to slightly less than 35% canopy cover.

In stands proposed for treatment, which include dry forest old growth, densities average about 40 TPA and 80 ft^2 of basal area of trees that exceed 14 inches DBH (project file OG Doc. 03). Based on exams conducted in these old growth stands (project file OG Doc 01) this is significant because the trees larger than 14 inches DBH represent a conservative estimate of those that likely survived the last fire (1926) of any significance in these stands. In other words, if the density of these trees 80 years after the last significant fire is currently 80 ft^2, and accounting for growth and mortality that has occurred during these 80 years, it is very likely the post-fire densities were within the range reported by Arno and others (1995), Habeck (1990, 1993), and Behrens (1999). In summary, data taken from several similar dry forest habitats across the Region provide consistent supporting scientific evidence that pre-fire suppression era stand densities were often less than 100 ft^2 of basal area and certainly within the range of 35-65% canopy cover as would be prescribed with the proposed combination of silvicultural treatments and prescribed burning.

The DEIS (p. 4-42 and 4-43 and FEIS Chapter 4) discuss the rationale and scientific reference conditions that support our proposed treatments in dry forest old growth. The project file (OG Doc.12) includes documentation that supports these old growth reference conditions and that silvicultural treatments can improve the health and vigor of old growth. The project file also contains documentation (OG Doc. 11) regarding the fire history in the project area, which supports our conclusions that fire burned frequently (less than 50 years) in the project area historically. These estimates correlate well with other areas on the District where fire history has been studied (OG Docs. 08, 09, 10). Arno and others (1995) found that fires at mean intervals of less than 50 years account for the presence of old growth ponderosa pine. This is a very important consideration. Pondersoa pine is a species with deep roots, thick bark, open crowns, large fleshy buds, long needles that deflect rising heat, and large heavy seeds that disperse within 150 feet of the parent tree. These attributes reflect a species that is adapted to low-intensity fire and regenerating in small openings. Essentially, the presence of old growth ponderosa pine, represented in multiple age classes, in the dry forest types within the project area indicates frequent historical fire and historical conditions that support the ecological needs of this species.

The DEIS (p. 4-43) (and FEIS Chapter 4) also points out that the SIMPPLLE model projects that the proposed treatments would reduce the risk of stand-replacing fire in dry forest old growth by over 60%.

F.4-B Comment:

In section 4.4-C of the DEIS, Units G1, G8, G9, and G10 are said to contain dry site old growth, and have been field reviewed reclassified as suitable for timber production. In Figure 4-10, portions of G2 and G7 also include patches of old growth, but is not mentioned within the units field reviewed. We would like information regarding all old growth patches identified, as well as previous activity such as roads (classified and unclassified), grazing, and previous logging in these areas.

Response: The discussion in section 4.4-C of the DEIS (p.4-46) relates to "Lands Suitable For Timber Production" (MA9) in the Forest Plan, not necessarily old growth stands (FEIS Chapter 4). FSM 1922.31a outlines the procedure for classifying lands as suitable for timber production. In summary, lands classified as suitable meet the following conditions:

- Land is occupied by trees, at least 16% stocked, or formerly occupied by tree cover
- Land is capable of growing industrial wood at a minimum biological growth potential (20 ft^3/ac/yr)
- Technology is available to produce timber without irreversible resource damage, or there is assurance that the area can be restocked.

Prior to field review, all or portions of Units F1, G1, G2, G8, and G9 were considered unsuitable for timber production, but field reviews determined these stands meet the conditions for suitability (Note: G10 was erroneously included in the DEIS for G2). Units G1, G2, G8, and G9, which are part of our old growth allocation, were part of this suitability change. The field exams for these old growth stands are included in the project file (OG Doc. 01). It should be noted that the Forest Plan did not

include specific management areas (MAs) for old growth. Old growth management on the IPNF is based on Forest Plan standards (p. II-29). See FEIS Chapter 3 for more information concerning Forest Plan old growth standards.

F.4-C Comment:

There remains much doubt and lack of clarity in the information the IPNF provides regarding old growth in the project area, District-wide, and forestwide. It fails to answer essential, fundamental questions.

First, the status of old growth in the affected OGMU(s). Does all the "allocated" old growth in the affected OGMU(s) meet the IPNF's own or accepted scientific criteria for old growth? How much doesn't really serve old-growth associated wildlife species' needs?

The amount of existing old growth in the project area seems to be exxagerated in the DEIS. It states, "…minimum standards are considered a starting point in determining whether a stand should be allocated as old growth. Other structural characteristics such as snags, downed woody debris, and number of canopy layers are also considered in the process (Green et al, 1992)." Given how vague the preceding defnition is, please disclose the precise definition(s) for old growth that the IPNF is using, including numbers/ranges for all of the components of old growth that the IPNF recognizes as necessary for defining old growth. It is part of our ongoing concerns about old growth on the IPNF where the IPNF says, essentially, "here's part of the definition of old growth that we're using, but we're not disclosing the full, objective criteria that we're using."

Response: The DEIS (p. 3-107 through 3-109, p. 4-43 and 4-44 and FEIS Chapter 4) discusses the distribution of old growth at various scales across the IPNF as it relates to the Myrtle Creek HFRA and how Forest Plan Standards are being met. This information is summarized in Table F.1 below. As shown in the table, the amount of old growth varies considerably across the landscape and is scale-dependent. For example, the IPNF has about 12% old growth (based on two independent inventories), while the North Zone of the IPNF has 17% old growth, but portions of the Central and South Zone of the IPNF contain less than 10% old growth (2004 Forest Plan Monitoring Report – OG Doc. 06). This is the type of variability one would expect across multiple scales, which is reflective of past disturbance patterns. In particular, those portions of the South and Central Zones, which were significantly affected by the 1910 fires, would be expected to have less old growth. Conversely, OGMU 14 contains 40% old growth, primarily because a large portion of this OGMU (upper Myrtle Creek) has experienced a fire-free interval of more than 150 years.

Table F-1 Old Growth at Various Scales

Scale	Forested Acres	% Old Growth
IPNF	2,310,000	12.1, 11.9 (FIA)
North Zone	980,000	17.0
Kootenai River sub-basin	390,000	16.7, 19.2 (FIA)
Project Level • OGMU 14 • OGMU 16 • OGMU 18	27,741 • 17,555 • 9,395 • 791	28 • 40 • 8 • 0

Stand exams have been conducted for all of the allocated old growth in the project area and each stand was reviewed to determine if any significant disturbances (e.g., fire, insects, disease, timber harvest) have occurred since the last exam and could have changed the old growth character. This stand-by-stand review is included in the project file (OG Doc 02). All of the old growth stands in the OGMUs meet the IPNF's minimum criteria for old growth allocation. These criteria are based on Green and others (1992, corrected 2/2005) and are included in the project file (OG Doc 05). The minimum criteria for each forest habitat type are provided below.

Table F-2 Minimum Standards for Old Growth Forest Types in Project Area

Forest Type	Trees per Acre	Large Tree Size (dbh)	Age of Large Trees (years)	Basal Area (ft^2/acre)
Douglas-fir	8	21"	> 150 years	40
Grand Fir	10	21"	> 150 years	80
Cedar and Hemlock	10	21"	> 150 years	120

Subalpine fir	10	17”	> 150 years	80

As stated in the DEIS and FEIS Chapter 3, snags, downed woody debris, and number of canopy layers are considered as important characteristics, but are not included in the minimum criteria. For snags and coarse woody debris Chapter 2 of the DEIS (p. 2-19, 2-20, 2-22, 2-23 and FEIS Chapter 2 and 3) discloses the design criteria for these characteristics that are incorporated for all treatments. Specific design criteria would also provide structural complexity in dry forest ecosystems, including old growth, as described in the DEIS (p.2-23 and FEIS Chapter 2). As discussed in Chapter 4 of the DEIS (p. 4-42 and 4-43 and FEIS Chapter 4) treatments in dry forest old growth would be designed to provide considerable variability in terms of residual tree sizes and canopy cover. Finally, it is worth noting the amount of old growth forests that are not proposed for treatment. As disclosed in the DEIS (p. 4-43 and FEIS Chapter 4) there are over 7,800 acres of allocated old growth in the project area. Finally, the proposed action (Alternative 2) includes 242 acres of treatments in dry forest old growth, but there are no proposed treatments in the cedar, hemlock, and subalpine old growth types in the project area, which means 97% of the old growth acres in the project area would not be treated. This amounts to over 7,500 acres that would continue to provide considerable structural diversity across the landscape.

F.4-D Comment:

The DEIS proposes to verify applications of harvest prescriptions to determine if they are in compliance with measures to protect old growth trees to determine if predicted results were achieved (post treatment). The stand structure and composition would be monitored through the use of established photo points. Photos would be taken prior to treatment, a second time 30 days following harvest, and a third time after fuel treatment operations are completed.

This illustrates our concerns also; the IPNF apparently believes that old growth is defined by the trees retained post-logging, instead of a scientifically sound definition of old growth.

Response: As stated in the previous responses (comments F-4a), which include several scientific reference conditions that help form an understanding of historical dry forest old growth structure, the proposed treatments in dry forest old growth consider far more attributes than the minimum criteria in Green and others (1992, corrected 2/2005). See Chapter 4 discussion of old growth for more information concerning the effects of the various alternatives.

F.4-E Comment:

The DEIS states In their study of old growth ponderosa pine and Douglas-fir stands on three National Forests in Montana, Arno et al (1995) found that eight out of nine plots had pre-1900 basal areas of less than 145 ft2 and that seven out of nine plots had pre- 1900 basal areas of 100 ft2, or less.

We question the accuracy of the data used to make this estimate. How could the data possibly count basal area from small trees of that era, given that the current on-the-ground evidence of their extent cannot be found? Baker and Ehle, 2001 present theory and empirical results that suggest that fire-history data have uncertainties and biases when used to estimate the population mean fire interval or other parameters of the fire regime. From their Abstract:

> *Present understanding of fire ecology in forests subject to surface fires is based on fire-scar evidence. We present theory and empirical results that suggest that fire-history data have uncertainties and biases when used to estimate the population mean fire interval (FI) or other parameters of the fire regime. First, the population mean FI is difficult to estimate precisely because of unrecorded fires and can only be shown to lie in a broad range. Second, the interval between tree origin and first fire scar estimates a real fire-free interval that warrants inclusion in mean-FI calculations. Finally, inadequate sampling and targeting of multiple-scarred trees and high scar densities bias mean FIs toward shorter intervals. In ponderosa pine (Pinus ponderosa Dougl. ex P. & C. Laws.) forests of the western United States, these uncertainties and biases suggest that reported mean FIs of 2–25 years significantly underestimate population mean FIs, which instead may be between 22 and 308 years. We suggest that uncertainty be explicitly stated in fire-history results by bracketing the range of possible population mean FIs. Research and improved methods may narrow the range, but there is no statistical or other method that can eliminate all uncertainty. Longer mean FIs in ponderosa pine forests suggest that (i) surface fire is still important, but less so in maintaining forest structure, and (ii) some dense patches of trees may have occurred in the pre-Euro-American landscape. Creation of low-density forest structure across all parts of ponderosa pine landscapes, particularly in valuable parks and reserves, is not supported by these results.*

The DEIS does not acknowledge the limitations of the fire history methodology, nor disclose in sufficient detail just what project-area data it relies upon.

Response: Arno and others (1995) includes a detailed discussion regarding the methods of stand reconstruction they employed to determine pre-1900 basal areas. Their entire process is too lengthy to include here, but in summary it includes consideration of the living overstory that established pre-1900, dead trees that are currently standing, and fallen trees. Habeck (1990 and

1993) used similar methods to determine pre-1900 basal areas. Their research publications are included in the project file and they are also are available publicly.

In the DEIS and FEIS Chapter 3 and 4, we referenced several reliable sources in our discussions of estimated fire return intervals in the project area (Chapter 3 and 4 Fire and Vegetation sections). The numerous sources (project file documents) referenced in the DEIS and FEIS Chapter 3 discuss their methods of reconstructing historical fire intervals and they acknowledge potential sources of error. We point out that many of the sources of error discussed in the comments would actually underestimate mean fire return intervals. We are aware there would be a degree of uncertainty in any method used to estimate historic fire return intervals. However, more important than the precise mean fire return interval is data that suggests fires occurred frequently in the project area. As noted in the DEIS and FEIS Chapter 3, and 4, and discussed in previous responses (comments F-4a), the mere presence of old growth ponderosa pine indicates mean fire return intervals of less than 50 years (Arno and others, 1995). We feel confident that data collected locally correlates very well with data from other areas where fire history has been studied on dry forest types in the Region.

We agree that creation of low-density forest structure across all parts of ponderosa pine landscapes would be inappropriate; however, given that most fires have been eliminated in these ecosystems for 80 years or more, the majority of these forest types on the District are at the upper limits of their historical densities, as supported by Regional and local scientific data. As the DEIS (p. 4-41) and FEIS Chapter 4 state, "In the dry forest types, old trees need relatively open conditions to maintain modest growth rates and survive several hundred years. Low-vigor trees are unable to marshal enough resources to maintain adequate defense. Large trees growing in a dense layer of smaller trees are especially vulnerable to attack, underscoring the importance of maintaining reasonable growth rates (Arno and Fiedler 2005)." The DEIS (p. 4-42) and FEIS Chapter 4 further states, "Absent fire, understory trees out-compete the old trees for moisture and nutrients. The old trees lose vigor and often succumb to insects and disease, or the stress imposed by even low- moderate intensity fires (Arno et al 1995, Biondi 1996)."

F.4-F Comment:

Is the IPNF claiming that the moist forest post-logging conditions illustrated in Figure 3-82 are somehow "natural?"

Response: We made no such claims that Figure 3-82 in the DEIS represents "natural conditions." The photograph was included because many of the moist forest stands (DEIS, p. 3-112, Figure 3-79) that burned in the 1926 fire resemble the stand in Figure 3-82 (The "before" (DEIS, p. 3-114, Figure 3-81) and "after" (Figure 3-82) photo sequence is provided as visual representation of how fuels treatments would look in these relatively young, but very dense forests. As the DEIS (p. 3-113) states, this stands represents a "moist forest stand on the District where fuels were reduced using a combination of timber harvest and mechanical piling. In this stand, the majority of trees removed were less than eight inches DBH. These prescriptions also focused on retaining the biggest and best quality trees, primarily the more fire-resistant western larch." Since many of the younger moist forest stands have similar characteristics, we felt a considerable portion of the public would appreciate the ability to visualize how some of the proposed treatments would look when completed. Most importantly, it was fire in these fuels that turned the Myrtle Creek Fire of 2003 into a crown fire on the south side of Myrtle Creek and provided the impetus for the fire to grow to nearly 3,600 acres. (The photos on the cover of the EIS was taken while the fire was burning in such fuels. Smoke can be seen rising from the south side of the watershed.) Firefighters had made considerable advances in controlling the Myrtle Creek Fire in areas where it was on the ground, but when the fire reached the crowns in stands similar to Figure 3-81 it became uncontrollable. Only a fortuitous change in the weather kept the fire at 3,600 acres. The treatment shown in Figure 3-82 modified the potential fire from a crown fire to a ground fire, which would be much easier for fire managers to control. The treated stands like the one shown in Figure 3-82 will provide future managers with many more options in terms of fuels management and other resource objectives.

F.4-G Comment:

The IPNF doesn't disclose all the considerations for old growth allocation to allow anyone to review the field data and be able to reach agreement with the IPNF. The IPNF's apparent failure to accept numerical minimums of canopy layers, snags, and large down logs as old-growth criteria, they are not considering the best scientific information available on OG wildlife habitat needs.

Since field reviews are necessary for accuracy of OG inventories, the failure provide information on the accuracy of the IPNF's forestwide inventory leaves compliance with the 10% Forest Plan standard very much in doubt, which is where it has been since before the Douglas-fir Beetle project in the late 1990s.

Since the IPNF does not recognize the importance of canopy layers, snags, defective trees, and large down logs in terms of objective old-growth criteria, the proposed activities approved for areas that would otherwise develop into old growth are problematic. The amounts of those structures within old growth (Green et al., 1992) could easily be substantially eliminated with the planned activities. Look at Figure 3-82, for example.

Response: As discussed in previous responses (pertaining to old growth),

- all allocated old growth stands have field exams,
- the IPNF uses the minimum criteria Green and others (1992, corrected 2/2005) as a starting point in our allocation process,
- snags and downed wood are part of our design criteria (DEIS and FEIS, Chapter 2),
- the 7,500 acres of old growth we are not treating exhibit considerable structural diversity, and
- the proposed treatments in dry forest old growth are also designed to provide structural diversity.

Additionally, Figure 3-82 is not an old growth stand (most of the trees are less than 80 years old) and is not intended to depict an old growth stand.

F.4-H Comment:

Then there is doubt as to the adequacy of the 10% old-growth Standard itself. Lesica (1996) stated that the Northern Region of the FS's general goal of maintaining 10% of forests as old growth may extirpate some species. This is based on his estimate that 20-50% of low and many mid-elevation forests were in old growth condition prior to European settlement. The adjacent Kootenai National Forest has done an analysis (USDA Forest Service, 1999) that shows 10% to be, quite realistically, not within the historical range. The IPNF and KNF are similar enough for USDA Forest Service, 1999 to raise significant doubt about the adequacy of the forestwide old-growth standard.

The DEIS does not disclose the historic range of old-growth habitat in this project area. The scientific basis for the IPNF's position, namely that maintaining 10% old-growth on the Forest is plenty to maintain population viability of all species needing old-growth habitat, has never been established. The FS does not cite adequate scientific basis—it is merely an arbitrary figure.

Response: The question of whether the 10 percent standard is arbitrary is beyond the scope of the project. What we do know is that our Forest Plan requires us to, "maintain at least 10 percent of the forested portion of the IPNF as old growth (Forest Plan II-29) and select and maintain at least 5% of the forested portion OGMUs that have 5% or more old growth," and that we have two statistically valid forest level inventories that confirm the IPNF meets these standards. Furthermore, as the DEIS discusses (3-109), given the rate forests are being regenerated on the District the trend is toward the development of more old growth, and larger patches, within the next 20-50 years. As discussed in previous responses the DEIS discloses our old growth allocation at several scales.

Given the nature of landscape variability it would be difficult to determine HRV for old growth at the project level. However, the DEIS (p. 3-108, Figure 3-74) does discuss the HRV for old growth across the North Zone, a much larger and more appropriate scale, as comparison to the amount of old growth found in the project area. Once again, as discussed in previous responses, the amount of old growth across landscapes is in large part due to variability in disturbances across landscapes in terms of time and space.

F.4-I Comment

Open roads fragment old growth, resulting in firewood cutting that destroys snag habitat and reduces recruitment of down woody debris in old growth. The IPNF does not disclose the significance of the effects on OG wildlife species' populations of habitat degradation of old growth because of firewood cutting and illegal poaching of trees due to unrestricted access. The IPNF did not present an analysis of the impacts of open roads through old growth in the affected OGMU(s).

Response: IPNF old growth standard (g) to maintain unit size states that roads should be planned to avoid old growth stands (Forest Plan, p. II-29) and the Myrtle Creek HFRA does **not** propose any road building anywhere, let alone through old growth stands. For context, over 3,600 acres of the allocated old growth in the project area is within designated roadless areas, or nearly 50% of the old growth. Additionally, a liberal estimate of 5% of the old growth acres (380 acres) would potentially be affected by firewood cutters assuming most cutting is done within 200 feet of open roads. However, firewood cutters typically choose the uphill side of a road to gather their wood, which equates to less that 2% of the old growth acreage adjacent to open roads. Additionally, the 5% estimate assumes that all of the old growth adjacent to open roads is composed of the species that firewood gathers prefer, i.e., western larch and Douglas-fir. However, these old growth stands are predominantly composed of species that firewood cutters seldom prefer, i.e., western red cedar, western hemlock, grand fir, subalpine fir, and Engelmann spruce. Consequently, the effective old growth acreage that firewood cutters would actually impact is likely very insignificant given the limited amount of old growth adjacent to open roads and the amount of old growth in designated roadless areas.

F.4-J Comment:

The IPNF's recent Twomile EA (Coeur d'Alene River Ranger District) states There have been changes over the last 100 years in the size and distribution of patches across the landscape. 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 (Geographic Assessment, p. 42; PF Doc. VEG-R10). (EA at 3-9.)

The DEIS does not provide a comparison between the natural historic range and current conditions regarding patch size, edge effect, and interior forest of old growth in the OGMU(s).

The IPNF does not disclose the block sizes considered adequate by the IPNF for old-growth allocation and to meet all OG wildlife species' requirements. The adjacent Kootenai NF's Forest Plan recognizes that 50 acres is the minimum size for old growth to be considered effective habitat, and that even that level won't meet many OG species' needs.

Since the DEIS provides inadequate analysis regarding the size, quality, and spatial relation of habitat blocks needed by the old growth associated wildlife species in the affected OGMU(s), the analysis completely fails to disclose the quantitative or qualitative significance of cumulative effects due to past logging in the area and across the Forest.

F.4-K Comment:

Since there is no scientific basis for assuming that 10% old growth is enough for species viability, and since there is no scientific basis to support the IPNF's use of its MIS as adequately "indicating" for other species including the Sensitive wolverine, black-backed woodpecker, fisher, flammulated owl, etc., the proof would be in the monitoring. And nothing else shows the FS has completed or is committed to the monitoring that would insure old-growth species' viability. Unfortunately, region-wide the FS has failed to meet Forest Plan old-growth standards, does not keep accurate old-growth inventories, and has not monitored population trends in response to management activities as required by Forest Plans and NFMA (Juel, 2003).

Response to Comments F.4-j and F.4-k: As discussed in the DEIS (p.4-44, Figure 4-10 and FEIS Chapter 4) Forest Plan standard (f) addresses the requirements for the size of old growth stands. As the EISs state we not only have one old growth patch larger than 300 acres, but we have several and some of those exceed 1,000 acres. While we do not have specific information regarding historic ranges of patch sizes, edge, and interior forest habitat we have discussed existing old growth in relation to estimated historic old growth levels across the North Zone. The estimates were discussed in response to previous comments as was the trend across the District and project area toward development of more old growth and large patches. Also, much of the old growth in the project area is located in upper Myrtle Creek, which is considered a "High Integrity Landscape (DEIS, Figure 3-61, FEIS Chapter 3)." High integrity landscapes are considered the least fragmented landscapes that contains large, naturally created patches of late succession vegetation with intact natural internal structural characteristics as well as a good variety of patch sizes and patterns (OG Doc. 07).

F.4-L Comment:

The IPNF FIA analysis does not assure that habitat quality regarding block size and spatial distribution of old growth is sufficient for maintaining viable populations of wildlife in the IPNF. Nor is it disclosed in the DEIS if the criteria for OG identification during the FIA inventory is consistent with the Green et al., 1992 criteria to be meaningful for wildlife habitat analyses.

Response: Using FIA data to determine patch size as suggested would be an inappropriate use of the data. FIA plot design provides a statistically sound representative sample designed to provide unbiased estimates of forest conditions at large and medium scales. This inventory design is appropriate for making estimates of old growth percentages at the scale of a national forest, or large areas of forest land (2004 Forest Plan Monitoring Report – OG Doc. 06).

The DEIS (p. 4-43, FEIS Chapter 4) and 2004 Forest Plan Monitoring Report (p. 67) state that Green and others (corrected, 2005) incorporates the IPNFs definitions for old growth.

F.4-M Comment:

In regards to logging, and its conflicts with old-growth habitat values:

(T)here is the question of the appropriateness of management manipulation of old-growth stands… Opinions of well-qualified experts vary in this regard. As long term results from active management lie in the future – likely quite far in the future – considering such manipulation as appropriate and relatively certain to yield anticipated results is an informed guess at best and, therefore, encompasses some unknown level of risk. In other words, producing "old-growth" habitat through active management is an untested hypothesis (Pfister et al., 2000, pp. 11, 15 emphasis added.)

In fact, the FS's claim to virtue for logging is not supported by the scientific literature. Veblen (2003) states:

The premise behind many projects aimed at wildfire hazard reduction and ecological restoration in forests of the western United States is the idea that unnatural fuel buildup has resulted from suppression of formerly frequent fires. This premise and its implications need to be critically evaluated by conducting area-specific research in the forest ecosystems targeted for fuels or ecological restoration projects. Fire regime researchers need to acknowledge the limitations of fire history methodology and avoid over-reliance on summary fire statistics such as mean fire interval and rotation period. While fire regime research is vitally important for informing decisions in the areas of wildfire hazard mitigation and ecological restoration, there is much need for improving the way researchers communicate their results to managers and the way managers use this information.

The IPNF cites absolutely no data collected in the analysis area or interpretation of data done with adequate scientific veracity to show that there is genuinely a problem with forest or tree density, that has been caused by fire suppression, or any that logging will cure.

Response: The DEIS (p. 4-42 and 4-43, FEIS Chapter 4) cites several sources where a combination of silvicultural treatments and prescribed fire can improve the health and vigor of dry forest old growth. "Prior to treatment, increment borings showed growth rates slowing in old growth trees and several old pines succumbed to beetle attacks (Arno and Fiedler 2005). Results three years later showed old growth trees had increased sap flow, higher foliar nitrogen content, and higher foliage production (Sala and Calloway 2001), indicating improved tree vigor and increased resistance to insects and disease. Stone et al (1999) also found that restoration of pre-Euro-American stand structure by thinning improved vigor of ancient, presettlement ponderosa pines in northern Arizona. Increased canopy growth and increased uptake of water, nitrogen, and carbon indicated improved tree vigor. They concluded in their study that the negative influence of postsettlement trees on presettlement trees likely resulted from competition for soil resources. Their conclusion agreed with correlative studies conducted at their study site by Sutherland (1983) and Biondi (1996)."

Previous responses to comments discuss site specific data collected in the project area that supports our conclusion that these dry forest stands currently exceed densities that were typical for these dry forest types.

F.4-N Comment:

Juday (1978) discusses in detail how the protection of old-growth forests greatly sustains the many uses of our national forests, as mandated by the Multiple Use-Sustained Yield Act and the National Forest Management Act. Instead of embracing a positive vision for old-growth forests, as outlined by Juday (1978), the IPNF continues to see the Forest as mainly a source of logs.

Response: As discussed in responses to several earlier comments, the purpose and need of the Myrtle HFRA project is to 1) maintain Myrtle Creek watershed as a source of high quality drinking water for the City of Bonners Ferry, 2) reduce hazardous fuels in the Myrtle Creek watershed and adjacent forests, and 3) trend vegetation in Myrtle Creek watershed and adjacent forest toward conditions that would be less susceptible to catastrophic fire, while maintaining and restoring habitat for fish and wildlife species.

Davis (1966) states the, "The organization of a forest property to provide a sustained flow of harvested products is the heart of forest management for timber production." This statement summarizes the heart and soul of growth and yield forestry. No where in the DEIS does it state that the primary objective of proposed treatments is to produce timber. The focus in all of our discussions is based on what would be left in the stands (i.e., old growth structure) versus what will be removed (i.e., merchantable timber). The DEIS (p.4-42, FEIS Chapter 4) states, "Proposed group selection prescriptions in these stands would feature maintenance of large (greater than 21" DBH) old growth trees (ponderosa pine, larch, and Douglas-fir), culture intermediate size trees, especially ponderosa pine and larch, and create small openings of 2-3 acres to promote regeneration these species, which will not regenerate in shaded conditions (smaller openings). Although it is obviously critical to retain the larger old growth trees, it is equally as critical in the long-term maintenance of dry forest old growth to develop replacement cohorts within the these stands." Additionally, if the District was most interested in timber production they would harvest the biggest and best trees, when in fact the proposed treatments would actually do the opposite. In terms of standing timber volume, the proposed prescriptions would actually leave approximately two-thirds of the merchantable timber (OG Doc 04). If the primary objective was to use these stands as a "source of logs" we would not propose to leave the biggest and best trees that have the most timber volume.

The DEIS (p. 4-43, FEIS Chapter 4) further discusses the long-term objectives of the proposed prescriptions and how they are designed to capture the variability of past disturbances, "Treatments would be scheduled about every 30-40 years, but would allow for earlier (20 years) or later entries (50 years) depending on the progress of the stand. For example, in another 20 years managers may decide a combination of prescribed fire and pre-commercial thinning is needed to meet target stand objectives, or perhaps a prescribed fire only treatment would meet the objectives. In the long-term, these variable treatment cycles would capture the natural variability of the disturbance cycles in these dry forest types. Most importantly, these treatments, after 80 years of fire suppression, would trend these stands in a direction that would provide future managers with a much broader array of management options."

F.4-O Comment:

The IPNF ignores the fact that some types of old growth are maintained by low intensity disturbances (Arno, Smith & Krebs 1997; Habeck 1990; Habeck 1988)." The FS's own studies disclose that mixed severity fires are also key to the development of some old-growth types (USDA Forest Service, 1998-1999). Thus, the development of mature forests to old growth is also being retarded by logging and fire suppression. The issue of old-growth mixed conifer—a type that contains a significant component of Western larch—is being ignored. USDA Forest Service (1998-1999) identifies Western larch as a "forest type at risk" with "36% loss" within the Columbia River Basin. Causes listed are "fire exclusion and past harvest." Logically then, the value for old-growth wildlife species is enhanced by fires, but the FS wants to suppress fire via its management.

Response: Our entire premise for entering dry forest old growth is based on the fact that these forests were maintained by low-intensity disturbances. Chapter 3 of the DEIS (p. 3-112, FEIS Chapter 3) discloses, "As stated in Arno et al (1995) and (Biondi 1996), absent fire, understory trees out-compete the old trees for moisture and nutrients the old trees lose vigor and often succumb to insects and disease, or the stress imposed by even low- moderate intensity fires."Western larch is often a component in these dry forest old growth stands and our target stand objectives include retention of the old growth larch trees, recruitment of the intermediate size trees, and creation of openings favorable for larch regeneration. However, western larch is typically a more significant component of cedar, hemlock, and some subalpine fir habitat types. This type of old growth is part of the more than 7,500 acres of the old growth in upper Myrtle Creek that where no treatments are proposed. Some members of KVRI actually requested that District consider treatments in these forest types, but the District replied that it is Forest policy at this time to not enter these types of old growth (KVRI meeting notes – November 30, 2004). (See Chapter 2 discussion of the Collaborative Development of Alternatives for more information.)

F.5 - Soil Resource

Please note that the soil resource discussion is located in Chapters 3 and 4 of the FEIS.

F.5-A Comment:

There is also concern regarding soil quality standards within the project area. Units D4, G3, and G10 all exceed soil quality standards, yet proposed silvicultural prescriptions included irregular shelterwood harvest by tractor (D4), commercial thinning by tractor in 20 acres (G3), and 49 acres of commercial thinning by tractor in IRA # 126 with patches of identified old growth.

Response: Refer to DEIS 2-15 (Soils - Item 3) FEIS Chapter 2, the three units which currently exceed soil quality standards (D4, G3, and G10) would be winter logged to further reduce additional impacts (Soils Report Appendix A-26, FEIS Chapters 3 and 4). Harvest and site preparation operations would strictly adhere to utilizing existing skid trail corridors and slash mat use. The restrictions should provide adequate protection so that current conditions are not exceeded. The skid trails would be rehabilitated during site preparation activities, thereby, move toward a net improvement in soil quality. Post-harvest monitoring is scheduled to assess if mitigation objectives in these units were met (A-27, 35 FEIS Chapter 2). See Chapter 2, section 2-x for design criteria and mitigation measures that will help protect the soil resource.

The IRA # 126 and old growth concerns are explained under separate headings in this document.

F.5-B Comment:

How did Region 1 assess the 15% soil standard measure? The Region One Soil Quality Standards (SQS) recognize a threshold level of damage in "activity areas" yet the DEIS fails to meet NEPA's cumulative effects analysis requirements in that it does not disclose levels of past soil compaction and other damage using the same analysis area concept. The DEIS is written as if cumulative "activity area" soil damage amounts in any given watershed are irrelevant.

Another reason why it's important to disclose such information is that previous noncompliance or exceeding of 15 percent may be obscured by using new activity area boundaries that dilute the total percentages of existing damage within an Myrtle Creek HFRA Project activity area. This problem arises specifically because the DEIS does not disclose the percent of existing detrimental disturbance within previously established activity area boundaries.

The DEIS prescribes using dedicated skid trails to limit the areas of compaction experiencing long-term detrimental compaction and therefore losses in soil productivity. We object to the lack of any meaningful limitation, on a watershed basis, of the amount of soils so damaged permanently or for the long-term. The SQS's failures are revealed by allowing permanent reductions in soil productivity over arbitrarily-decided levels inside "activity areas" and unlimited amounts of areal extent damage due to roads, landings, etc. outside activity areas. Essentially, the FS's management scheme is committing vast areas of the IPNF to permanent losses or reductions in soil productivity, without explaining or quantifying the resultant losses in timber yield, ecological dysfunction due to other vegetative alternations, and disruptions in hydrologic functioning. This does

not satisfy NFMA's requirements to maintain soil productivity, and reveals an agency which, although deeply rooted within the Department of Agriculture, is unable to maintain the basis for all sustainable agriculture—soil productivity.

Regarding soil productivity, it is not clear at all from reading the DEIS that the IPNF actually made proper estimates of existing detrimental disturbance based on scientifically sound methodology, using experts adequately qualified to assess the complexities of soil qualities and cumulative impacts, which could accurately reflect existing soil productivity limitations and damage.

Response: Refer to the DEIS on page A -10 (FEIS Chapter 3), which explains the regulatory framework used for the soil resource. The Regional Soil Quality Standards (R-1 Supplement 2500-99-1) were revised in November 1999 (DEIS, A-11 (FEIS Chapter 3). Manual direction recommends maintaining 85% of an activity area's soils 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).

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, mines, developed recreation and administrative sites.

F.5-C Comment:

How many service landings are proposed on existing classified roads? The DEIS states that "locating landings on existing classified National Forest system roads that area considered designated lands eliminates additional impacts to activity units." We are interested in information regarding the size, location, cumulative area and number of landings in this area.

Response: The landings would be located on system roads adjacent to the proposed harvest units. Units with skyline or tractor harvest systems are usually less than one acre and existing landings are reused where feasible. Helicopter landings are usually an acre or two in size depending on safety variables, and also located on system roads or turnouts as close to the Unit as possible to minimize flight time. The FEIS includes a map (Map Appendix).

F.5-D Comment:

Page 2-19 states that G3 and G10 currently exceed soil quality standards due to past harvest impacts, with the estimated effectiveness as low to moderate. Nothing is said of D4 that is proposed for irregular shelterwood harvest. We are troubled that tractor logging is proposed for 34 acres in Unit D4, an area of unstable slopes, with slumping roads and past clearcuts surrounding the area. This would certainly appear to fit the definition of a landslide-prone area and be protected under INFISH guidelines. The Forest Service should modify the proposal to avoid entering these areas.

Response: Unit D4 was dropped during analysis for the FEIS. See Chapter 2 for descriptions of the alternatives.

F.5-E Comment:

The fact that the impacts of the recent fire are ongoing are another reason the IPNF ought to be light-handed in these watersheds. The DEIS does an extremely poor job of disclosing the sensitized nature of the watersheds, due to the recent fire. (See, for example Beschta et al., 1995 and Beschta et al., 2004.)

Response: Indicators of the 2003 fire in the watershed are described in a reach-by-reach analysis of Myrtle Creek as discussed in the DEIS on 3-27 through 36. Landtype sensitivity descriptions in the watershed are described in the DEIS on page A-15. See FEIS Chapter 3 for information.

This same comment has been included in the Aquatics section F.2 of Chapter 2.

F.5-F Comment:

Alexander and Poff (1985) reviewed literature and found that the amount of soil damage varies even with the same logging system, depending on many factors. For example, as much as 10% to 40% of a logged area can be disturbed by skyline logging. They state:

There are many more data on ground disturbance in logging, but these are enough to indicate the wide diversity of results obtained with different equipment operators, and logging techniques in timber stands of different composition in different types of terrain with different soils. Added to all these variables are different methods of investigating and reporting disturbance.

Response: The IPNF monitoring reports disclose site specific impacts to soils in treated units. Different types of logging equipment on various sites are monitored to verify modeling coefficients (DEIS p A-22, (FEIS Chapter 3 and 4). Monitoring reports can be referenced on the IPNF website at http://www.fs.fed.us/ipnf/eco/manage/monitoring/fp2002monrpt.pdf,

This year's monitoring focused on the following three harvest systems:

* Winter felling and decking with a harvester and summer / fall helicopter log removal.

This harvest system was monitored on Unit 71 of the Charlie Flight Timber Sale, which occurs on the St. Joe Ranger District. Unit 71 on the Charlie Flight timber sale had 4 percent detrimental compaction. Compaction was the only detrimental impact that occurred in this unit. This unit meets Regional and Forest Plan soil quality standards. The Charlie Flight Unit also met the fine organic matter guidelines and the coarse woody debris guidelines.

Unit 71 was in the western red-cedar habitat type and the recommended range of coarse woody debris is 17 to 33 tons per acre and fine organic matter for these habitat types should be 30 percent or greater. Transects on this unit ranged from 37 to 66 tons per acre of coarse woody debris and 33 percent was the average for fine organic matter levels.

* A cut to length harvester and log forwarder:

This type of operation on Unit 17 of the Dutch Cat Timber Sale was monitored at the St. Joe Ranger District. Unit 17 had 12 percent detrimental compaction. Compaction was the only detrimental impact that occurred in this unit. The unit meets Regional and Forest Plan soil quality standards. The Dutch Cat Unit 17 also met the fine organic matter guidelines and the coarse woody debris guidelines.

Unit 17 is in the western red-cedar habitat type and the recommended range of coarse woody debris is 17 to 33 tons per acre and fine organic matter for these habitat types should be 30 percent or greater. Transects in this unit averaged 23 tons per acre or coarse woody debris and 32 percent was the average for fine organic matter levels.

* Horse logging operation:

A past operation on Units 1, 6 and 8 of the Dry Wall Project was monitored at the Bonners Ferry Ranger District. Units 1, 6 and 8 on the Dry Wall project had an average of 1.5 percent detrimental impacts. These units meet Regional and Forest Plan soil quality standards.

F.5-G Comment:

Regarding the potassium-limited soils issue, the IPNF's recent Mission Brush SFEIS states that until minimum thresholds are developed through research, the Idaho Panhandle National Forests is using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. This begs the question that if the IPNF does not know what constitutes sufficient potassium, then how can the agency assert that removal of potassium on already potassium-limited sites will ensure sufficient potassium will remain on that site?

And the IPNF has nowhere made the commitment to "extended rotations" (Mission-Brush SFEIS at A-27) to mitigate potassium deficiencies, simply because it refuses to recognize any natural or regulatory limitations on logging.

Response: Nutrient cycling issues are discussed in the Myrtle HFRA DEIS on A-14, and (FEIS Chapter 3). The Inland 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; Shaw 2005). 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 design and mitigation measures for soils (see Chapter 2).

Extended rotations are part of areas on the IPNF allocated to the old growth. Refer to the DEIS on 4-43 (FEIS Chapter 4), Forest Plan Standard 10 (b) – This standard calls for maintaining "at least 10% of the forested portion of the Idaho Panhandle National Forests as old growth". The Forest Plan identified 2,310,000 forested-acres on the Idaho Panhandle National Forests. Therefore, the Forest Plan standard requires maintaining 231,000 acres of old growth on the forest. Based on two independent inventories and monitoring tools (FIA and IPNF stand level inventory) the IPNF is maintaining over 12% allocated old growth on its forested acres. As part of the Forest Plan strategy, 65,853 acres (16.7%) on Bonners Ferry Ranger District are allocated for old growth management (USDA 2005). The Myrtle Creek HFRA Project complies with Forest Plan standard 10 (b). See IPNF website for monitoring reports on forest old growth.

F.5-H Comment:

Despite a regulatory obligation to provide the public accurate and complete information, the DEIS fails to provide the public with accurate and complete information about which units have experienced historic logging, where in each unit it occurred, how many times these units have been entered, historic yarding methods, fuel treatments, site prep information, compaction

assessment techniques used in the analysis, or any detailed assessment information including transect information, penetrometer calibration information, actual penetrometer data, pit information, core sample data, etc., etc., etc.

Indeed, the DEIS seems to indicate that the majority of these units have very low existing compaction percentages but provides exactly no supporting information to justify these very low figures despite the history of extensive logging, the admitted lack of complete and accurate information, and the apparent failure to conduct on-the-ground surveys in all activity areas.

The DEIS fails to include a map showing the boundaries of all previously established "activity areas" as the R-1 Soil Quality Standards define "activity areas", and present all available data on levels of existing detrimental disturbance within those activity areas, in either a tablular or map form. Then, based on that data the IPNF will be in a better position to analyze the water yield and other hydrological implications of the various amounts of hydrologically dysfunctioning soils, within each project area watershed and subwatershed, and disclose them to the public. This is also in the R-1 Soil Quality Standards. The models the DEIS uses do not consider compacted soils, for example, for cumulative effects watershed analyses.

Response: The Council on Environmental Quality (CEQ) 1502.2 (b) requires that the environmental documents be analytic rather than encyclopedic to reduce paperwork. Please refer to DEIS A-10 (FEIS Chapter 3), Regulatory Framework and Methodology sections; these are the standards this project follows. Past harvest activities are discussed in the DEIS 3-102 thru 104 (FEIS Chapter 3) and are part of the existing or baseline condition. From the DEIS on A-12 (FEIS Chapter 3), "Existing conditions and impacts from past activities were quantified using a combination of on-the-ground soil transects (the "Onsite Assessment Method" outlined in Niehoff (2002)), depth of organic matter, and amount of coarse woody debris". The results of the field transects are located in the DEIS on A-21 (FEIS Chapter 3).

Previously entered units are part of the existing condition and are described in Chapter 3 of the FEIS. Soil transects are also explained in Chapter 3.

F.5-I Comment:

Furthermore, given the agency-acknowledged impacts that wildland fire brings to soils (see for example USDA Forest Service 2002a, USDA Forest Service 2002b and USDA Forest Service 2006a), the DEIS does not adequately quantify either the areal extent of damage nor reductions in productivity.

Response: Refer to the DEIS on A-18 (FEIS Chapter 3). The 1926 fire represents the last major natural fire event that occurred in the project area prior to the Myrtle Creek Fire of 2003, which burned approximately 3450 acres in the drainage, on primarily south-facing slopes and some pockets of the middle- to lower-lying north-facing mountain side. Distribution of soil burn severity was equally distributed with 31 percent having a high, 34 percent having a moderate, and 35 percent having a low rating. Hydrophobic soils were initially estimated to total seven percent of the total burn area and were limited to south-facing, dry site Ponderosa pine/brush areas (Janicki 2003). Other fires and their effects on soils are discussed in the DEIS on 3-16 and A-18, 23 through 35 (FEIS Chapters 3 and 4).

F.5-J Comment:

Why does the IPNF consider that having 15% or 20% of soils in a given activity area to be damaged is acceptable? When did you have that debate with the public and scientific community? Landsberg, et al., 2003 found that on ash-derived soils, "Compaction from earlier harvesting lasted for 70 or more years."

The problems Lacy (2001) identifies of regulatory mechanisms certainly exists in Regional and Forest-level standards and other guidance applicable for the Myrtle Creek HFRA Project.

Response: Refer to the DEIS on page A -10 (FEIS Chapter 3), which explains the regulatory framework used for the soil resource. From A-11 (FEIS Chapter 3), The Regional Soil Quality Standards (R-1 Supplement 2500-99-1) were revised in November 1999. Manual direction recommends maintaining 85% of an activity area's soils 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). 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, mines, developed recreation and administrative sites.

Soils analysis for this project is tiered to the IPNF 1987 Forest Plan on page II-32. This guiding document went through the public scoping and commenting process. The IPNF is currently revising the Forest Plan, a process which included a great deal of public involvement and numerous opportunities to comment on future management of the Forest; more information is available on the IPNF website www.fs.fed.us/kipz/index.php.

F.5-K Comment:

We object to the FS's assumption that use of BMPs will result in meeting soil quality standards and maintaining soil productivity, since no BMP monitoring has ever occurred on the IPNF to validate such assumptions.

The DEIS does not adequately demonstrate the effectiveness of the soil mitigation measures proposed. There are good reasons to include a more thorough discussion of their effectiveness. For example, "Monitoring of winter-logging soil effects conducted by the Forest Soil Scientist on the Bitterroot National Forest over the past 14 years has shown that 58% of the ground-based, winter-logged units failed to meet Region 1 Soil Quality Standards. Winter-logging resulted in an average of 16% detrimentally damaged soil." (USDA Forest Service, 2005b, p. 3.5-21.)

Response: The FEIS discusses monitoring in Chapter 2 (FEIS Chapter 2). The IPNF conducts soil quality / BMP monitoring. An example can be viewed in the IPNF Forest Monitoring Report 2003, pages 75-78, which is available on the Forest website at: http://www.fs.fed.us/ipnf/eco/manage/monitoring/fp2003monrpt.pdf. See response to Comment F.5-f for additional information on results of monitoring.

F.5-L Comment:

The IPNF must disclose how the productivity of the land [has] *been affected in the project area and forestwide due to noxious weed infestations, and how that situation is expected to change in the coming years and decades.*

Response: For this project see DEIS on 2-14 and A-1 (FEIS Chapter 3, Appendix A) . The IPNF response to invasive plant species (noxious weeds) is outlined in the Forest Plan and the success of the management activities is evaluated through monitoring. The forest-wide conditions are outside the scope of this site-specific project.

Forest Service Handbook 3409 defines a strategy of Integrated Pest Management[1] for managing pests, including noxious weeds. The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally uninfested areas, as described in the IPNF's 1989 IPNF Weed Pest Management EIS.

Weed management on the district is guided by the Bonners Ferry Noxious Weed Management Project Final EIS (USDA, 1995), which states in part:

> Across the Bonners Ferry Ranger District, "At the present time [1995], most infested sites are along road clearings. Noxious weeds are probably having little effect on sediment yield in comparison to other road related activities (road use, maintenance, etc.). Impacts from future spread of the weeds would depend on the slope, soil characteristics, precipitation patterns, and distance to water from the infested sites. However, even under the worst-case noxious weed infestation scenario, it is unlikely that increase in sediment yield to streams would be sufficient to affect fisheries or water quality." (BFRD Weed FEIS, pg. 4-2).

The Myrtle HFRA Project Noxious Weeds Report (located in the project file) includes the following information regarding weed infestations and treatments in the project area:

> Current weed infestations in the project area occur along roads and include moderate levels of spotted knapweed and goatweed; and low level infestations of oxeye daisy, meadow hawkeye, orange hawkweed, common tansy, sulfur cinquefoil, and Canada thistle. Spotted knapweed and goatweed also occur in natural openings in the project area, but off-road weed infestations are generally low overall and are scattered. During the 2005 growing season, goatweed experienced major population growth throughout most of Idaho and it also spread in several areas of the Myrtle Creek watershed.
>
> Weed infestations along Forest roads in the project area have decreased since treatment first began. Because they occur off-road and because some areas proposed for treatment are susceptible to invasion by them, spotted knapweed and goatweed are of greater concern than roadside infestations that are actively being controlled. Management of these species will emphasize reducing infestation levels and slowing their rate of spread.
>
> Spotted knapweed – Most studies of spotted knapweed to date have focused on its dominance of native grasslands, prairies, or both. In contrast, the Myrtle HFRA project area is largely dominated by mesic to dry forested habitats with a high shrub component where the tree and shrub canopy cover is likely a major limiting factor in the spread of spotted knapweed. Spotted knapweed infestations have been associated with reductions in forage production, plant species richness and diversity, soil fertility, and wildlife habitat, as well as increases in surface water runoff and stream sedimentation.

[1] Integrated Pest Management – "a decision-making and action process incorporating biological, economic and environmental evaluation of pest-host systems to manage pest populations." FHS 3409.11, 6/86.

Goatweed – In forested areas, goatweed (also known as St. Johnswort) is commonly associated with disturbances (roads, grazing, logging, fire). Where it occurs in forest zones in Idaho, it is abundant only in small, localized areas in naturally open ponderosa pine stands or where tree cover has been greatly reduced by logging, fire, or other disturbance. Several studies suggest that goatweed requires abundant light for best development. Its impact on native plant communities may not be as great as earlier literature seems to indicate, perhaps due to the moderate success of biological control efforts over the last 60 years. The most commonly described impacts are loss of forage production and carrying capacity on rangelands and losses from livestock poisoning.

Forest roads in the project area were identified in the Bonners Ferry Noxious Weed EIS as Sites #1a (Snow Creek Road 402 - location A), 2a (Myrtle Creek Roads 2411 and 633 – location A), 2b Myrtle Creek Mid Road 633 – location B), and 2c (Myrtle Creek Upper Road 633 – location C). The roads were first treated for noxious weeds in 1995; follow-up treatments, including release of biological control agents for spotted knapweed, have occurred since then. Including weed treatment and prevention practices in timber sale contracts has increased the likelihood of success in containing and reducing weed infestations throughout the Bonners Ferry Ranger District.

Through the BAER activities following the 2003 Myrtle Creek Fire, many burned areas, excavator and hand fire lines were seeded with native and desired non-native species; several areas were hydro seeded, and mulch was applied by helicopter in other areas. The project file contains photos showing the effectiveness of the seeding. The past two years of monitoring have shown these efforts to be moderately to highly successful (see project file).

Weed prevention and treatment measures (FEIS Chapter 2 Design Criteria and Mitigation Measures) would reduce, but not eliminate, the potential for spread of goatweed and knapweed within the project area. Pretreatment of existing infestations on roads proposed for decommissioning followed by preventive seeding would reduce the risk of weed spread over time to current levels. The risk of new invaders becoming established would be low. Assuming the availability of appropriated and KV funding, roadside weed infestation levels would be expected to continue to decline over time.

(Internal citations omitted.)

Funding for noxious weed treatments for the North Zone for Fiscal Years 1998 through 2006 are shown below. These dollar amounts do not include the BAER funding for Myrtle Creek watershed after the 2003 Myrtle Creek Fire.

Table F-3 North Zone Noxious Weed Program Funding

Fiscal Yr	Appropriated and KV Funding	RAC Funding	Total Funds
98	$34,000		$34,000
99	$42,000		$42,000
2000	$59,000		$59,000
01	$90,000		$90,000
02	$199,000	$25,000	$224,000
03	$176,000	$43,000	$219,000
04	$92,000	$43,000	$138,000
05	$91,000	$45,000	$136,000
06	$80,000	$74,000	$154,000

F.5-M Comment:

The meaning of "soil productivity" in the terminology of NFMA is largely ignored. In the SQS the FS claims "Soil quality is maintained when erosion, compaction, displacement, rutting, burning, and loss of organic matter are maintained within defined soil quality standards." But even if the FS were to meet the 15% Standard in all Activity Areas forestwide, and even if the soil conditions of land outside proposed activity areas could reasonably be ignored, the FS still cannot assume that there has been no "significant or permanent impairment of the productivity of the land" as NFMA requires. For example, the IPNF fails to consider the soil productivity implications of any level of road density in project area watersheds. And the implications of "sustained yield" in the context of soils damaged at any level of percent detrimental disturbance has never been a part of the IPNF's dialogue. It is reasonable to expect that in order for the FS to assure that soil productivity is not or has not been significantly impaired, to assure that the forest is producing a sustained yield of timber, for one example, tree growth must not be significantly reduced by soil-disturbing management activities.

Does the IPNF believe that only soils compacted such that bulk density has increased by more than 20% are in a detrimental condition? If so, please provide data that corroborate this assertion. There are adequate data and research indicating that increases in bulk density of less than 20% from land management activities degrade soil conditions and processes in a persistent fashion. Adequate disclosure of adverse soil impacts requires disclosure of the amount of soils that have been

adversely affected by compaction from all previous activities, including past logging, roads, landings, and past and on-going grazing, and not just the amount of soils that have been compacted such that bulk density has been increased by >20%.

Page-Dumroese et al. (1998) noted that soil compaction in the range of a 15-20% increase in bulk density in ash cap soils may decrease productivity of ash-cap sites by reducing pore space and root and ectomycomhizal activity.

Page-Dumroese et al., 2000 emphasize the importance of validating soil quality standards using the results of monitoring:

Research information from short- or long-term research studies supporting the applicability of disturbance criteria is often lacking, or is available from a limited number of sites which have relative narrow climatic and soil ranges. …Application of selected USDA Forest Service standards indicate that blanket threshold variables applied over disparate soils do not adequately account for nutrient distribution within the profile or forest floor depth. These types of guidelines should be continually refined to reflect pre-disturbance conditions and site-specific information. (Abstract.)

Restoration of soil functioning ought to be a high priority in areas such as this, where a lot of industrial logging has taken place already. The Bitterroot National Forest reports, "It is acknowledged that the effectiveness of soil restoration treatments may be low, often less than 50 percent." (USDA Forest Service, 2005b at p.3.5-20.) What data does the IPNF have on the efficacy of its soil restoration efforts?

The DEIS does not adequately consider the fine ecological balance existing site-specifically in soils, nor the implications for ecological health. Harvey et al., 1994 state:

> *The ...descriptions of microbial structures and processes suggest that they are likely to provide highly critical conduits for the input and movement of materials within soil and between the soil and the plant. Nitrogen and carbon have been mentioned and are probably the most important. Although the movement and cycling of many others are mediated by microbes, sulfur phosphorus, and iron compounds are important examples.*
>
> *The relation between forest soil microbes and N is striking. Virtually all N in eastside forest ecosystems is biologically fixed by microbes... Most forests, particularly in the inland West, are likely to be limited at some time during their development by supplies of plant-available N. Thus, to manage forest growth, we must manage the microbes that add most of the N and that make N available for subsequent plant uptake.*
>
> *(Internal citations omitted.)*

Response: Refer to the DEIS on page A -10 (FEIS Chapter 3), which explains the regulatory framework used for the soil resource analysis. From A-11 (FEIS Chapter 3), the Regional Soil Quality Standards (R-1 Supplement 2500-99-1) were revised in November 1999. Manual direction recommends maintaining 85% of an activity area's soils 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). 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, mines, developed recreation and administrative sites.

We share your concern that compacted soils can slow tree growth. That is why mitigation such as designated trail systems, logging over frozen ground, slash mats or snow is commonly used on the IPNF. The soil analysis is in compliance with NEPA, NFMA, and the Regional Soils Standards as discussed in the Soil Resources Report (Appendix A, Consistency with the Forest Plan and Other Regulatory Direction (FEIS Chapter 3)).

All units except Units G3, G10 and D4 currently meet the soil standards (DEIS, Appendix A, Table A-5 (FEIS Chapter 3)). From the DEIS on page A-27, "The three activity areas which currently exceed soil quality standards across the entire unit (D4, G3, and G10) will be winter logged to further reduce additional impacts. Harvest and site preparation operations would strictly adhere to utilizing existing skid trail corridors and slash mat use. The restrictions should provide adequate protection so that current conditions are not exceeded. Post-harvest monitoring is scheduled to assess if mitigation objectives in these units were met". As noted earlier, Unit D4 was dropped from consideration between the DEIS and FEIS. Thus Units G3 and G10 are now the only units that do not meet the soil standards (FEIS Chapter 3)

Provision for net improvement on previously impacted activity areas would be achieved through soil restoration activities that would affect old detrimental disturbance in units G3 and G10. This would be accomplished through decompaction, addition of organic matter, seeding, and weed control. Effectiveness is low to moderate (Heninger et. al 2002) but decompaction would provide for improvements in hydrologic function and would initiate a recovery process that otherwise may be prolonged as soil compaction from past and proposed harvest activity persist". Features designed to protect soils are listed in the DEIS in Chapter 2 (FEIS Chapter 2). Monitoring reports are discussed in the above responses and can also be viewed at the IPNF website at: http://www.fs.fed.us/ipnf/eco/manage/forestplan/index.html#fpmon.

F.5-N Comment:

The DEIS references existing conditions in excess of regional soil disturbance standards. At the conclusion of the proposed activities, soil conditions will not have improved. Specifically, regional standards require no more than 15% of an activity area to have detrimentally disturbed soils. In the DEIS, three units will exceed regional standards (page A-21). Additional units will be within several percentage points of exceeding regional standards. This includes the unit where the temporary road will be constructed. We are concerned that even after the temporary road is decommissioned that soil disturbance (compaction, displacement, rutting and erosion) will remain.

Response: All units except Units G3, G10 and D4 currently meet the soil standards (DEIS, Appendix A, Table A-5(FEIS Chapter 3)). From the DEIS on page A-27, "The three activity areas which currently exceed soil quality standards across the entire unit (D4, G3, and G10) will be winter logged to further reduce additional impacts. Harvest and site preparation operations would strictly adhere to utilizing existing skid trail corridors and slash mat use. The restrictions should provide adequate protection so that current conditions are not exceeded. Post-harvest monitoring is scheduled to assess if mitigation objectives in these units were met".

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F.6 - Historic Range of Variability

F.6-A Comment:

Hayward, (1994) states:

> *Despite increased interest in historical ecology, scientific understanding of the historic abundance and distribution of montane conifer forests in the western United States is not sufficient to indicate how current patterns compare to the past. In particular, knowledge of patterns in distribution and abundance of older age classes of these forests in not available. …Current efforts to put management impacts into a historic context seem to focus almost exclusively on what amounts to a snapshot of vegetation history—a documentation of forest conditions near the time when European settlers first began to impact forest structure. …The value of the historic information lies in the perspective it can provide on the potential variation… I do not believe that historical ecology, emphasizing static conditions in recent times, say 100 years ago, will provide the complete picture needed to place present conditions in a proper historic context. Conditions immediately prior to industrial development may have been extraordinary compared to the past 1,000 years or more. Using forest conditions in the 1800s as a baseline, then, could provide a false impression if the baseline is considered a goal to strove toward.*

This it really calls into question the entire mechanical manipulation regime as represented by the Myrtle Creek HFRA Project. The Forest Service (FS) admits that the project area and IPNF have been fundamentally changed by fire suppression, logging, and roadbuilding, so the FS must consider how much native forest it has fundamentally altered compared to historic conditions forestwide before pursuing "treatments" here. As stated above, the Forest Plan is out of date and you need to put that fact in perspective. Essentially, this means considering new scientific information on all kinds of changes away from "historic conditions"—and in the forestwide context of Forest Plan Revision—not on a project-level basis prior to revision.

Response: The DEIS describes historic disturbance regimes and how they have affected the forests in the project area on pages 3-85, 89 to 91; also refer to pages 3-95 to 100. (FEIS Chapter 3)

The current status of the IPNF's Forest Plan Revision can be found on the IPNF website at: http://www.fs.fed.us/kipz/index.php.

F.7 - Roadless

F.7-A Comment:

All or portions of units D1, D6, D9, E3, E10, F1, G8, G9, and G10 are within the Kootenai Peak Inventoried Roadless Area #126. This amounts to around 779 acres of commercial thinning, group selection seed tree and irregular shelterwood harvest all within this IRA. Unit E10, identified in Figure 2-1 is not identified within Table 2-4. We would like clarification if E10 is included in the proposed treatment areas as shown in the DEIS in Figure 2-1, or not included in the 24 units listed in Table 2-4 which lists any vegetation and fuels reduction proposed.

Response: In the DEIS, the map of Alternative 2 (Figure 2-1) incorrectly labeled the unit in question as Unit E-10 rather than E-8 as it actually is. The listing in the Alternative 2 table was correct. The map in the FEIS shows the correct number (E-8). The Inventoried Roadless Areas are also discussed in greater detail in the FEIS Chapters 2, 3, and 4.

F.7-B Comment:

Two units, D6, and E3 are also proposed for openings over 40 acres within this IRA. The Myrtle Creek DEIS shows that old growth patches exist within units G8, G9, and G10 within the Kootenai Peak IRA. Even when unit G10 exceeds soil quality standards, commercial thinning by tractor harvest is proposed within a unit including old growth patches in an IRA. Units B1, B3 B4, B5, and B6 are within the Selkirk Inventoried Roadless Area #125, adding up to 460 acres of irregular shelterwood. Four of the five units are proposed to include openings over 40 acres. B4, a 47-acre unit silvicultural prescription is irregular shelterwood, with an over 40-acre opening, leaving less than 7 acres (if any) within the IRA. The remaining unit cannot have a 40-acre opening, as it is only 23 acres in size. All units are just north of Myrtle Creek and at the far west of the project area over four miles from Bonners Ferry. We are opposed to logging within roadless areas—inventoried or not. The IPNF ought to be well familiar with the scientific finding proceeding from the ICBEMP studies, such as USFS and USBLM, 1999a and the analysis presented in the Roadless Area Conservation FEIS.

Furthermore, the DEIS does not clarify any roadless boundary issues. It is not adequate to merely accept previous, often arbitrary roadless inventories—unroaded areas adjacent to inventoried areas were often left out. Impacts on logically-bound roadless areas as a whole are required to be considered, analyzed, and disclosed. Additionally, there is a lot of public support for adding unroaded areas as small as 1,000 acres in size to the roadless inventory.

Response: The analysis for this project follows the direction found in 36 CFR II Section 294.13 and FSM 1925 – Management of Inventoried Roadless Areas. It authorizes management activities that maintain or restore the desirable characteristics of ecosystem composition and structure, for example, to reduce the risk of uncharacteristic wildfire effects. It also allows management in a portion of an inventoried roadless area where construction of a classified road and subsequent timber harvest have previously taken place, and the roadless area characteristics have been substantially altered by those activities. The openings larger than 40 acres are needed to create strategic fuel breaks in the project area. Unit G10 will have the excess skid trails rehabilitated to trend the SQS toward a net improvement as stated in the R-1 guidelines (see FEIS Chapters 2, 3, and 4 Soil Resources and Fire and Fuels discussions).

F.7-C Comment:

The analysis of the project's effects on roadless areas is wholly inadequate. Not only that, but the 1,138 acres of roadless area logging is hardly mentioned in the DEIS. Nowhere in the discussion of affected environment or environmental consequences is the roadless issue addressed. Instead, a total of 3 pages of text are dedicated to a discussion of roadless in the Appendix. This discussion fails to disclose the irreversible and irretrievable commitments associated with logging in roadless, not to mention other factors and impacts required. The DEIS also did not disclose whether any unroaded areas were inventoried or may be found within the analysis area.

The courts are clear that a decision to log a roadless area is "environmentally significant" [Smith v. US Forest Service, No. 93-36187 (9th Cir. Aug. 22, 1994)] and "the decision to harvest timber on a previously undeveloped tract of land is "an irreversible and irretrievable decision' which could have 'serious environmental consequences.'" [In National Audubon Society et al. v. US Forest Service, 4 F. 3d 832 (9th Cir. 1993)].

There is no quantification of the impacts to roadless areas in terms of integrity, size, naturalness, wildness, or other roadless values. The DEIS only gives a general narrative, and reaches a decision that 1,138 acres of logging will not alter the character of roadless recreational opportunities. NEPA requires site-specific analysis, the DEIS fails on this count.

The DEIS gives no indication what the impacts may be on roadless areas in terms of wilderness character or the ongoing forest plan revision. Finally, the DEIS does not discuss any existing roadless direction, either national rules, interim direction, or the ongoing state petition process. Regardless, case law in Kettle Range Conservation Group v. USFS. makes it clear that the on-the-ground situation is what determines roadless nature of an area.

The few forested areas that appear to be still intact in Lower Myrtle Creek are in roadless areas and the Myrtle DEIS proposes extensive regeneration logging in them. According to Appendix A, 13.7% (681 acres – the D units and G8, G10, E3 and E8) of the Kootenai Peak Roadless area will be impacted and .5% (457 acres – the B units which are all regeneration units) of the much larger Selkirk Roadless Area will be logged. Appendix A treats the logging in roadless areas as though it is a non-issue.

We believe that the logging proposed in these roadless areas will adversely impact the few areas in the Myrtle watershed that are ecologically intact and has the potential to further degrade water quality rather than protect it. This should be addressed in the FEIS.

Response: The Roadless Area discussion has been included in the main body of the FEIS (Chapter 2, 3 and 4). Information concerning revision of the Forest Plan is available from the Idaho Panhandle National Forests Forest Supervisor's office (address and phone number are included at the beginning of the FEIS).

F.8 - Wildlife

F.8-A Comment:

The Forest Service has yet to disclose how past and proposed actions will reduce the ability to provide for old-growth associated species habitat needs.

Response: The effects of past and proposed actions on old-growth associated species are discussed in the DEIS and FEIS in Appendix B. Specifically, the DEIS discusses project effects on Northern goshawk (Appendix B, pp. 26-28), fisher/marten (Appendix B, pp. 29-30) and pileated woodpecker (Appendix B, pp. 32-34). Effects of past actions and events are summarized in Appendix B, pp. 28, 30 and 34 for goshawk, fisher/marten and pileated woodpecker, respectively. Since this proposal would not reduce old growth habitat acres, it will not reduce the ability to provide for old-growth associated species habitat needs. FEIS (Appendix B)

Additionally, the DEIS (p. 3-107 through 3-109, p. 4-43 and 4-44) discusses the distribution of old growth at various scales across the IPNF as it relates to the Myrtle Creek HFRA and how Forest Plan Standards are being met. Currently, nearly 28% of the acres in the vegetation assessment area are included in the IPNF's old growth allocation. FEIS (Chapter 2, 3, and 4)

F.8-B Comment:

Much of the project falls into the following Management Areas, and we are concerned that the proposed actions do not follow the management direction specified for these areas. 30% of the project area is Management Area 2, consisting of lands designated for timber production and the recovery for the grizzly bear. 30% of the project area is in a Management Area 7, designated caribou habitat. 15% of the project area is Management Area 9, consisting of areas not capable of producing forest products and should be managed primarily for visual quality objectives. 5% of the project area is in Management Area 10, which is managed primarily for semi-primitive recreational experiences and meet visual quality objectives. 10% of the project area is in a Management Area 11, which is managed primarily for primitive recreation experiences and meet visual quality objectives.

Response: These percentages are calculated for the project area as a whole, which consists of the entire Myrtle Creek watershed plus a portion of the lower Snow Creek watershed. However, the areas in which this project proposes management actions are limited to the lower portions of these watersheds. To aid understanding of the layout of the management areas across the two watersheds and the locations of proposed management activities, a Management Area Map has been included in the FEIS Map Appendix.

Nearly all of the acres to be treated (affected area) are within Management Area (MA)1 or MA2. Substantial sections of the lower Snow Creek drainage were classified in the Forest Plan as MA9, but further evaluation of these areas has resulted in their being reclassified as suitable for timber production (DEIS p. 4-46, FEIS Chapter 4). Timber harvest within the Woodland Caribou Recovery Area (MA7) would be limited to less than 50 acres of currently unsuitable habitat, and would likely trend these stands towards suitable condition more quickly than no action would (see *X_species.doc* and *Biological Assessment*, project file). (See Chapter 2 descriptions of alternatives FEIS

F.8-C Comment:

The Forest Service should establish that the species that exist, or historically are believed to have been present in the analysis area are still part of viable populations. This identification of populations should be done at a specific geographic scale, and include a large enough area to include cumulative effects analysis.

Response: It's a false assumption that species that historically occurred in the area still exist in the same area and are contributing to viability. Wildlife will occupy their preferred niches on the landscape, and move from place to place as forest structures change and different habitat conditions develop (Clark and Sampson 1995). Consequently, not all wildlife species will persist indefinitely where they were found historically or where they are found today because of the dynamic environments in which they live.

F.8-D Comment:

We would like to see any evidence that "managing for old growth habitat" will improve old growth species habitat over the short-term or long-term.

Response: The DEIS (p. 4-42 and 4-43) and FEIS Chapter 4 discuss the rationale and scientific reference conditions that support the proposed treatments in dry forest old growth. The project file (OG Doc.12) includes documentation that supports these old growth reference conditions and that silvicultural treatments can improve the health and vigor of old growth (see response to Old Growth comment #1). As discussed in the Wildlife Report (DEIS Appendix B), flammulated owls prefer to nest and forage in large diameter, open-canopied ponderosa pine/Douglas-fir forest stands. Currently, most potential flammulated owl habitat in the project area contains high densities of smaller stems in the understory, with the exception of portions of 76 acres of "suitable" habitat (DEIS Appendix B, p. 24; FEIS Appendix B). This understory congestion makes these stands less desirable for flammulated owl nesting, as well as greatly increasing the risk of stand-replacing fire. Treatments in dry-site forest stands (including the two old growth stands) are designed to mimic or trend these stands toward structural conditions this species prefers. While there are no guarantees that flammulated owls will occupy these areas after treatment, it is apparent that most of these acres currently are not meeting habitat conditions preferred by flammulated owls, and will continue to move away from suitable condition over time. Therefore, it seems intuitive that manipulating stands that do not currently meet species habitat requirements presents far less risk to continued viability of the species than lack of action would.

Managing vegetation to improve habitat conditions for flammulated owls is no different than managing vegetative conditions to address habitat needs for a wide variety of species that occur on National Forest lands, based on their habitat relationships supported by literature. As a Federal land management agency we are directed to manage habitat capability levels to meet or maintain viable populations of wildlife (Multiple-Use, Sustained Yield Act 1960, National Forest Management Act 1976).

F.8-E Comment:

There is still substantial risk to the viability of black-backed woodpeckers following recent large wildland fires in this region. In subsequent years, there have been fires in the Northern Rockies but not as substantial as in 2000; and in any case the FS has yet to consider the viability of the black-backed woodpecker in the context of this landscape scale.

Response: Black-backed woodpeckers are nearly restricted to mixed or high intensity fires (Hutto 1995). These burned areas are considered the highest value to black-backed woodpeckers. The Myrtle Project is not a fire salvage project. Therefore, this project would not affect primary or high value black-backed woodpecker habitat.

The USFS has conducted a viability analysis for black-backed woodpecker across the Northern Region (Samson, 2006). Samson's analysis concluded that short-term viability of the black-backed woodpecker in the Northern Region is not an issue because:

- 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.
- Increases in 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.

F.8-F Comment:

Dolan (1998a,b) states in regards to impacts on the black-backed woodpecker due to fire suppression and post-fire logging states: It seems that we have a huge cumulative effects problem here, and that each salvage sale removes habitat that is already very limited. We are having trouble avoiding a "trend to federal listing" call for the BBWO in salvaging burns, unless comparable acres of fire-killed dead are being created through prescribed burns.

Response: No salvage harvesting of fire-killed timber is proposed for this project.

F.8-G Comment:

The FS has yet to design a consistent, workable, scientifically defensible strategy to ensure viable populations of the black-backed woodpeckers. Fire suppression, insect and disease suppression, and "salvage" logging policies of the FS are the

biggest threat to black-backed woodpecker population viability on the Forest, unfortunately in failing to create a conservation strategy the cumulative impacts of the IPNF's ongoing fire suppression policy will remain unexamined.

Response: The Myrtle HFRA project is not the appropriate planning level for developing a conservation strategy for the black-backed woodpecker, or addressing the agency's fire suppression policies. Project analysis determined that while portions of black-backed woodpecker source habitat has been affected by past, present and reasonably foreseeable actions, sufficient habitat remains within the analysis area (including the 2003 Myrtle Creek Fire burned area) to continue incidental or minor use by black-backed woodpeckers (FEIS Appendix B).

The changes in species composition from historical vegetation patterns have increased the incidence of insect and disease , and Douglas-fir beetle and fir engraver activity has recently been very high (FEIS Appendix B). These conditions historically have not been known to occur over large landscapes in the Idaho Panhandle National Forests.

Consequently, insects and diseases will continue to exert their influence on the treated and untreated areas within the Myrtle Creek drainage, providing conditions for both nesting and foraging. It is important to note that while regeneration cutting would open the forest canopy to provide growing space for natural or planted trees, it would retain both live and dead trees in an irregular spacing for sustained foraging opportunities.

F.8-H Comment:

There is considerable scientific controversy over the adequacies of the IPNF's snag standards and guidelines, recognized by the IPNF itself. The IPNF (USDA Forest Service, 2000c) recently called for updated snag guidelines: "Apply snag and down woody material guidelines from the Upper Columbia River Basin Assessment to improve marten habitat" (p. 39). The Northern Region Snag protocol has not been subject to independent scientific peer review and validation from post-implementation monitoring. Nor has it been the subject of a contextually proper NEPA and NFMA review as a forest plan amendment.

The Forest Plan's reliance on Thomas et al., 1979 was severely criticized in Bull et al. 1997. The FS has not responded to this new scientific information that seriously calls into question its snag standards and guidelines.

Snags may be cut down for safety reasons during logging operations (due to OSHA regulations), however the DEIS does not consider in any quantitative fashion the level of loss of standing snags, or resultant impacts to wildlife. The IPNF fails to disclose how much snag loss would be expected because of safety concerns and also skyline corridors and other methods of log removal—the loss could be more significant that disclosed, because the IPNF doesn't provide any idea the degree of snag loss due to these concerns.

Response: The Northern Region Snag Protocol (USFS 2000) is not a Forest Plan Amendment, but recommendations designed to improve snag retention in treated areas. The IPNF has chosen to follow recommendations contained in the Northern Region Snag Management Protocol regarding snag retention standards and recruitment strategies where such opportunities exist. While current conditions may not meet these objectives due to existing stand structure (relatively young, healthy stands with low occurrence of quality snags), long-term management objectives are intended to manage snag habitat to exceed Forest Plan guidelines. Wildlife tree retention guidelines rely heavily on recommendations provided by Bull et al. (1997), which states that published data suggests that populations of cavity nesters were viable in stands of ponderosa pine and mixed-conifer forests that contained about four snags per acre and a large component of old growth.

The DEIS and FEIS acknowledges the loss of some snags from logging operations. However, design features are provided to minimize these losses (see FEIS Chapter 2). Snag retention objectives are accounted for on a treatment level scale, not managed on a per acre basis. It would be extremely difficult to predict how much snag loss is anticipated, especially when the natural density and distribution varies across the landscape, and perceived safety risk will vary among operators. The retention objectives for this project exceed the Forest Plan's standards/guidelines for managing snag habitat.

F.8-I Comment:

The DEIS fails to substantiate the reasons for not analyzing impacts on many MIS and Sensitive wildlife species. These species' historic range includes the land in the project area, so omitting cumulative effects analyses makes no sense biologically.

Response: The DEIS (Appendix B, p. 2; FEIS Appendix B) discloses a screening process used to determine whether or not a species should be analyzed. A number of Threatened, Endangered or Region 1 Sensitive Species (TES) and IPNF Management Indicator Species (MIS) were presumed to not be present in the action area, would be affected at a level that does not increase risk to the species, or effects on the species can be adequately mitigated by altering the design of the project. Documentation and rationale for lack of further analysis can be found in the project file (*X_species.doc*). Due to the lack of direct or indirect project effects, there would be no cumulative effects to these species.

F.8-J Comment:

The flammulated, boreal owl and the great gray owl are species of concern that are sensitive to logging and other management activities. The IPNF provides inadequate management strategies to insure their viability.

Response: The boreal owl inhabits higher elevation spruce-fir forests, which would not be impacted by project activities. Regarding the great gray owl, The National Forest Management Act of 1976 (NFMA) directs Forests to select management indicator species (MIS) for emphasis in planning, and which are monitored in order to assess the effects of management activities on their populations and populations of other species with similar habitat needs which they may represent (FSM 2620.5). The goshawk, discussed in the EA, would represent the effects of management activities on great gray owls because they are found in coniferous forests, forage in relatively open stand conditions, and are known to nest in abandoned goshawk nests (Clark et al. 1989).

Boreal and great gray owl are not identified as Sensitive or MIS on the IPNF. Flammulated owls are discussed in detail in the DEIS and FEIS (Appendix B). Since there would be no loss of currently suitable habitat (merely a short-term disturbance during implementation) and as many as 636 acres of currently unsuitable habitat would be trended towards suitable condition, it was determined that this project would not likely contribute to a trend toward listing or cause a loss of viability to the species.

F.8-K Comment:

According to the DEIS, flammulated owls use primarily open, old forests dominated by ponderosa pine and thus alleges that the flammulated owl would benefit from logging. However, according to the Grade/Dukes Timber Sale Biological Evaluation, Payette NF, research indicated that flammulated owl nests "occurred in old growth ponderosa pine/Douglas fir exhibiting two canopy levels and averaging 55% canopy closure" (p.3).

Response: Howie and Ritcey (1987) found that flammulated owls selected forest structure that was generally open with canopy closure ranging from 35-65 percent except in pockets of regenerating Douglas-fir. Goggans (1986) described flammulated owls using forest stands characterized by ponderosa pine/Douglas-fir with canopies less than 50 percent.

Old forests consisting of ponderosa pine and Douglas-fir seem to be a key component of flammulated owl territories (Reynolds and Linkhart 1992). Variability in structure of these old stands seems important to support life functions of flammulated owls (Wisdom et al. 2000). Treatments are designed to advance dependable or stable habitat (focusing on the development and persistence of large diameter ponderosa pine and Douglas-fir) through removal of dense understory vegetation (DEIS Appendix B, p. 24, FEIS Appendix B). Treatment prescriptions and conservation measures were developed to achieve desired habitat conditions including values for canopy cover and structural complexity. As discussed in the DEIS and FEIS, group selection harvest and preservation of small clumps of dense, small-diameter tress (preferably in the vicinity of large snags) will result in a patchy distribution of flammulated owl habitat components (nesting, roosting and foraging) with variable overstory canopy cover (DEIS Appendix B, p. 24; Chapter 2, p. 23 FEIS Chapter 2).

F.8-L Comment:

The DEIS does not analyze the existing condition of the proposed cutting units or the effect of the project on these habitat components or their distribution throughout existing flammulated owl habitat.

Response: Existing condition of, and project effects on, flammulated owl habitat are discussed in detail in the DEIS Appendix B pp. 15, 37-38 and FEIS Appendix B.

F.8-M Comment:

The FS does not have adequate forestwide population or population trend data on the flammulated owl or its habitat. Management activities could displace the owl from cutting units and portions of the project area.

Response: The District has in the past - and will continue to - survey suitable habitat near activity areas in the Myrtle Creek watershed for flammulated owl occupancy. However, these surveys merely document presence, rather than abundance. Attempting to estimate population numbers and trends would be prohibitively expensive in that it would require intensive surveys over large areas for a number of years. Instead, the IPNF uses habitat as a proxy for population data on featured species. The Ninth Circuit Court has held that quantitative population data is not required by 36 CFR 219.19, and clearly sanctions the use of habitat analysis for those species for which population data could not be obtained.

As discussed in the DEIS and FEIS Appendix B, it is possible that management activities could displace owls from portions of the project area (Appendix B, p. 38, FEIS Appendix B). However, the 76 acres of "suitable" habitat include only small areas where habitat conditions favor flammulated owl nesting, interspersed with larger areas of unsuitable habitat (due to high densities of smaller stems in the understory). Treatment would result in a temporary disturbance to resident animals that may

be present during implementation, and subsequent underburning may leave shrub and forb understory too depauperate to provide preferred foraging habitat in the short term. However, within two to five years the understory will have recovered sufficiently to provide habitat for the arthropod species flammulated owls rely upon for foraging.

F.8-N Comment:

Logging and other disturbance associated with the timber sales and other cumulative impacts could affect northern goshawk nesting, post-fledging family habitat, alternative nesting, foraging, competitors, prey and potential habitat, including areas away from cutting units.

Response: Since there are no known active goshawk territories in the project area, it is unlikely that project-related activities would disturb nesting goshawks. As discussed in the DEIS (Appendix B, p. 10, FEIS Appendix B), potentially suitable nesting habitat in or adjacent to proposed treatment units was surveyed for occupancy in 2004, 2005, or both; and a historic nest in lower Snow Creek (approximately ½ mile from harvest units) has been inactive since 1991. While the proposed action may reduce suitable nesting habitat by as many as 206 acres, eight contiguous suitable nesting stands greater than 35 acres in size would remain within the project area: exceeding the Reynolds et al. (1992) recommendation of at least three suitable nest areas per 5,000-6,000 acre home range (Appendix B, p. 27, FEIS Appendix B).

F.8-O Comment:

Greenwald et al., 2005 reviewed the current literature on goshawk habitat relationships applicable to the Northern Rockies. Nine of 12 studies demonstrated selection for stands with higher canopy closure, larger tree size, and greater numbers of large trees than found in random stands.

… based on apparent inconsistencies between subsequent research and Reynolds et al. (1992), we recommend adaptation of the management guidelines to incorporate results of numerous studies conducted since 1992.

Response: Greenwald et al. (2005) do not provide "new information" regarding Northern goshawk habitat relationships, but rather is a selective summary of existing studies already available. Dr. Richard Reynolds responded to Greenwald et al. (2005) in a paper titled *Habitat Conservation of the Northern Goshawk in the Southwestern United States: Response to Greenwald et al. 2005* (Reynolds et al. 2005). Dr. Reynolds discusses the contents of his response in the first paragraph of the paper as follows:

> In their review of the literature on northern goshawk….Greenwald et al. (2005) suggested that current management for the northern goshawk, as described in the *Management Recommendations for the Northern Goshawk in the Southwestern United States* (MRNG; Reynolds et al. 1992…)...are inadequate….Here we show that Greenwald's et al. (2005) conclusion derives from misunderstandings of the desired goshawk habitat conditions described in the MRNG; a poor understanding of the ecological factors limiting goshawk populations, a failure to understand goshawk forest habitat as dynamic ecosystems, incomplete reviews of the literature, and inclusion of studies with limited samples of goshawks.

Due to legitimate concerns over the incomplete and non-exhaustive review of literature by Greenwald et al. (2005), as well as their apparent misunderstandings of *Recommendations for the Northern Goshawk in the Southwestern United States* (MRNG; Reynolds et al. 1992), we will continue to base goshawk habitat management upon the recommendations contained in Reynolds et al. (1992).

F.8-P Comment:

The DEIS does not adequately consider cumulative effects on upland habitat for boreal toads. This does not make sense, since such small populations that are likely to persist are especially susceptible to fragmentation and extirpation due to isolation of smaller populations.

Response: The primary risk factor for toads is loss of breeding habitat. Breeding habitat is associated with standing water bodies (e.g. lakes, ponds) and slow-moving streams and backwater channels (Maxell, 2000). Stream channels within the Myrtle HFRA project area, especially those associated with activities, are generally high-gradient, narrow channels. Consequently, breeding habitat is severely limited. Therefore, the Myrtle HFRA project is not expected to have any meaningful impacts to the boreal toad. This explanation can be found in the Project File (*X_species.doc*). Due to the lack of direct or indirect effects, there would be no cumulative effects.

In addition, Maxell (2000) identifies risk factors associated with breeding habitat, of which none relate to upland habitat. If there were isolated pockets of potential breeding habitat, these sites would be protected through project design features (DEIS Ch. 2, p. 17; FEIS Chapter 2).

F.8-Q Comment:

The preference for large diameter of nesting trees for the pileated woodpecker is notably absent from the DEIS. McClelland and McClelland (1999) found such results in their study in northwest Montana, with the average nest tree being 73 cm. (almost 29") dbh. Effectively, the IPNF provides inadequate commitment to leaving specific numbers and sizes of largest trees favored by this MIS.

Response: The DEIS appropriately acknowledges that the pileated woodpecker has specific nesting requirements, specifically large trees…with nest cavities usually located more than 30 feet above the ground (DEIS Appendix B, p. 12; FEIS Appendix B). Issue indicators used to measure effects on the pileated woodpecker are changes in nesting habitat, including quality and abundance of large diameter trees and snags (DEIS Appendix B, p. 14; FEIS Appendix B). In addition, wildlife design features (DEIS Ch. 2, pp. 22-23; FEIS Chapter 2) direct that snag and defective tree retention practices focus on the largest diameter size class represented in the stand with specific numbers and sizes. In addition, harvest activities would focus on the retention of desired tree species such as ponderosa pine (DEIS Ch. 2, p. 8; FEIS Chapter 2).

F.8-R Comment:

In order to meet the requirements of the FS/USFWS Conservation Agreement for Canada lynx, the FS agreed to insure that all project activities are consistent with the Lynx Conservation Assessment and Strategty (LCAS), and that programmatic Standards of the LCAS are met. The DEIS does not adequately demonstrate consistency.

Response: Project affects to Canada lynx habitat components, and consistency with LCAS guidelines, are clearly disclosed in the DEIS Appendix B (pp. 23-24, 26; FEIS Appendix B). Project activities would not decrease suitable denning habitat below 10% of lynx habitat within either the Myrtle-Cascade or Snow Canada Lynx Analysis Units (LAUs), would not increase unsuitable habitat above 30% of lynx habitat in each LAU, and would not increase unsuitable habitat by more than 15% of lynx habitat in either LAU within a ten-year period.

F.8-S Comment:

The IPNF falls far short of analyzing and disclosing these cumulative effects on OG wildlife species' viability, caused by the current conditions and by the proposed timber sale.

Response: Since the IPNF currently complies with Forest Plan standards regarding old growth and this project would not result in a reduction of allocated old growth, there would be no loss of viability to old growth associated species. The impacts of the existing condition and proposed activities on old growth-associated species' viability is discussed in detail in Appendix B, pp. 10, 28-29 (Northern goshawk); 11, 30-31 (fisher/marten); and 12, 33-35 (pileated woodpecker). FEIS Appendix B.

F.8-T Comment:

The 40 miles of road reconstruction could lead to significant increases in motorized use, leading to unforeseen conflicts with wildlife. Additional OHV traffic also has the potential to lead to riparian degradation by increasing erosion and subsequent sedimentation of streams.

Response: The DEIS identifies "roadside and surface maintenance, etc." for approximately 40 miles of existing roads that will be used as haul routes. This number is in error: the actual total is about 29 miles for Alternative 2 and about 22 miles for Alternative 5 (see Chapter 2 description of alternatives). Less than 6.5 of these miles (Road 1309, Road 402A and Road 2226) are currently restricted roads that provide access to both public (USFS & Idaho Department of Lands [IDL]) and private (Forest Capital Partners, LLC. (FCP) lands. Administrative use of Road 1309 (within the Myrtle BMU) is regulated so that use limits defined in the 2004 Biological Opinion are not exceeded. The gate on Road 1309 is considered secure, and illegal OHV use of this road is rare or nonexistent. Roads 402A and 2226 are outside the Grizzly Bear Recovery Zone, but within the designated area of grizzly bear occupation (Pack River Occupied Area). The gate on Road 402A will be moved to allow unrestricted access to private property adjacent to the Snow Creek Road (Road 402) while maintaining habitat security on USFS and FCP properties further upslope. Similarly, use of Road 2226 is restricted to USFS and IDL administrative activities. The remaining haul routes (excluding stored road 402C) are currently open to the public; and, with the possible exception of Road 2190, receive relatively high levels of vehicular traffic throughout the snow-free season. Since it is a spur road that is already well used by hunters and berry pickers, it is unlikely that the improved surface on Road 2190 will result in significant traffic increases.

F.8-U Comment:

The DEIS relies on an outdated (2001) communication with IDFG biologist Wayne Wakkinen for the statement that "[l]ocal biologists consider the [Selkirk] population to be on the increase…" DEIS at B-8.

Response: More recent (2006) conversations with Mr. Wakkinen have indicated that he remains "cautiously optimistic" about the state of the Selkirk grizzly bear population. He bases this opinion on the same factors that led him to this conclusion in 2001 (reported bear sightings, number of sows with twins or triplets, and sightings in areas not previously known to be used by grizzly bears).

F.8-V Comment:

Two facts lead to the conclusion that the Selkirk population is likely in decline: First, researchers trapped and studied bears in areas "...believed to hold the highest densities of bears...." USFWS, 1999. Because those high densities would be associated with higher reproductive and/or survival rates than would pertain to the whole population, we should interpret the reported values as overestimations of population trend. Second, since the 1999 report, at least one collared female has been killed.

Response: The areas in question are mainly within the Blue-Grass BMU, which in 1999 contained of only 45% core habitat (currently it is at 51%). If you accept the statement that these areas held the highest densities of bears, and the idea that insufficient (<55%) core habitat results in higher direct and indirect mortality, it does not follow that these areas would have "higher reproductive and/or survival rates" than the population as a whole. As a result, we are not convinced that Wakkinen and Johnson (1999, 2001) overestimate the population trend.

F.8-W Comment:

The grizzly population estimate for the Selkirks is 46 bears. The loss of more than 25% of the population (12 bears) over 4 years is a strong indication that the population is in decline.

Response: While we don't dispute that the loss of 12 bears over four years significantly impacts the Selkirk grizzly population, your claim that this represents more than 25% of the population assumes that there has been zero reproduction in this time frame. This assumption is invalidated by the confirmed sightings of a grizzly sow with triplets in or near the project area in 2004 and again in 2006, and the fact that at least four of the mortalities you cite were yearling cubs.

F.8-X Comment:

Appendix B indicates that there have been confirmed sightings of grizzly bears in the Myrtle and Snow Creek drainages and in the Kootenai Wildlife Refuge at the base of Myrtle Creek. In 2004 there were sightings of a female grizzly with 3 cubs along the Myrtle Creek road, presumably within the Myrtle project area. Also Appendix B states that there has been "increased use of the lower Myrtle Creek drainage by grizzly bears in the vicinity of the 2003 burn area." DEIS at B-18.

Response: The actual quote from Appendix B is "…*apparent* increased use.." by grizzly bears in the vicinity of the burn. This may have overstated the case somewhat: a single sighting doesn't necessarily mean "increased use." However, the statement was meant to draw attention to the fact that, one year after the Myrtle Fire, a grizzly family was observed in a portion of the Myrtle Creek drainage where there had been no confirmed sightings in recent memory. The previously documented grizzly bear sightings in the USFS database from Myrtle and Snow Creeks were mostly from the higher elevations in these drainages (above Jim Creek in Myrtle or from the Roman Nose Lakes area in upper Snow). Similarly, sightings in the Kootenai National Wildlife Refuge (KNWR) have been infrequent in recent years. There is reason to believe that grizzly bears may make use of the lower portions of these drainages and the KNWR during the spring, similar to behavior exhibited by bears further north in the Recovery Zone (Smith and Boundary Creeks). However, there is a lack of documentation of this use pattern in the Myrtle BMU.

F.8-Y Comment:

The Forest Service fails to consider the full potential for harm to grizzly bears from the proposed helicopter logging in core. It is a scientifically established fact that even occasional or low levels of human activity can displace grizzlies from preferred or secure habitats, and that these displacements affect females the most, and that the avoidance of particular areas (in this case the core area affected by helicopter logging) can persist for several generations. USFWS 2002 at 24, 25.

Response: The potential effects of helicopter logging on grizzly bears in the Myrtle BMU are addressed in greater detail in the Final EIS Appendix B and Biological Assessment. The Biological Assessment conducted a risk/exposure analysis regarding helicopter logging that includes probability, duration, frequency, magnitude, intensity and timing.

Your comment reflects a misreading or misunderstanding of the Biological Opinion on the Moose Post Fire Project (USFWS 2002). The pages you cite never mention helicopter use, and only make a passing reference to potential effects of logging. To argue that helicopter logging can cause avoidance that "can persist for several generations" takes the discussion in the BiOp completely out of context. This section of the BiOp deals exclusively with effects of roads and other "long-term displacement"

(while the BiOp does not define "long-term", it is reasonable to assume from context that this refers to displacement from roads or activities that contribute to disturbance for "extended periods of time"). We are unaware of any scientific studies that have addressed the long-term (up to several generations) effects of repetitive helicopter use on grizzly bears. While we do not deny that helicopter use has the potential to have a disturbance effect on grizzly bears that may be present in the vicinity, we disagree that intermittent disturbance lasting a few years would necessarily displace future generations of bears.

F.8-Z Comment:

The DEIS states that "[s]ince no road construction is involved in these [core] areas, this activity will not result in core loss, but rather a short term impact to core habitat." DEIS at B-18. We disagree. The affected core will be avoided by bears during the activity and subsequently avoided for a long period of time. This constitutes a loss of core habitat. It would be utterly illogical and contrary to grizzly bear science to ignore the impacts of intensive helicopter use in habitat that has been designated as "secure" core for grizzlies.

Response: While grizzly bears would likely avoid the affected area during implementation (at least during daylight/working hours), we do not share the opinion that the area will subsequently be "avoided for a long period of time" (see previous response). Therefore, this is considered a temporary impact to, rather than a loss of, core. The impacts of helicopter logging were not ignored (DEIS Appendix B, p. 18-19, FEIS Appendix B). It is somewhat irrational to assume that a temporary (two years) disturbance with nearly zero risk of direct mortality (helicopter logging) would have the same impact on individuals or populations as permanent landscape features (roads) supporting long-term intermittent disturbance and a much higher risk of both direct and indirect mortality (collisions and poaching).

Motorized access (i.e. motorized roads and trails) is one of the most influential parameters affecting habitat security for grizzly bear. Core habitat is defined and mapped as those areas that fall outside the influence zones of roads and trails with motorized use. Motorized roads and trails were selected as the crucial components affecting core habitat because of their fixed, enduring nature. By managing motorized access on the landscape, human/bear interactions and potential for grizzly bear mortality can be reduced and habituation to humans minimized. While helicopter logging can displace bears to a less secure (more unsecured) environment, it is a temporary intrusion and does not necessarily carry with it the morality risk and habituation risk associated with permanent road features.

Therefore, it is reasonable to assume that point source disturbances, such as repeated helicopter use, can influence the utility of the affected area, but not trigger or cause a re-delineation of the original core habitat. Especially when the expectation is that grizzly bears would not be displaced into high risk environments and that the affected habitat would be fully reclaimed after a temporary intrusion.

F.8-AA Comment:

Although avoiding displacing bears that may be present during the critically important spring season is a positive step, the fact is that grizzlies are wide ranging and may use any habitat within their range during any and all seasons. There is no way to guarantee that grizzlies will not be displaced, e.g., harmed, by three consecutive years of helicopter logging during the grizzly summer and fall non-denning seasons. Low elevation spring habitat will be affected by the helicopter (and/or other ground-based logging disturbance) and as stated above, these areas will be likely avoided (rendered unusable for grizzly bear use) for a long period of time.

Response: The DEIS does not guarantee that grizzlies will not be displaced by helicopter logging. Timing restrictions are merely a means to reduce the likelihood of adverse effects to an acceptable level. Displacement does not necessarily equate to "harm." The USFWS Consultation Handbook defines "harm" as an act that actually kills or injures wildlife. Injury may include significant habitat modification or degradation that significantly impairs behavioral patterns such as feeding, breeding or sheltering. Given the availability of high quality, displacement habitat adjacent to treatment areas, it is possible that grizzly bears could be displaced by project activities yet not "harmed." As stated above, we do not believe that this displacement effect will linger for a "long period of time."

Because grizzly bears are wide-ranging, there is no absolute guarantee that grizzly bears will not occur in the area. However, grizzly bear movement is influenced mostly by the search for food. Consequently, they will demonstrate preferences for some areas (e.g. snow-free spring habitat, huckleberry shrubfields) over other areas (e.g. dense timber). Therefore, risks can be avoided or minimized by avoiding preferred habitats during seasons of expected use, conducting activities in areas with low habitat quality, conducting activities in are area with no records of observations, etc. If measures have been taken to minimize risk, then it is reasonable to conclude that the effects of displacement do not constitute significant effects.

F.8-BB Comment:

Appendix B acknowledges that helicopter logging "is generally considered to be more impactive on wildlife than ground-based systems." DEIS at B-19. Helicopter flight lines "will generally be over already disturbed areas – either from the Mama

Cascade timber sale or openings from the Myrtle Fire." Id. As pointed out above, Appendix B states that there has been "increased use of the lower Myrtle Creek drainage by grizzly bears in the vicinity of the 2003 burn area." DEIS at B-18. Grizzly bears are known to be attracted to areas that have burned because of the post-fire forage that is high quality. Thus grizzlies will likely be attracted to the Myrtle Fire area and are likely to be displaced from that preferred habitat by the disturbance from helicopters flying overhead.

Response: Grizzly bears are attracted to recent burns because of the flush of succulent vegetation (grasses and forbs) that grows in the first few years following a fire. Within about five years post-burn, woody plants (shrubs and eventually conifers) become established and begin to take over the site. In higher, cooler, more mesic sites (such as those impacted by the Sundance and Trapper Peak burns), these shrubs consist of huckleberries, salmonberry and other preferred forage species. However, on warmer, drier habitat types (such as the low elevation areas impacted by the Myrtle fire), this phase of succession includes oceanspray, ninebark, snowberry and other shrubs less palatable to bears. While recent burns (and other openings during spring "green-up") are almost universally attractive to foraging bears due to the high content of herbaceous species present, areas not capable of supporting huckleberries quickly lose their appeal as unpalatable woody species take over (or, seasonally, as grasses and forbs dry up). Since the burn and adjacent Mama Cascade units are lacking in overstory cover, and will become less attractive foraging areas as succession advances, the probability of project activities disturbing bears in this area will diminish in subsequent years.

F.8-CC Comment:

Furthermore, Appendix B indicates that the open road density (OMRD) in the Myrtle BMU will increase as a result of the project and that 1,316 acres of core in the Myrtle BMU could be affected by disturbance from ground based and helicopter yarding. Id. While the OMRD will not exceed the 33 percent maximum OMRD standard as a result, the Forest Service must still take into consideration that utilization of previously restricted roads has the potential to displace bears from habitat that they may be using because it has been free from human disturbance and that this displacement carries the same risks and potential for harm as displacement from preferred habitat due to the helicopter logging. They will also be displaced from any additional acres of core that are impacted by ground-based logging. These factors need to be considered in the BA.

Response: The potential effects of the use of restricted road segments on grizzly bears are discussed in Appendix B of the DEIS, pp. 18-19; FEIS Appendix B. Restricted roads in BMUs (including Road 1309) often receive a low level of administrative use during most years (these roads do not influence OMRD calculations unless the allowable number of administrative use trips is exceeded during one or more seasons of the active bear year) – that is why they are factored into TMRD calculations. As a result, they are not completely "free from human disturbance." Similar to restricted roads in BMUs, restricted roads in the recurring use area (PROA) also receive a low level of administrative use or maintenance. As discussed in the DEIS (Appendix B, p. 19; FEIS Appendix B), traffic on these roads would be limited to the purchaser and administrative personnel, and subsequently would not elevate open road densities – as provided for in the 2004 Biological Opinion (USFWS 2004, p. 138).

Ground-based logging units either are outside core habitat or are within the ½ mile buffer of adjacent helicopter logging units (i.e. – the impact to core is already factored in). The effects of logging in ground-based units is also discussed in the DEIS (Appendix B, p. 18).

The USFWS determined that implementation of Terms and Conditions of the 2004 BO would not jeopardize the continued existence of the grizzly bear, and that incidental take of grizzly bears was unlikely to occur in BMUs meeting these recommendations. Therefore, utilization of previously restricted roads as haul routes will not adversely affect grizzly bears as long as 33% OMRD is not exceeded.

F.8-DD Comment:

Statistics and findings related to human-caused fires and EHE [Elk Habitat Effectiveness] need to be addressed and analyzed.

Response: Rocky Mountain elk is not a MIS on the North Zone of the IPNF, therefore it is not necessary to evaluate elk habitat effectiveness for this project. However, values calculated for Elk Habitat Effectiveness (EHE) are mainly driven by the presence of drivable roads. Within Grizzly Bear Management Units (BMUs), Terms and Conditions of the 2004 BO ensure that road densities will remain low enough to provide for big game habitat security. On the portion of the project area that corresponds with the designated grizzly bear recurring use area (PROA), the density of drivable roads on USFS-managed land is less than one mile/mile^2 (11.4 road miles in an approximately 12.5 square mile area). In addition, big game security is not an issue in the majority of the project area because the entire Myrtle Creek watershed is a game preserve where hunting is not allowed.

F.9 - Miscellaneous

F.9-A Comment:

The DEIS contained a number of confusing items. After a thorough review, we placed calls to district staff to clarify some of these points (June 26, 2006). It became apparent that certain activities authorized in the Myrtle-Cascade Project would be re-authorized in the Myrtle Creek HFRA Record of Decision (ROD). This was unclear from the DEIS. Further, the location of proposed road reconstruction activities is unclear in the DEIS and apparently even unclear to district staff. According to district staff, the only road reconstruction they were aware of was on Snow Creek (Rd. 402) and Myrtle Creek (Rd. 633) Roads. This does not appear to be the case from the 40 miles of road reconstruction proposed in the DEIS.

Response: The Myrtle Creek HFRA is not re-authorizing any decisions made with the Myrtle-Cascade Project of 2001. The Myrtle Creek HFRA EIS is providing the means (through NEPA) to analyze two road segments (Roads 402-C and 1309-UA) not studied in Myrtle-Cascade EIS. They are both recommended for decommissioning (DEIS 2-11; FEIS Chapter 2).

As explained above in responses to Aquatics comment F.2-L; the DEIS' statement of 40 miles of road reconditioning was an error, which has been corrected in the FEIS. As described in Chapter 2, Alternative 2 includes approximately 29 miles of reconditioning of roads that would be used as haul routes, and Alternative 5 includes approximately 22 miles. The locations of the road work are shown in the Map Appendix of the FEIS.

F.9-B Comment:

In the discussion of activities proposed in Inventoried Roadless Areas, impacts to roadless values were relegated to the appendix, with minimal discussion in the DEIS itself. Given the controversial nature of logging in the roadless areas, the discussion should be fully included and roadless activities clearly disclosed in the body of the report.

Response: The discussion of Inventoried Roadless Areas has been included in the main body of the FEIS; see FEIS Chapter2 2, 3, and 4.

F.9-C Comment:

There are additional areas in the DEIS that should be clarified. On page 2-7 and A-21, slash treatments of YT are proposed, with no definition of methods. Page 2-7 lists 2 units to receive such treatment, whereas A-21 lists only one unit where YT is applicable. Regeneration logging (page 2-8) deserves specific descriptions for the irregular shelterwood and seed tree prescriptions. On page 2-28, Group Selection is listed as a partial cut prescription, rather than a regeneration prescription. Group selection should be listed as a regeneration logging method. An index would be helpful, both in assisting the clear organization of information, as well as allowing readers to find specific sections of the DEIS.

Response: YT is the acronym for "yard tops," a treatment used for the purpose of fuels reduction. The FEIS clarifies where this practice would be used, the rationale and predicted effects (FEIS Chapters 2, 3 and 4).

In the FEIS, the description of regeneration treatments (irregular shelterwood and seed tree with reserves) has been expanded and includes the criteria and objectives for use of these treatments (FEIS Chapter 2, Silvicultural Treatments). The Vegetation Summary table shows group selection / commercial thinning as a regeneration prescription (FEIS Table 2.11).

The FEIS organization is described prior to the Table of Contents. The Table of Contents includes a detailed listing of the specific sections of the EIS and was designed to function similar to an index to aid readers in finding information.

F.9-D Comment:

The Idaho Dept. of Parks and Recreation is concerned how this project could temporarily disrupt the snowmobile trail opportunity.

Response: The timber sale contract would contain safety measures for winter recreation (see Required Design Criteria and Mitigation Measures in Chapter 2 FEIS Chapter 2. For example, no log hauling would be permitted on weekends and holidays to avoid conflicts with other uses including snowmobile traffic.