Environmental Assessment

Prospect Hill Mineral Exploration/Access 2008

Libby Ranger District
Kootenai National Forest
Libby, Montana

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Kootenai National Forest
July 2008

Prospect Hill Mineral Exploration/Access

Environmental Assessment

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Reader Obligation

Reviewers should provide the Forest Service with comments during the review period for the environmental assessment (EA). This will enable the Forest Service to analyze and respond to the comments at one time to use the information to make an informed decision, thus avoiding undue delay in the decision-making process. Reviewers have the obligation to structure their participation in the National Environmental Policy Act so that it is meaningful and alerts the agency to the reviewers' position and concern.

Comments on the EA should be specific and should address the adequacy of the assessment or the merits of the alternatives discussed or both (40 CFR 1503.3). Comment should also be directed at identifying specific environmental concerns that cold result in significant effects from this project. Comments received in response to this solicitation, including the names of the respondents, are a part of the public record and will be available for public inspection. Comments submitted anonymously will be accepted and considered. However, persons who submit anonymous comment may not have legal standing to appeal the subsequent decision under 36 CFR 215.

Comments on the EA should be sent to Malcolm Edwards, District Ranger, Libby ranger District, 12557 Highway 37, Libby, Montana, 59923 by August 28, 2008 to be most helpful.

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Prospect Hill Mineral Exploration/Access Project EA

Chapter 1

Purpose and Need for Action

INTRODUCTION

This chapter identifies the project area, the proposed action, the purpose and need for the action, the relationship to the Forest Plan, the scope of the analysis and the decision to be made. All referenced maps are located at the end of this document.

PROJECT AREA DESCRIPTION

A 20 acre parcel of privately owned land is located in T30N, R31W, Section 29, Principal Montana Meridian, Lincoln County, Montana. This rectangular parcel is a patented mining claim associated with the Herbert Mine (active in the 1930s) and is surrounded by National Forest System (NFS) land. Three sides of the parcel border on NFS land designated Management Area (MA) 13 (Designated Old Growth Timber). The north boundary of the property borders MA16 (Timber with Viewing). The private parcel falls almost entirely within grizzly bear habitat, Bear Management Unit (BMU) 2. Two of the portals are located on unpatented mining claims on NFS lands near the southwest corner of the private property. Neither adit is currently accessible due to backfill and sloughage obstructing the portals.

The area is currently accessed by an NFS Road 5252 across NFS lands on the north side of Prospect Creek. This road, constructed to access the Herbert Mine, originates on private land along the Granite Lake Road #618. NFS Road 5252 turns and crosses Prospect Creek approximately 0.1 mile south of, and approximately 240 feet in elevation below the southwest property corner and portal location. Exploration drill roads, constructed in the early 1990s, exist on the private property. Exploration drill roads constructed on NFS lands during the late 1980s and early 1990s were all reclaimed by 1998. The property corners have been located, surveyed and marked by brass caps. Property lines have not been surveyed.

PURPOSE AND NEED

1) Mineral Exploration: The purpose of this project is to process the proposed Plan of Operation (POO) for mineral exploration and to follow all applicable laws, regulation and policies pertaining to the proposed action on NFS land. The role of the Forest Service (FS), under the primary authorities in the Organic Administration Act, Locatable Regulations 36 CFR 228 Subpart A, and the Multiple Use Mining Act, is to ensure that mineral activities minimize adverse environmental effects on NFS lands and comply with all applicable environmental laws. Encouraging mineral activities under appropriate laws and regulations and responsible development of mineral resources, in a manner that recognizes national and local needs for economically and environmentally sound exploration, extraction and reclamation, are goals and objectives of the Kootenai National Forest Plan (Forest Plan, pg. II-2). The FS has a need to:

- Respond to the proposed Plan of Operation t
- o explore for silver and gold.
- Ensure the selected alternative would comply with other applicable federal and state laws and regulations.
- Ensure the selected alternative, where feasible, would minimize adverse environmental impacts on NFS lands.
- Ensure measures would be included, where practicable, that provide for reclamation of the surface disturbance.

Access to the portal area, initially Portal #2 (see map), would require construction of approximately 0.4 miles of new road (Segment 1) to tie between the Granite Lake Road (#618) and existing NFS Road 5252. NFS Road 5252 would require Best Management Practices (BMPs) (minor reconstruction) to approximately 0.7 miles of the existing road. A new road (Segment 3) of approximately 0.2 miles would be constructed off NFS Road 5252 leading to the mine portals. These activities would be authorized through an approved POO. Road access for mineral exploration can be authorized, provided that it is the next logical step

for the development of the mineral resource, and that activities comply with other applicable statutory restrictions such as the Threatened and Endangered Species Act. The purpose and need for this project is consistent with Forest Plan direction for locatable minerals (Forest Plan Objectives, p. II-8).

2) Access to Private Land: The purpose for this project is also to grant reasonable access to the owner of the Prospect Hill property (who is also the proponent of the minerals exploration). This proposal would allow year-round vehicular access across NFS land. To accomplish this access, approximately 0.2 miles of new road construction (Segment #4) would be needed to connect the private parcel to Segment #3 (see map). The Alaska National Interest Lands Conservation Act (ANILCA, P.L. 96-487; 16 U.S.C. 3210) directs the FS to authorize reasonable access to private in-holdings in accordance with provisions of other laws. This project implements the forest wide management objective to grant right-of-ways as necessary on those management areas where such grants do not conflict with the Forest Plan, or when other statutory rights prevail (Kootenai Forest Plan Objectives, p. II-9).

PROPOSED ACTION

To meet the purpose and need for this project, the Proposed Action would implement the following activities:

- Authorize the property owner, through an approved POO, to use mechanized equipment to open and conduct sampling of two adits on his mining claims on the site of the Herbert Mine.
- The property owner would construct, as designated by the FS, two segments of road, totaling approximately 0.6 miles of new construction on NFS land, to access the mine portals.
- The property owner would construct, as designated by the FS, one additional segment of road, approximately .02 miles of new construction on NFS land, to access the western side of the private property.
- BMPs would be applied to the existing NFS Road 5252 for approximately 0.7 miles.
- Approximately 12 large diameter trees would be harvested during the construction of segments 3 and 4 (see map) of the new road in old growth forest.

Additional activities proposed as mitigation for this project include:

- Intermittent stored service of approximately 1.8 miles of road to benefit wildlife, watershed and fisheries resources.
- Designation of an additional 40 acres of effective old growth to mitigate loss of undisturbed habitat for old-growth dependent species.
- Timing regulation on road construction would be in place to reduce bear displacement.

RELATIONSHIP TO THE FOREST PLAN

National forest planning takes place at several levels, including: national, regional, forest, landscape, watershed and project levels. The Prospect Hill Mineral Exploration/Access EA is a project-level analysis; its scope is confined to addressing the major issues and possible environmental consequences of the project. It does not attempt to address decisions made at higher levels, i.e. Forest Plan. It does, however, implement direction provided at those higher levels.

The Forest Plan embodies the provisions of the National Forest Management Act, its implementing regulations, and other guiding documents. The Forest Plan sets forth in detail the direction for managing the land and resources of the Kootenai National Forest (KNF). Where appropriate, the Prospect Hill Mineral Exploration/Access EA tiers to the Forest Plan FEIS, as encouraged by 40 CFR 1502.20.

The Forest Plan uses management areas (MAs) to guide management of National Forest System lands within the KNF. Each MA provides for a unique combination of activities, practices and uses. The Prospect Hill Mineral Exploration/Access project area includes MA 13 and is bordered on the north side

by MA 16. Goals, objectives and desired conditions of each are included or summarized in Table 1.0. Chapter III of the Forest Plan contains a detailed description of each management area.

Table 1.0 - Forest Plan Management Area (MA) Description

MA	DESCRIPTION
13	**Designated Old Growth Timber (Unsuitable Timberland):** This MA consists of parcels of existing old growth or mature timber stands which contain components of old growth. The goal of this MA is to provide the special habitat necessary for old-growth dependent wildlife (usually other than big game) on a minimum of 10% of each major drainage on the Forest, and in units that represent the major habitat types and tree species of each drainage.
16	**Timber with Viewing (Suitable Timberland):** This MA is located throughout the Forest at elevations ranging from 2,800' to 5,000'. It is characterized by productive forest land that has moderate viewing sensitivity. This MA is usually in midground or background as viewed from major travel corridors or the foreground to midground of well traveled, but secondary travel corridors. Most wildlife species occur in this MA, but it is not critical to their existence, or population goals. There is no identified habitat for threatened or endangered species.

DECISIONS TO BE MADE:

1. Whether to approve the proposed Plan of Operations to explore the two adits as proposed.
2. What, if any, mitigation measures would be necessary to approve the proposed Plan of Operations?
3. Whether to issue a Special Use Permit for the construction and motorized use across NFS lands to access private land.

Prospect Hill Mineral Exploration/Access Project EA

Chapter 2

ALTERNATIVES

INTRODUCTION

This chapter describes and compares the alternatives considered for the Prospect Hill Mineral Exploration and Access Project. It describes the alternative development process, including how public comment helped formulate the alternatives; the alternatives considered but eliminated from detailed study and the alternatives considered in detail.

ALTERNATIVE DEVELOPMENT PROCESS

Public Involvement

The proposal has been listed in the Schedule of Proposed Actions since January, 2005. The Libby Ranger District conducted public scoping on the Prospect Hill proposal. A legal advertisement was published in the Daily Inter Lake and a display ad in The Western News on July 27, 2005. A letter, requesting comments on the project, was mailed to individuals known to be interested in the project. Four comments were received. Using the comments from the public, the interdisciplinary team (IDT) developed a list of issues to address.

Issues

The Forest Service (FS) separated the issues into two groups: Key (significant) and non-significant issues. Key issues are used to formulate alternatives, prescribe mitigation measures or analyze environmental effects. Issues are "key" because of the extent of their geographic distribution, the duration of their effects or the intensity of interest or resource conflict. Non-significant issues were identified as those:

1) Outside the scope of the proposed action;
2) Already decided by law, regulation, Forest Plan, or other higher level decision;
3) Irrelevant to the decision to be made;
4) Conjectural and not supported by scientific or factual evidence.

The Council on Environmental Quality (CEQ) National Environmental Policy Act regulations requires this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…" A list of non-significant issues and reasons regarding their categorization as non-significant may be found in the Response to Comments folder in the project record.

As for significant issues, the FS identified four specific issues raised during scoping.

1. **Wildlife -** The private property is located in grizzly bear habitat. Road construction would occur in Bear Management Unit 2 (BMU 2). Mineral exploration and access would cumulatively impact threatened grizzly bear.
2. **Access Management -** The proposed access changes would reduce the amount of roads open to the public in BMU 2.
3. **Recreation –** Using an earthen barrier for permanent closure of currently open roads, which are accessible only across private land (NFS Road 5053 and 5252), would exclude use by snowmobiles. Construction of closure and/or decommissioning should be such that it allows access for horses, foot traffic and snowmobile as well as wildlife to achieve multiple-use.
4. **Watershed and Soils** - Environmental effects of road construction such as surface water run-off may cause impacts to adjacent property down-slope of road construction. Groundwater, should it be encountered in the adits, may need water quality analysis and treatment before discharge.

The district resource specialists identified the following design features and mitigation to address the project issues.

Wildlife - Design features of the proposed action have been applied to protect wildlife with particular emphasis on the threatened grizzly bear. Requirements of the Plan of Operations and Special Use Permit include voluntary compliance with proper storage of human food, garbage, livestock feed and other attractants on National Forest Service (NFS) land within grizzly bear habitat as specified in the

Draft Kootenai National Forest Special Order (Special Order, KNF 2001; Occupancy and Use Restrictions and Food Storage for the Cabinet/Yaak Ecosystem). Enforcement of this Special Order on private lands is under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS). The permit is contingent upon adherence to the USFWS' authority.

The road access mitigation measures, described in Table 2.1**,** offset the road construction in BMU 2.

Access Management – NFS Road 4791V (1.2 miles) is currently restricted seasonally to motor vehicles from December 1 to June 30, including snow vehicles. This road would be restricted yearlong to all motorized vehicles. Both NFS Road 5053 (grown-in) and NFS Road 5252 are currently open-yearlong but are not accessible to the general public because access is across private land. An earthen barrier would be placed at the property line in section 33 and another at the end of NFS Road 5053 where it junctions with NFS Road 5252. A small stretch of NFS Road 5252 would also have an earthen barrier installed at the property line in section 33 and at the junction of where the newly constructed portion of NFS Road 5252 meets with the existing NFS Road 5252. Access changes would not take place until the new road construction begins. Refer tot the project map in this document for more information.

Recreation - Design of road closure/storage would include leaving a trail for hiking and horse passage. The purpose of year-round closure to motorized vehicles including snowmobiles is protection of grizzly bear and big game habitat. Recreational use of the open roads would continue unchanged until access road construction begins.

Watershed and Soils – The landowner would be required to meet minimum standards for construction of new roads. Roads would meet Best Management Practices (BMPs) and Inland Native Fish Strategy (INFS) standards. The Approved Plan of Operations would include stipulations on management of water which may be encountered in underground workings. These stipulations will insure compliance with the Clean Water Act.

RANGE OF ALTERNATIVES

Section 102(2)(e) of the National Environmental Policy Act (NEPA) states that all federal agencies shall "study, develop and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources."

The range of alternatives may extend beyond the limits set by the Forest Plan goals and objectives under the NEPA; however, the National Forest Management Act (NFMA) requires that the selected alternative fully comply with the Forest Plan unless the plan is amended.

The range of alternatives presented in this chapter was determined by evaluating public and internal comments and the purpose and need for the project. This project is intended to authorize the claim owner to open and explore two adits, the portals of which are on NFS land, adjacent to his private property. Temporary access to the portals would be part of the Approved Plan of Operations. This project is also intended to provide reasonable access to the owner of the 20 acre parcel of private property on Prospect Hill. Other influences included Forest Plan goals, objectives, desired condition, and standards and guidelines; federal laws, regulations and policies. Within these parameters, the alternatives developed by the IDT and decision maker display a reasonable range of access options, management requirements, mitigation measures and effects on resources. In addition to the alternatives considered in detail, the IDT and decision maker examined other alternatives during the analysis process. Although these alternatives contributed to the reasonable range, they were eliminated from further consideration for the reasons listed below.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

1. **Route from Flower Creek Ridge Road (#4729) in Flower Creek Drainage** consists of access via NFS Road 4729 and exploration drill roads constructed in the early 1990s. The

drill roads were considered completely reclaimed in 1998. This alternative would have allowed the permittee to reconstruct the exploration drill roads and use them for year-round vehicular access to the north end of his property. The route does not access the portal area adjacent to the south end of the property. This route was not chosen due to its impacts on the South Flower Cross Country Ski Area. Snow removal activities would negatively affect the general publics' ability to use the cross country ski area. Road construction and reconstruction would also involve impacts to the Flower Creek municipal watershed.

2. **Grant Access As Proposed In Prospect Creek Drainage without Mitigating the Impacts to Grizzly Bear Habitat and Water Quality.** This alternative was developed to address public concern that access changes would limit recreation opportunities and opportunities to gather firewood. Access changes are a necessary management tool to maintain standards for open road densities in BMU 2 and in core grizzly bear habitat. Road closures offset new construction in these areas and are designed to mitigate impacts to grizzly bear. A specific concern related to public access was a desire to maintain access for hiking, horses, hunting and other non-motorized uses on roads in the Prospect Creek drainage. Design of road closures to allow non-motorized access addresses this need. Another specific concern was maintaining snowmobile access on roads in the Prospect Creek drainage. Snowmobile use on NFS Roads 5053 and 5252 in the Prospect Creek drainage is available only to adjacent land owners. The purpose of year-round closure to motorized vehicles including snowmobiles is protection of grizzly bear and big game habitat. Keeping roads in the Prospect Creek drainage open to motorized travel including snowmobiles was therefore eliminated from further study.

3. **Grant Access on Proposed Route in Prospect Creek Drainage to Portal Area Adjacent to the South End of the Private Property Only.** Access to the remainder of the private land would be accomplished through new construction and through reconstruction of exploration drill roads within the boundaries of the private land. Due to the steepness of the terrain on the private land above the portal location, new road construction would negatively affect adjacent NFS lands. Access solely to the south boundary of the private land does not provide reasonable use and enjoyment of the private property as requested, and was therefore eliminated from further study.

ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE 1 (No-Action)

Alternative 1 is the no-action alternative. NEPA requires that an EA include a "no-action" alternative to serve as a baseline to compare action alternatives. This alternative provides a baseline for comparison of environmental consequences of the other alternatives to the existing condition (36 CFR 1502.14) and is a management option that could be selected by the Responsible Official. This alternative would **not** authorize motorized access, road construction and mineral exploration of two adits on NFS lands by issuing an approved Plan of Operations to the proponent. This alternative would not allow motorized access to the private parcel. It would allow only continued non-motorized access to the private in-holding and to portal locations on mining claims on NFS lands. Non-motorized access would occur across NFS lands via the existing open Road #5252. A Private Road Special Use Permit would not be granted. The existing transportation network would remain unchanged.

ALTERNATIVE 2 (Proposed Action)

An Approved Plan of Operations (POO) would be issued to the proponent/operator to open and explore two adits on his mining claims on NFS lands. The POO would be in effect for 5 years, to permit exploration sampling. A Private Road Special Use Permit (SUP) would authorize the construction of additional road from the portal area to provide motorized access to the west boundary of the private property. This SUP would be issued for 10 year timeframe. Authorization of a SUP and an approved POO would require necessary state and other pertinent permits to be in place.

The POO would authorize the use of heavy equipment to open and explore the mine portals of the Herbert

mine. The portals are on NFS land. It would authorize the private landowner to clear vegetation around

the portals and waste piles and to expand the existing waste piles by piling additional material from the portals. Any topsoil disturbed would be piled separately for use in reclamation. The expanded waste pile area is located adjacent to Portal #1 and Portal #2 and would affect approximately 1 acre of land. The areas would be cleared of vegetation and leveled to be used for waste rock storage, and for equipment and supplies storage. All waste rock will be contoured at the close of the project to conform to existing topography. Piles would maintain a 2:1 minimum slope. Existing flat waste rock areas adjacent to both Portal #1 and Portal #2 may be used. All material will be required to be piled in a stable configuration. As proposed, Portal #2 will be stabilized using a steel cylinder which will be secured with a locking steel door. As a part of the project reclamation, this steel door will be replaced at the close of the project with bat grates as approved by the FS. Hinged grates, to allow underground access, may be used should continued access be necessary. Material around Portal #1, the lower portal, will be backfilled into and around portal. The Approved POO would be issued for a 5 year timeframe. Activity timing restrictions for grizzly bear would apply as noted in the design features (pg 5).

To access the portals, approximately 0.6 miles of road would be constructed (map - Segments 1 and 3) connecting with the existing NFS Road 5252 (Segment 2). Starting from the Granite Lake Road (618), approximately 0.4 miles (Segment 1) of new construction would be permitted, connecting to the existing NFS Road 5252. A spur road would switchback on NFS land to the portal near the southwest corner of the private land (Section 3) off the upper part of NFS Road 5252. A FS gate would be erected near Granite Lakes Road to restrict public access. A map depicting these road segments is located in the map section of this document.

Alternative 2 permits the private property owner to use NFS Road 5252 and to construct approximately 0.2 miles (Segment 4) of additional road to access the west boundary of the private land (see map). The new road construction equates to approximately 4 acres of land. This permit would be issued subject to the approval of construction design, issuance of necessary environmental permits, and incorporation of design criteria as described under "Construction Stipulations for SUP" (Project File).

Table 2.0 displays the road management activities that are proposed with this project. The proposal is to put the roads into intermittent stored service by removing the gates and constructing earthen barriers as a closure. The roads would be ripped and seeded. Culverts would be removed from NFS Road 5053 and a foot trail would be constructed on the uphill side.

Table 2.0 – Road Management Activities

ROAD #	MILES	EXITING STATUS	PROPOSED ACTITIVY – PROPOSED STATUS
4791V	1.2	Restricted seasonally to motor vehicles from 12/1 to 6/30, including snow vehicles.	Intermittent Stored Service - Restricted yearlong including snow vehicles.
5053	0.5	Open-yearlong but not accessible to the general public except across private land	Intermittent Stored Service - Restricted yearlong including snow vehicles.
5252	0.7	Open-yearlong but not accessible to the general public except across private land	BMPs - Restricted yearlong including snow vehicles except by Permittee and FS
5252*	0.1	Open-yearlong but not accessible to the general public except across private land	Intermittent Stored Service - Restricted yearlong including snow vehicles.
TOTAL	**2.5**		

*** This section of road starts at the north property line of section 33 and extends to where the new construction of Segment 1 intersects with Rd 5252**

DESIGN FEATURES AND PROJECT MITIGATION

Minerals

The operator would be required to adhere to all operating plan requirements, including a reclamation bond, which is part of the Approved Plan of Operations Addendum (POOA). These requirements address the following:

- **Groundwater Management -** Montana DEQ regulations for management and testing of groundwater, should it be encountered, will be followed. Depending on water volumes

encountered, the FS and DEQ may require the operator to submit a detailed water management plan for approval within 30 days of encountering groundwater.

- **Pollution –** Operators shall at all times comply with applicable local, state and federal requirements for pollution abatement. Failure of operator to comply may result in termination or suspension of authorization.
- **Fire Regulations –** Montana state forest fire rules and regulations would be followed; forest activity restrictions and closures would apply.
- **Archaeological Discoveries –** If previously undiscovered cultural resources are exposed as a result of operations under an approved plan, the operator shall leave such discoveries intact and immediately notify the District Ranger. The operator shall not proceed until he is notified by the District Ranger that he has complied with the provision for mitigating unforeseen impacts as required by 36 CFR 228.4 (e).
- **Risk and Hazards –** High winds, falling limbs or trees, and other hazards are natural phenomena in the forest that present risks which the operator assumes. The operator has the responsibility of inspecting his site, lot, right-of-way and immediate adjoining area for dangerous trees, hanging limbs and other evidence of hazardous conditions and, after securing authorization from the FS, removing such hazards.
- **Area Maintenance/Garbage –** Kootenai National Forest food storage guidelines would be followed. The proper storage of human food, garbage, and other attractants on land within grizzly bear habitat as specified in the Draft Kootenai National Forest Special Order (Special Order, KNF 2001; Occupancy and Use Restrictions and Food Storage for the Cabinet/Yaak Ecosystem). The FS recognizes that compliance on private land is voluntary (Appendix 9).
- **Noxious Weeds –** The operator will be responsible for eradicating any new invader weed species within his project area. All off-road equipment such as excavators and backhoes will be power washed and inspected by the FS prior to being moved on to NFS lands. Any weeds spraying on NFS land would require a licensed sprayer.
- **Noise and Dust -** Mufflers will be required on all equipment. Operator will provide dust abatement on access roads and in work area as determined necessary by FS Authorized Officer during the timeframe of the POO.

Road Access

- Road use by vehicle would be restricted to the permittee and the FS.
- Table 2.1 displays the road management activities that are required (mitigation) with this project. The road management activity miles total approximately 1.8 miles.

Table 2.1 – Road Access Changes

ROAD #	MILES	EXITING STATUS	PROPOSED ACTITIVY – PROPOSED STATUS
4791V	1.2	Restricted seasonally to motor vehicles from 12/1 to 6/30, including snow vehicles.	Intermittent Stored Service - Restricted yearlong including snow vehicles.
5053	0.5	Open-yearlong but not accessible to the general public except across private land	Intermittent Stored Service - Restricted yearlong including snow vehicles.
5252*	0.1	Open-yearlong but not accessible to the general public except across private land	Intermittent Stored Service - Restricted yearlong including snow vehicles.
TOTAL	**1.8**		

*** This section of road starts at the north property line of section 33 and extends to where the new construction of Segment 1 intersects with Rd 5252**

Wildlife

- Road construction and access would not occur during April 1st - June 15th, for protection of spring grizzly bear habitat.
- The adjacent old growth stand would be monitored for pileated woodpecker and flammulated owl nesting during the months of April and May, previous to project implementation. If monitoring reveals nesting activity within 300 feet of the proposed construction route, road construction would be further suspended until after July 15th.
- After completion of the mineral exploration portion of the project, if conditions are favorable, a bat gate would be used to close the entrance of the adit. The gate would exclude the public for

safety reasons, but allow bats to utilize the mine.

Old Growth

- Wood cutting would not be allowed behind the gate by the permittee or the general public.
- Signs identifying OG areas would be placed along the newly constructed section of NFS Road 5252. These signs would say **- "Old Growth Forest managed for its unique natural value. Do not cut or remove wood from behind this sign".**
- The designation of approximately 40 acres of additional OG within the Treasure PSU would mitigate loss of undisturbed habitat for old-growth dependent species.

Weeds

- The permittee would make sure that the herbicide applicator is licensed.
- The permittee would be required to treat existing noxious weeds on and along NFS Road 5252 the first operational season for weed spraying (spring or early summer) prior to starting road construction.
- The permittee would be required to annually treat noxious weeds on and along Road 5252, including the newly constructed segments, as well as on the waste rock piles associated with the two portals on NFS land.
- FS would treat existing noxious weeds on roads to be stored prior to that activity. If possible, schedule spraying two or more seasons before activities are expected to occur to reduce the amount of viable weed seed stored in the soil.
- The permittee would pressure or steam-wash all equipment prior to moving on the sites, removing all soil and plant parts that may contain weed seed, to prevent weed spread and introduction.
- The permittee would seed and fertilize roads, cut and fill slopes with certified weed-free seed.
- The permittee would utilize certified weed-free straw for any mulching or sediment control work.
- Gravel brought in for road surfacing must be from an FS approved source, free from new invader weed species.
- The permittee would minimize mineral soil disturbance or exposure during all mechanized ground based activities, to reduce the seed bed for noxious weeds, and minimize impacts to soil productivity.
- The permittee would monitor and treat, if necessary, all roads post-construction.
- The permittee would implement FS manual (FSM) 2080 Noxious Weed Management Prevention and Control Measures (Appendix 10).
- All herbicides used in the project area would be applied according to the labeled rates and recommendations to ensure the protection of surface water, ecological integrity and public health and safety. Herbicide selection would be based on target species on the site, site factors (such as soil types, distance to water, etc), and with the objective to minimize impacts to non-target species. Fs would designate appropriate herbicide to be used in accordance with the 2007 KNF Invasive Plant ROD.

Botany

- The finding of any additional sensitive plant populations would result in additional mitigation needs dependent on the species found. A requirement similar to timber sale contract provision R1-C6.251#, Protection of Habitat of Endangered Species, would be used in the Plan of Operation to modify the action as necessary to protect PTES plant populations in the event that they are missed by field surveys and found after Plan of Operations is approved.

Soil and Water

- The permittee would implement the Best Management Practices (BMPs) listed in Appendix 2 over the 0.7 mile of existing road.

COMPARISON OF ALTERNATIVE FEATURES

Table 2.2 displays a tabular comparison of the alternative features considered in detail and the environmental effects of each expressed by the approximate unit of measure. This information, along with a detailed discussion of the environmental consequences presented in Chapter 3, provides the basis for comparing alternatives.

Table 2.2 – Comparison of Alternative Features

ACTIVITY	ALT 1	ALT 2
Use of heavy equipment to conduct minerals exploration on claims on NFS lands.	No	Yes
Road construction on NFS lands to access claims and portals adjacent to south boundary of private land and to access west boundary of private land (mile).	0	0.8
Motorized access to claims and portals adjacent to south boundary of private land during timeframe as established in Approved Plan of Operations.	No	Yes
Year-round permanent motorized access by land owner to west boundary of private land	No	Yes
Miles of BMP work	0	0.7
Miles of Road Storage	0	1.8
Miles of Pool Creation in Prospect Creek (mile)	1	1

Prospect Hill Mineral Exploration/Access Project EA

Chapter 3

Affected Environment
and
Environmental Consequences

INTRODUCTION

This chapter describes the physical and biological environment that would be affected by the proposed management activity. It includes a resource-by-resource description of the affected environment. The descriptions disclose specific environmental components and the geographic scope of each resource. This section provides the foundation for analysis of environmental consequences and consistency with the Forest Plan.

This chapter also discloses the environmental consequences of implementing the alternatives. Each alternative would affect the environment differently. The environmental effects, which are discussed, are the scientific and analytic basis for comparison of the alternatives. Environmental effects that result from implementation of the alternatives are discussed in terms of direct, indirect and cumulative effects:

- **Direct effects** are caused by an action and occur at the same time and place.
- **Indirect effects** are caused by an action but occur later in time or farther removed in distance.
- **Cumulative effects** result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions (40 CFR 1508.7 and .8).

FOREST PLAN DIRECTION

This analysis incorporates by reference, management direction found in the Forest Plan as amended by the Inland Native Fish Strategy (INFS), Final Environmental Impact Statement (FEIS) and Record of Decision (ROD September 1987). These documents discuss land allocations and the effects of implementing these allocations. Chapter II of the Kootenai Forest Plan (FP) contains management area (MA) standards and guidelines for the entire Kootenai National Forest (KNF). This environmental analysis focuses on site-specific activities not discussed in the Forest Plan.

Forest Plan appendices contain guidelines for old-growth habitat management, water yield increases, cultural resources, vegetation management and a soil and water conservation practices handbook. Riparian area management is discussed in Chapter II of the Forest Plan, Appendix 26, amendments 1/91 and 2/94. Guidelines for management areas provide direction for all resources.

PAST, PRESENT AND REASONABLY FORESEEABLE ACTIONS

Analysis of cumulative effects presented in this chapter considered past, present, proposed and reasonably foreseeable activities that could affect the issues pertinent to this analysis. Activities on public and private lands have been considered. The analysis area considered by each resource is explained in the individual resource section of this document.

Past Actions: past actions provide the baseline of human use in the analysis area.

1) Past activity on the Herbert Mine;
2) The Treasure Mountain Interface project;
3) Harvest activities on the developed Lukens Hazel Mine property;
4) Existing, non-forest system roads accessible through private land;
5) Foot access to portals of existing mine.

Current and Reasonably Foreseeable Future Actions:

Reasonably foreseeable actions include continued forest management on Forest Service (FS) land and development on private land in the Prospect Hill project area that are on-going or scheduled to occur within the next five years. These activities may occur regardless of which alternative is selected for implementation. The following list identifies those current and foreseeable actions that the IDT determined were appropriate for inclusion in the analysis of environmental effects. These activities occur within the analysis area and effect or may effect the decision made.

1. Road activities approved under the Treasure Interface Project, as funds become available.
2. The Snowshoe Mine reclamation, a Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA) Project.

3. The continuation of land development, including the construction of roads, the clearing of vegetation, the construction of residences and the installation of improvements on private lands (i.e. Luken Hazel Mine).
4. Mining with the majority of it being in the form of sluicing, panning and suction dredging.
5. Planned timber harvest activity in the Libby Creek Watershed by Plum Creek Timber Company (PCTC) and Montana Department of State Lands. As proposed, through 2010, PCTC plans to complete 162 acres of equivalent clearcut acres (ECAs) with no new road construction. Montana Department of State Lands plans to complete 48 acres of ECAs in 2010.

The reasonably foreseeable actions are expected to occur and have been included in the analysis of cumulative effects. A large amount of private lands are included in this project area. Data on those lands has a moderate level of accuracy, and is the best available information derived from those landowners and field verified information.

Road Activities: Routine road maintenance is likely to occur as needed on existing roads in the Prospect Hill project area. The roads most likely to receive maintenance are those open to vehicle traffic.

Weed Control: Spraying to control weeds is ongoing under the Kootenai Invasive Plant Management Environmental Impact Statement and Record of Decision, April 2007. The county sprays for noxious weeds on the Granite Creek Road Right-of-Way and the other county roads in the area. Noxious weed management activities may also occur on PCTC lands and private property. The FS sprays for weeds along NFS roads. The Weeds Project File contains herbicide summaries for the area.

Public Activities Likely to Occur: Firewood and Christmas tree cutting is likely to continue to occur along open roads in the area. Recreational use of the area would also continue and includes driving open roads, snowmobiling, hunting, hiking, berry picking and other activities.

INTRODUCTION

The owner of two mining claims, Prospect #1 and Prospect #2, in the Prospect Creek drainage has proposed exploration activities on the claims which are the site of the inactive Herbert Mine. Elevation is 3,200 to 3,500 feet. Activities proposed are:

1) Obtain motorized access to two portals;
2) Remove backfill from portal openings utilizing heavy machinery;
3) Gather mineral samples from inside of the adits;
4) Stabilize portals against collapse;
5) Secure portals against unauthorized entry.

Phase I of the exploration involves work at the #2 portal (upper).

Prospect Creek is the site of numerous prospects and of the Herbert Mine which was active in the 1930s. Originally the Herbert property consisted of 19 mining claims. In 1934, approximately 300 feet of development had been done in an adit approximately 300 feet above the mining camp on Prospect Creek (Johns 1970). The mineralization is in the Wallace Formation, consisting of sharply folded sandy shale and sericitic sandstone. The rock is oxidized with a northwest trending fault zone and associated quartz veins.

Two adits access this fault zone. Newspaper articles from 1934, describe the upper adit (#2) at 500 feet in length, and the lower adit (#1) at 200 feet. The adits were 7 feet wide in a series of veins described as from 15 to 30 feet in width. It was anticipated that when the exploration reached below the oxidized zone, that a silver/gold ore body would be encountered. A mill utilizing flotation and cyanide process was planned at the site. In 1938, ore was being stored at the site awaiting financing for mill construction, some crushed ore having been sent to a smelter reportedly returned favorable results. According to Willis M. Johns of Montana Bureau of Mines and Geology (MBMG Bulletin 79), it was possible to pan small quantities of gold from the oxidized rock containing the quartz veins.

A portion of the property was later patented. Portal #1 and #2 lie on the unpatented portion; the steep terrain of the patented portion has two airshafts but no portal access to the underground workings. Intermittent work was conducted at the Herbert Mine site into the 1960s and the Montana Bureau of Mines and Geology listed the property as “developing” in 1974 (MBMG Bulletin 395).

In 1989, Orvana Resources of Coeur d’Alene, Idaho constructed approximately 4,700 feet of temporary road and drilled 20 rotary holes 200 to 500 feet in depth. Exploration was conducted on National Forest Service (NFS) lands and the private land of the patented claim. Orvana accessed portions of the area from the north in the drainage of the South Fork of Flower Creek. In 1999, bond was returned to Orvana upon inspection of successful reclamation and revegetation of the roads and drill sites. Portal #2 was backfilled as part of the reclamation phase of the project.

ANALYSIS AREA

The analysis area encompasses the Prospect Creek drainage above the Granite Lakes Road. Prospect Creek is at approximately 3,000 feet and the ridge line is at approximately 3,800 feet above sea level.

ANALYSIS METHODS

Site visits were conducted to the portal area via the NFS Road 5252 originally constructed to access the Herbert Mine. A literature review was conducted of newspaper articles, MBMG and U.S. Geological Survey Bulletins.

AFFECTED ENVIRONMENT

The project area is the site of past prospecting in the form of shallow cuts, adits and drill holes. A mining camp occupied an area along Prospect Creek, a blacksmith shop and bunkhouse were set up near the lower portal. Building scraps and a deposit of crushed rock showing oxidized fragments and quartz are visible near the lower portal. A road template is discernable, leading from the mining road on up to the area near the upper portal, skirting below another deposit of crushed rock. This narrow road is revegetated by small diameter

trees. Outcrops of steeply dipping Wallace Formation rocks are found on the steep slopes to the east-southeast of the portal area. The oxidized, faulted zone is evidenced in the portal area. The area is a dry, south/ southwest facing slope. MBMG visited the site as part of their abandoned mines inventory in September of 1998. The object of the inventory was to locate discharge from workings or waste material, adit discharge, steep waste rock dumps or unsafe structures and openings. No environmental problems were found at the site on NFS land by MBMG at that time. This is in part due to the lack of surface water, springs or seeps, and to the lack of a production of tailings from any on-site milling or smelting.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1 (No Action)

Direct and Indirect Effects

Effects to mineral resources resulting from the no-action alternative include continued sloughing around Portals #1 and #2, continued natural revegetation of areas around the Herbert Mine with slow revegetation of crushed rock piles due to a lack of topsoil. The portals would not be opened or sampled. There would be no need for upgrades to the existing mine road and only foot access from the mine road to the upper portal would be possible. No new roads would be constructed. A Plan of Operations (POO) for mineral exploration would not be issued. A Private Road Special Use Permit (SUP) would not be authorized.

Cumulative Effects

The cumulative effects for the no-action alternative would be that within the Prospect Creek drainage, the many overgrown pits and cuts associated with past gold and silver prospecting would continue to exist and slowly revegetate as would the area around the Herbert mine as described above. Downstream of the Herbert Mine, on the south side of Prospect Creek, the D. and W. prospect was worked in the early 1930s. It consisted of two tunnels including the 500 foot 'Ida V" driven on a Northwest striking quartz vein in Wallace Formation rocks. MBMG could find only caved adits and prospect pits in 1998. The area is overgrown and no evidence of contaminated springs or seeps was found. No changes would be expected to the D. and W. under Alternative 1, and the D. and W. would not affect the project area.

A portion of the Lukens Hazel Mine (Glacier Silver-Lead patented mining claims) property extends into the Prospect Creek drainage. It is high on the ridge on the Prospect Creek side; the vast majority of the property lies in the Shaughnessy Creek drainage. The Lukens Hazel Mine was active as early as 1910, and consisted of over 10,000 feet underground workings on the north side of Shaughnessy Creek in Wallace formation rocks to a depth of 300 feet. A 325 ton mill at the site crushed ore for shipment to a smelter. By 1964, the property was inactive. A small part of the Lukens Hazel property is visible from the Prospect Hill project area, but there are not effects from it to the project area. There are no effects from the Orvanna exploration project as all disturbances have been reclaimed.

ALTERNATIVE 2

Direct and Indirect Effects

Effects to mineral resources resulting from Alternative 2 include removal of waste rock and overburden from Portal #2 as Phase I of the mineral exploration, and removal of waste rock and overburden from Portal #1 as phase II. Portals would be stabilized and secured during the life of the project. Temporary access to the portal area would be authorized and access roads would be constructed and/or improved. Areas near the portals would be cleared of vegetation and leveled to allow space for safely piling waste rock. A POO would be approved, and requirements would be included as an Addendum to the Plan. Requirements would include sampling of water encountered underground, if encountered. Management of water quality will comply with Montana State Department of Environmental Quality (DEQ) A road extending from the NFS Road 5252 to the west side of the private property would be constructed. This road would be approximately 0.2 miles long (see map). This road would have no effect on the mineral resource of the area.

Reclamation of the site and reclamation of the segment of road leading from the existing mining road (NFS Road 5252) to the portal area would be required and part of the POO. Waste rock would be contoured into a stable configuration, covered in topsoil and revegetated. The portals would be closed at the end of the project

using bat grates or other appropriate closure device as approved by the Forest Service (FS). Access to the area would change as proposed in this project mitigation. Access changes identified in this document would be complete before implementation of the Prospect Hill project.

Cumulative Effects

The cumulative effects to mineral resources resulting from Alternative 2 would be the effects of any other minerals activities occurring in the project area. As described under Alternative 1, other minerals projects in the project area consist of inactive prospects including the D. and W. mine downstream from the project activities, and the Lukens Hazel mine of which only a small portion overlaps into the Prospect Creek drainage. Small waste rock piles, piles of debris, road templates and other disturbances still exist from the Herbert Mine. All disturbances from the Orvanna exploration project have been reclaimed.

CONSISTENCY with the FOREST PLAN and OTHER MANAGEMENT DIRECTION

Authorization of mineral exploration activity at the Herbert Mine site on Prospect Hill is consistent with the Forest Plan and other management direction. Forestwide management direction goals include the encouragement of responsible development of mineral resources in a manner that recognizes national and local needs and provides for economically and environmentally sound exploration, extraction and reclamation.

INTRODUCTION

The Kootenai National Forest (KNF) provides habitat for over 300 different species of wildlife (KIPZ Analysis of the Management Situation, USDA Forest Service 2003b: 49, 59-64), many of which occur on the Libby Ranger District and within the Treasure Planning Subunit (PSU) analysis area. The presence or absence of these wildlife species depends on the amount, distribution and quality of each animal's preferred habitat. In addition to habitat changes, many of these animals are impacted by hunting or trapping. Montana's Department of Fish, Wildlife & Parks (MFWP) regulates game animal populations. The Forest Service (FS) and the MFWP work together to ensure that an appropriate balance is maintained between habitat capability and population numbers. The FS also works closely with the U.S. Fish & Wildlife Service (FWS) to assist in the recovery of animals listed under the Endangered Species Act (ESA). Proposed federal projects which have the potential to impact species protected by the ESA require consultation with the FWS.

For the purpose of this Environmental Assessment (EA), a number of wildlife species were selected for detailed analysis. The species chosen represent a combination of fine filter (species specific) and coarse filter (management indicator species) analyses. The FWS requires that endangered, threatened and proposed species be included in an effects analysis. The Regional Forester designates sensitive species. Any effects to sensitive species present or potentially present in a project area must be disclosed. Management Indicator Species (MIS) are identified in the Kootenai Forest Plan (1987, Appendix 12) and represent a particular habitat or habitat complex. Each MIS represents a group of species that share common habitat components required for sustained growth and successful reproduction. Other species that would not be affected by any of the alternatives are reviewed, but not discussed in detail. The wildlife portion of this chapter is divided into five sections: old growth, MIS, sensitive, threatened and endangered, and neo-tropical migratory birds.

The bounds of analysis for each species were determined using the viability analysis concepts described by Ruggiero et al. (1994). Species viability is tiered to the forest-wide conservation plan (Johnson 2004).

The wildlife analyses include the baseline conditions (created by all past management practices and natural events), direct, indirect and cumulative effects of the proposed actions and cumulative effects of reasonably foreseeable projects (for this analysis, the Mines Management Corporation Montanore Mine project and the Snowshoe Mine reclamation project.)

OLD GROWTH HABITAT

Data Sources, Methods, Assumptions, Bounds of Analysis

Management and characteristics of old growth (OG) and stand attributes necessary for a stand to be considered OG are discussed and summarized in the KNF Plan (Appendix 17, FP II-1, 7, 22, FP III-54), Green et al. (1992), Pfister et al. (2000), Kootenai Supplement No. 85 to FSM 2432.22 (1991) and Castaneda (2004). Data sources to identify OG stands include District files and surveys and the KNF old growth GIS layer. For the timber compartments found in the Treasure PSU (#520, 521, 522, 523, 524, 525, 528, 529, 530, 546, 547, 550), field verification of OG stands was completed using walking transect surveys.

The KNF Plan identified the pileated woodpecker as the MIS for OG habitat (KNF Plan, Vol. II, Appendix 12-1). For effects to old growth-associated wildlife species, refer to the pileated woodpecker analysis in the MIS section of this document.

Criteria used to compare the alternative impacts on old growth include:

1) Acres of vertical structure removed. These are the acres of direct harvest in designated old growth. This includes both effective (OG) and replacement (ROG) old growth.
2) Miles of road built adjacent or through designated old growth.
3) Acres of edge effect in old growth
4) Acres of interior habitat remaining in old growth
5) Acres of additional old growth designated.
6) Percent of designated old growth (OG/ROG) in the PSU.

Current edge effects were determined by applying a 300 ft. buffer around existing regeneration harvest units

(TSMRS activity codes 4100-4134) that are ≤ 30 years old and border old growth stands. Edge effects influence interior stand ecology up to a distance of 3 times the average height of trees at the stand boundary (Russell et al. 2000: 134; Harris 1984: 110-111; Morrison et. al 1992: 84; Province of BC 1995: App. 1, and Ripple et al. 1991: 79). The KNF average OG tree height across OG types is 100 feet (KNF TSMRS). That average was used to calculate the applied buffer. Effects of alternatives were determined by using the same buffer on proposed regeneration units that border OG stands.

The analysis boundary for project impacts is the Treasure PSU, while cumulative effects to OG are analyzed at the Forest level.

AFFECTED ENVIRONMENT/EXISTING CONDITION

Existing conditions are a result of timber harvest, road construction, land development and historic mining activities. Old growth surveys within the Treasure PSU have inventoried approximately 6,000 acres. The Prospect Hill map in the map section of this document, displays the distribution of old growth stands within the Treasure PSU. The Treasure PSU has no undesignated OG or ROG. Replacement old growth (ROG) stands have many OG characteristics, but not enough to be considered OG currently. These stands are expected to become OG in time.

Table 3.1 summarizes the designated and undesignated status of the OG and ROG acres in the Treasure PSU and the Kootenai Forest-wide situation. Table 3.1 also shows the minimum acres required to be designated to meet Forest Plan standards. Designated OG stands in the project area support the habitat conditions described in "Old Growth Forest Types of the Northern Region" (Green et al. 1992).

National Forest Service (NFS) lands comprise 69% of the Treasure PSU. Old growth stands on corporate timber land and State lands have largely been harvested, and most remaining OG is on NFS lands. The present allocations in the Treasure PSU meet Forest Plan direction as clarified in FSM 2432.22.

Old growth stands in the analysis area are mainly composed of larch, ponderosa pine, Douglas-fir and other conifers. Old growth management area (MA) designations in the Treasure PSU were made to conserve the best OG attributes available and to provide the best distribution, size, habitat type coverage and quality of what is available. These OG stands are physically connected to other OG stands where possible, or are interconnected to adjacent OG stands by stands composed of 100+ year old age classes.

Table 3.1- Old Growth Acres on NFS Lands in the Treasure PSU and Forest-Wide

STATUS	TREASURE PSU ACRES (%)*	KNF ACRES (%)*
Total NFS lands	66,387	2,219,091
Total NFS lands below 5,500 feet elevation	45,913	1,869,222
Minimum acre designation required by Forest Plan	4,591 (10)	186,922 (10)
Designated OG (MA13, or OG MA) ≤ 5,500 ft Elevation		
Designated effective OG	5,752 (12.5)	138,902 (7.4)
Designated ROG	1,168 (2.5)	62,605 (3.3)
Designated unknown (KNF Forest Plan)	0 (0)	19,558 (1.1)
Total designated OG and ROG	6,920 (15)	221,605 (11.8)
Undesignated Effective OG And ROG ≤ 5,500 ft Elevation		
Undesignated effective OG	0 (0)	61,192 (3.3)
Undesignated ROG	0 (0)	36,229 (1.9)
Totals for both Designated And Undesignated OG And ROG ≤ 5,500 ft Elevation		
Total designated and undesignated effective OG	5,752 (12.5)	199,865 (10.7)
Total designated and undesignated ROG	1,168 (2.5)	98,834 (5.3)
Grand total of all old growth	6,920 (15)	298,699 (16)

*Acres were updated in April 2007 for the Treasure Subunit, Forest-wide acres as of September, 2007.

Block Size

The acres designated for OG management in the Treasure PSU are in 80 units, ranging from 7 to 369 acres in

size. Of these designated OG blocks, 54% are greater than 50 acres in size. The larger blocks provide interior habitat and connectivity within the areas of NFS lands.

Stands smaller than 50 acres in size were designated to protect additional attributes unique to OG where they exist in the subunit. They were designated based on recommendations in Morrison et al. (1992:85), where they state *"it is vital to recognize that in heavily fragmented landscapes, the last remaining patches of older or forested vegetation may play an important role. The patches may act as stepping stones for dispersal of many species associated with the specific environmental conditions throughout the landscape. Removal of such patches because they fail to meet criteria for size and provision of interior conditions may result in a network of dispersal for wildlife being severed in the landscape".* These stands are largely surrounded by multi-aged stands, which provide corridor links to larger blocks of old growth.

Distribution
Designated OG stands represent the best distribution of OG habitat that remains in the Treasure PSU (following Forest Plan direction), recognizing that these areas and their boundaries may change due to natural events such as windstorms, epidemic insect infestations and stand replacing fires.

Stand Structure
Old growth stand structure is described by Green et al. (1992, errata corrected 2004). In summary, Green et al. identifies three structural stages that are useful in describing OG. They are late seral single story (e.g. Douglas-Fir, ponderosa pine, lodgepole sites), late seral multi-story (e.g. larch, white pine) and near climax (e.g. cedar, grand fir, sub-alpine fir sites). Stands identified as OG contain one of these structure stages.

Disturbance
Within existing designated OG, there are a total of 8 miles of local roads. Of this, 1.7 miles are restricted seasonally, 0.1 miles are restricted yearlong, 5.3 miles of roads have prohibited use and 0.9 miles are open year-round. Roads allow for potential access by firewood cutters to remove standing snags. There are 27 old growth stands adjacent to 47 existing regeneration units (stands <30 years old). These units create an edge influence on about 647 acres of old growth.

ENVIRONMENTAL CONSEQUENCES
Table 3.2 displays a comparison of effects to the 319 acres of OG habitat in stand 11_D, the only stand affected by the Prospect Hill Project.

Table 3.2 - Summary of Measurement Criteria in OG Stand 11_D to Evaluate Effects to OG

MEASUREMENT CRITERIA	EXISTING CONDITION/NO ACTION	ALT. 2
Acres of vertical structure removed	0	3.6
Miles of road existing or built through old growth	0.7	1.5
Number of existing or proposed units adjacent to old growth	0	0
Acres of edge influence in old growth	57	90
Acres of interior habitat remaining in old growth	262	229
Acres of additional old growth designated	0	40

Management activities (including timber harvest, road construction, mining etc.) have the potential to impact the function of OG habitat or specific components of OG, such as interior habitat and vertical structure. Activities may also allow noxious weed invasion.

Timber harvest and road construction can affect adjacent OG stands by altering six microclimatic factors (solar radiation, soil temperature and moisture, air temperature, relative humidity and wind speed - Chen et. al. 1995). Microclimatic changes lead to vegetative changes (e.g. species richness, diversity, structure, composition) (Russell and Jones 2001). Changes in vegetative conditions may lead to effects such as wildlife species composition, species abundance and higher predation (Askins 2000: 120) (see pileated woodpecker analysis). All these effects extend varying distances into the uncut stands depending on a number of variables

(e.g. aspect, slope, elevation, wind speed and direction, etc.). While there is no single answer to the extent of area influenced by edge (Chen et.al. 1995), research (Harris 1984, Russell et al. 2000, Morrison et.al. 1992, Ripple et al. 1991; Province of BC 1995) has identified a three tree height rule of thumb as the distance in which effects occur. The depth of influence is also related to time since harvest, with effects dissipating within 20 to 50 years, depending on the factor (Russell and Jones 2001, Ripple et al. 1991, Russell et al. 2000). In the Treasure PSU, average tree growth in regeneration units >30 years of age results in tree heights of 20-50 feet and densities that reduce the depth of influence from edge effects.
While changes in vegetation and wildlife use may occur on the acres influenced by edge, those acres remain functional old growth for some species.

The old growth acres not impacted by edge effects provide interior habitat.

ALTERNATIVE 1 (No-Action)
Direct, Indirect and Cumulative Effects
This alternative would have no direct effect on designated OG or associated plant and wildlife species (also see pileated woodpecker discussion). The conditions for the 6 measurement criteria in Table 3.2 would remain unchanged. No OG would be treated through timber harvest or prescribed burning. There would be no risks from these activities, such as soil compaction, weed introduction or modification of stand structure. All OG areas would maintain their existing conditions, and continue to provide habitat for those species which utilize the area over a long term.

Existing conditions include the effects of edge from open roads. Roads opened for firewood cutting may result in some continuing level of snag removal from the old growth stands.

Potential natural disturbances (wildfire, insect or disease epidemics, wind) could reduce OG characteristics or completely remove an area of OG under extreme conditions. While these events might occur, extreme conditions are not predictable so it cannot be said with reasonable certainty whether or not these events would have more or less effect than the action alternatives. Fire suppression over the last century has altered stands historically maintained by fire disturbance. The affected stand has developed fuel loading and ladder fuels that are uncharacteristic for some sites. These conditions will continue to accrue until a natural disturbance occurs.

The most recent forest-wide OG analysis (2007 Forest Plan Monitoring Report, USDA FS 2008) concludes that at least 11% of KNF below 5,500 feet elevation is designated for OG management. This alternative would not affect the 10% standard for OG at either the PSU or Forest scale.

ALTERNATIVE 2 (Proposed Action)
Direct and Indirect Effects
No timber treatments are proposed in designated effective or replacement OG, or in undesignated effective or replacement old growth in Alternative 2.

A new road would be constructed through OG stands in Alternative 2. A portion of the road construction is adjacent to designated effective OG stand 11_D, and a portion bisects the stand. Some increase in edge effect or impact on snags is likely due to the road construction. The road would be closed to the public during and after project use. However, the project requires these OG areas to be signed “Old Growth Forest managed for its unique natural value. Do not cut or remove wood from behind this sign”. Signs would be placed along the road as private users pass through the old growth. No other roads would be opened under Alternative 2.

Ground disturbing activities in or adjacent to OG may result in noxious weed invasion. The project design includes measures to reduce this potential risk.

The estimated acres of canopy removed by new road construction (~4 acres) under this alternative would not affect the 10% standard for OG at either the PSU or Forest scale. The effects of road construction at the stand level are mixed. A survey of the 319 acre stand 11_D yielded an estimate of 10 large diameter trees (>19”

diameter at breast height (dbh)) per acre. The approximate location of the new road would result in the removal of roughly 12 large diameter trees, about 0.4% of the large diameter trees in the stand. Road construction would increase edge influence in the stand by 56% from existing conditions; a change from 18% to 28% of the unit acres being affected by road corridors. Alternative locations for sections of the road could avoid clumps of large diameter trees, reducing road effects. As the road location is approximate, these alternative locations will be used where possible. Due to the reduction in quality of OG habitat from edge influence and canopy cover loss, the designation of approximately 40 acres of additional OG would mitigate loss of undisturbed habitat for old-growth dependent species.

Cumulative Effects
Cumulatively, the proposed activities in designated OG would not reduce the amount and distribution of OG below Forest Plan requirements. However, due to cumulative edge effects, there may be reduced old growth quality for some plant and animal species.

Alternative 2, in combination with other proposed and reasonably foreseeable Forest Service, State and private activities would maintain the designated management level of old growth.

REGULATORY CONSISTENCY
Alternative 2 is consistent with Forest Plan direction to maintain a minimum of 10% OG below 5,500 feet in elevation in each third order drainage or compartment, or a combination of compartments (Kootenai Supplement No 85., supplement to FSM 2432.22).

After implementation of the Prospect Hill Project, designated OG below 5,500 feet elevation in the Treasure PSU would remain at the levels previous to implementation. Only approximately 4 acres of OG would be affected. The current Forest-wide assessment (USDA Forest Service FY2007) shows that the KNF has 9.0% ± 7.2 % of lands OG. The Kootenai Forest Plan established that maintaining 10% of OG habitat is sufficient to support viable populations of OG dependent species (Vol. 1, II-1, 7, III-54; Vol. 2, A17).

MA13 Recreation Standards: Alternative 2 complies with these standards. A forest closure order exists to off-highway vehicles which restricts them to established roads and trails.

MA13 Wildlife and Fish Standards: Alternative 2 complies with these standards. The proposed activities in designated OG would not reduce the amount and distribution of OG below Forest Plan requirements.

MA13 Range Standards: Alternative 2 complies. No active range allotments occur.

MA13 Timber Standards: Alternative 2 complies with standards 1 and 3. Firewood cutting could impact snags located in OG habitat, and this effect is taken into consideration in the cavity habitat analysis.

MA13 Facilities Standards: Alternative 2 complies with standards 2 and 3. All alternatives would continue to restrict motorized access on local roads where closures exist.

MA13 Fire Standards: Planned ignitions. Alternative 2 contains no proposed ignitions. The Forest Plan (Vol. 1, III-56) states that planned ignitions are acceptable to maintain old growth characteristics, i.e. old growth ponderosa pine.

SNAG HABITAT
Data Sources, Methods, Assumptions, Bounds of Analysis
The analysis process is based on field data of snags > 10 in. dbh and is applied as a worse case scenario. Old growth stands provide 100% snag level (SL), or 2.25 snags/acre, as do untreated forest stands (Tincher 1998). Partial cut stands provide at least 60% snag level, or 1.35 snags/acre (Johnson and Lamb 1998). Regeneration units provide 0 - 40% SL, or 0 – 0.9 snags/acre. This percentage varies by period of harvest: pre- versus post-1987 KNF Forest Plan. No cavity structures are provided by units harvested or planned prior to the 1987 Forest Plan (Johnson and Lamb 1998). Harvest units planned before 1987 were implemented through 1992. Harvest units planned after the 1987 Forest Plan, which have been implemented from 1993 to the present, provide at least 40% SL (USDA FS 2003). Road beds account for 4 acres per mile and provide 0% SL.

$$\frac{\text{33 ft road width x 5280 ft/mi}}{\text{43,560 ft}^2\text{/ac}} = \text{4 ac/mi}$$

Snag density in forest adjacent to roads is also low. While research off the KNF has shown some snag retention within 200 feet of roads (Tincher 1998, Bate and Wisdom 2004), observations on the forest suggest that snag levels along roads can be as low as zero. Since firewood cutting is allowed from any open road, retention of snags within 200 feet of the road over time is highly unlikely. Therefore, a worst case scenario was used for road snag levels. Roads were buffered by 200 feet on each side to account for total snag loss, resulting in snag levels of 0% on an additional 49 acres per mile of road:

$$\frac{\text{400 ft road buffer x 5280 ft / mi}}{\text{43,560 ft}^2\text{ / ac}} = \text{49 ac/mi}$$

Thomas (1979: 72-75) was used to determine the percent of the potential population level (PPL) needed to maintain primary cavity excavator populations:

$$\frac{\text{\% SL}}{\text{\% PSU area with above \% SL}} = \text{PPL}$$

The 1987 KNF Forest Plan recommends maintaining a minimum cavity excavator PPL on a drainage or compartment basis at ≥ 40% of the PPL throughout commercial forest lands and at ≥ 60% of the PPL in riparian areas. These recommended percentages equate to snag levels of approximately 0.9 snags per acre for the commercial forest lands and 1.35 snags per acre for riparian areas. Due to the need to provide a continuous supply of snags over time, there is also a need to designate green trees as snag replacements.

Usually 2 replacements are needed for every snag (USDA FS 1987: A 16-11). This results in the general recommendation of 1-2 snags and 2-4 snag replacements per acre or a total of 3-6 per acre. The KNF Plan riparian standards, as amended by the Inland Native Fish Strategy (INFS; USDA FS 1995), provide adequate snags and replacement trees to meet the riparian 60% SL standard. Therefore, the following analysis focuses on the general forest standard of 40% PPL.

The effect indicators for snag and down wood habitat are:

1) Percent of the maximum population potential by PSU;
2) Acres treated that reduce snag and down wood levels.

The analysis boundary for project impacts (direct and indirect) on snags is the Treasure PSU. This size is sufficient to cover home range sizes of species associated with snag and down wood habitat structure. Cumulative effects are evaluated at the Forest scale.

AFFECTED ENVIRONMENT/EXISTING CONDITION

Historically, the number of snags per acre >10" dbh likely approached 5-10 snags per acre within KNF. Fire suppression and logging practices have changed the amount and distribution of these components across the landscape (USDA Forest Service 2000).

Snags, broken topped live trees, live cull trees and down logs are used by a great variety of wildlife species for nesting, denning, perching, roosting, feeding and shelter. On the KNF, 42 species of birds, 14 species of mammals and several species of amphibians are recognized as largely dependent on cavity habitat (snags and down wood).

Snag surveys in the Treasure PSU cover approximately 680 acres. These surveys recorded snags in diameter classes based on wildlife habitat needs. The existing PPL on NFS lands in the Treasure PSU is calculated at 106%. This PPL exceeds current Forest Plan direction.

Forest-wide cavity excavator PPL was shown to be 88.7% in the 1997 Forest Plan Monitoring Report (USDA FS 1998: 43). The 2007 report (USDA Forest Service 2008: 37) shows 100% of the compartments monitored

meet or exceed Forest Plan standards for PPL and that Forest-wide the 40% PPL is being met.

As the proposed project is in OG stand 11_D, snag levels are assumed to be 100%. An OG survey of the stand estimated the density of large snags (>19" dbh) at 0.7/acre. Actual density of snags >10" dbh is unknown.

Snag data for other small private, corporate and state lands is not available.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

Under Alternative 1, no activities are proposed, so no direct effect to snags is expected. Wildlife use of cavity habitat would continue at current levels. The addition or loss of snags would be dependent on other factors, such as firewood cutting, wind events, natural attrition or wildfire. The level of impact from these factors can not be calculated due to the high uncertainty in predicting occurrence and intensity levels.

Cumulative Effects

Alternative 1 would not authorize any cumulative snag-reducing activities. Suitable cavity habitat would still occur on NFS lands.

A timber sale planned by Plum Creek Timber Company (PCTC) would regenerate 379 acres, with no new road construction. The Montana State Department of Natural Resources planned timber sale that would regenerate 112 acres. This would not affect snag levels or PPL on NFS lands. Firewood gathering would continue to remove some snags from the open road corridors.

Cumulatively, with all lands considered, and all other reasonably foreseeable actions on private and corporate lands considered, sufficient cavity habitat would remain in the Treasure PSU.

ALTERNATIVE 2

Direct and Indirect Effects

Management activities that could reduce snags in riparian areas are restricted by Riparian Habitat Conservation Area (RHCA) standards and guidelines (USDA Forest Service 1995). For the proposed activities, this would result meeting the riparian standard for snag levels (60%).

There are no harvest or fuels reduction units in the proposed project that would reduce or create new snag habitat.

New road construction may result in the removal of 1-2 large snags for safety purposes (USDA Forest Service 2002). As mitigation for the new road construction, road use by vehicle would be restricted to the permittee and the USFS. The permittee would not be allowed to collect firewood from the road. Due to the small direct impact, and mitigated indirect impact, of the new road construction, this project is not expected to have a negative effect on snag levels on a PSU or Forest level.

Cumulative Effects

Cumulatively, when other activities including the harvest on private, state and NFS lands discussed under Alternative 1, and all past, present and reasonably foreseeable activities on private, state and NFS lands are considered, habitat on NFS lands is considered sufficient to provide cavity habitat to cavity dependent species. After implementation of Alternative 2 and the reasonably foreseeable FS projects, the primary cavity excavator PPL on NFS lands in the Treasure PSU is not expected to change.

The 2007 FP monitoring report (USDA FS 2008) documents results for the past 20 years, and indicates the KNF is providing sufficient cavity habitat at the drainage or compartment as well as the Forest scale.

REGULATORY CONSISTENCY

No alternative causes the Treasure PSU overall PPL to drop below the general forest 40% or riparian 60% primary cavity excavator potential population level. This is consistent with Forest Plan standards. KNF Plan cavity habitat standards in MAs 10, 15, 16 and 17 remain met.

MANAGEMENT INDICATOR SPECIES (MIS)

REGULATORY FRAMEWORK

Based on direction found in the National Forest Management Act (16 USC 1604(g) (3) (B)), the 1987 KNF Plan (Appendix 12) identifies management indicator species. The Forest Plan states, "the maintenance of viable populations of existing native and desirable non-native vertebrate species, as monitored through indicator species, will be attained through the maintenance of a diversity of plant communities and habitats." (FP II-22)

Table 3.3 - Management Indicator Species

PA - Project Area

SPECIES	HABITAT	COMMENTS
Grizzly Bear (*Ursus arctos*)	General Forest	See Threatened and Endangered Species Section
Gray Wolf (*Canis lupus*)	General Forest	See Threatened and Endangered Species Section
Bald Eagle (*Haliaeetus leucocephalus*)	Rivers, Lakes	See Threatened and Endangered Species Section
Peregrine Falcon (*Falco peregrinus*)	Cliffs	No cliff habitat in PA. Species not found in PA. No impact to species. No further analysis.
Elk (*Cervus elaphus*)	General Forest	Emphasis big game species for this project
White-tailed Deer (*Odocoileus virginianus*)	General Forest	Non-emphasis big game species for this project
Mountain Goat (*Oreamnos americanus*)	Alpine	No alpine habitat in PA. Species not found in PA. No impact on species. No further analysis.
Pileated Woodpecker (*Dryocopus pileatus*)	Snags, OG	Also see old growth and snag sections

Elk and white-tailed deer are two MIS species that represent similar habitat. Summerfield (1991) recommends determining which big game species would be featured in a particular area, since species' winter requirements differ. Based on Forest Plan direction, the biological potential of the area, state wildlife management objectives, public comments during scoping and the information contained within the Kootenai Conservation Plan (Johnson 2004: Appendix H), an emphasis species was identified for this report.

As a general rule, the following process was used to determine the featured species. In the Conservation Plan, the KNF and MFWP Elk Task Force established management emphasis designations for elk by PSU (ibid: Appendix H, Attachment B, page H-12 and 2600 letter of 5-16-1997). In PSUs with high emphasis for elk, that species is the emphasis MIS. For PSUs in which elk are a low emphasis, white-tailed deer is the indicator for general forest habitat. For PSUs in which elk are moderate emphasis, the project biologist would designate the general forest indicator, based on site specific information about elk and deer use. The Treasure PSU is high emphasis for elk; therefore elk will be the general forest indicator in this analysis.

ELK

Data Sources, Methods, Assumptions, Bounds of Analysis

Elk are one of the indicator species for general forest habitat condition. The Prospect Hill project area is located in the Treasure PSU, which is identified as an area where elk are emphasized over white-tailed deer, which is also a general forest indicator species (KNF and MFWP Elk Task Force 1997).

Elk population ecology, biology, habitat description and relationships identified by research are described in Murie (1979) and Toweill and Thomas (2002). Elk population and harvest data come primarily from MFWP. Additional information is from recent District wildlife observation records and Forest historical data (NRIS FAUNA). The analysis boundary for project impacts to individuals and their habitat is the Treasure PSU. The boundary for determining population trend is the MFWP elk hunting District 104 and for determining viability is the KNF.

The effects analysis is based on direction provided in the KNF Plan (1987) as amended and in Coordinating Elk and Timber Management (MFWP 1985). Additional guidance is provided by Defining Elk Security: The Hillis Paradigm (1991). Potential effects to elk habitat can be identified by analyzing four effects indicators: cover/forage ratio, habitat effectiveness, security and key habitat components.

Cover/Forage Ratios

Cover/forage ratio portrays the percentage of area that meets elk requirements for cover and forage. Cover provides protection from weather, predators and humans. Two different types of cover have been recognized. Hiding cover is defined as vegetation capable of hiding 90% of an elk from the view of a human at 200 feet. Thermal cover is a stand of conifers that are 40 feet tall with 70% crown closure. Forage areas are those natural or man-made areas that do not qualify as cover (hiding or thermal) (Thomas 1979: 109, 114, 116). Recently, elk use of thermal cover and foraging areas has been reexamined and this research indicates that providing thermal cover is not a suitable solution for inadequate forage conditions (Cook et al. 1998).

The KNF Plan (1987) recommends a cover/forage ratio of 30/70% for elk winter range (measured on the combined acres in MA 10 and 11 lands). Summerfield (1991) recommends cover to be 60% on winter and summer range (measured on all MAs not winter range). On elk winter range, the cover should be at least 40% thermal cover (ibid). Summer range cover may be in any combination of hiding and thermal cover (ibid). The KNF Plan (1987) also identifies the general maximum size for an opening as 40 acres. Summerfield (1991) recommends that the opening size standard be the same as the standard for grizzly bear (a maximum of 600 feet to cover from any point inside an opening).

Cover/forage ratios for summer range in the PSU, cover/forage ratio for winter range in the PSU, cover percentage for combined MAs 15, 16, 17 acres in the PSU, the percent thermal cover on winter range, and the number of regeneration harvest units greater than 40 acres in size at the PSU scale is the measures for effects.

Habitat Effectiveness

The habitat effectiveness (HE) of an area refers to the percentage of habitat that is usable by elk outside of the hunting season that does not contain open roads. Numerous studies have shown that there is a strong negative correlation between elk use of an area and the density of open roads, even if those roads are only lightly traveled (Frederick 1991).

The KNF Plan (1987) calls for an open road density (ORD) in MA-12 (Big Game Summer Range and Timber) of ≤0.75 miles per square mile. This translates into a HE value of 68% (Lyon 1984). On MAs 15, 16, 17 and 18 the Forest Plan open road density standard is ≤3.0 miles per square mile, which equates to 38% HE.

The percent HE for PSU, ORD for MA12 and ORD for the combined MA15, 16, 17 and 18 lands in the PSU are the measure of effects.

Security

Security areas are defined as areas that are larger than 250 contiguous acres in size and more than one half mile from an open road (Hillis et al. 1991). These areas offer elk refuge through reduced vulnerability during the hunting season and can greatly influence the age structure and composition of a herd.

The KNF Plan has no standard for security. A panel of state and federal wildlife biologists convened in 1996 and produced, "Integrating Kootenai National Forest Plan and Fish, Wildlife & Parks Elk Management Plan Final Task Force Report (Johnson 2004: Appendix H-B). This document identified security as important component in elk habitat and that the Hillis et al. (1991) method would be used to calculate it. This method recommends a minimum of 30% of an elk's fall use area be maintained as security habitat. Since elk use in the fall could be any place within a PSU, the 30% minimum is measured against the PSU NFS acres. Appendix H-B (Johnson 2004: p. H-12) also provides the elk management emphasis level by PSU as well as definitions for security levels (H-B-13).

The percent security in the PSU will be the measure for effects.

Key Habitat Components
Wallows, wet meadows and bogs will be avoided when constructing roads (Forest Plan 1987; III-44, 49). When these areas are located they would be mapped and managed as riparian areas.

The number of features potentially impacts by the project are the measure for effects.

AFFECTED ENVIRONMENT/EXISTING CONDITION

The Treasure PSU is located in elk hunting district 104. The population in the hunting district is stable (MFWP 2004). Treasure PSU is managed with a high emphasis for elk (Johnson 2004: App. H-B: p. H-12). The number of wallows in the PSU is unknown and there is no information on calving areas in the PSU. Cover/forage ratio would not be affected since no timber harvest or treatments are proposed. Habitat effectiveness would not be affected due to mitigation road storage (Table 2.1). Only security may be changed by the project and will be analyzed for effects. Currently, secure habitat for elk comprises 54.3% of the PSU, the majority being contiguous in MA 7 (wilderness) and MA 8 (recommended wilderness) areas.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

Cover/Forage Ratios
Under Alternative 1, all cover/forage ratios would remain unchanged in the short-term. As trees and shrubs continue to grow and mature, the number of acres of productive foraging habitat would decline. Forest encroachment upon forage openings and increased canopy closure would reduce the quantity of forage. The increased tree density and continuous fuel profile from the ground up to the main canopy puts the area at risk of wildfire. If severe wildfires occur, it is likely that some forage habitat would be greater than 600 feet from cover, making it less likely to be used by elk.

Open Road Density and Habitat Effectiveness
ORDs and HE would remain unchanged under the no-action alternative.

Security
Secure habitat for elk would remain unchanged under the no-action alternative.

Special Habitat Features
Under the no-action alternative, all acres of wetlands would remain. Timber harvest would not occur within the Streamside Management Zone (SMZ) of any wetlands.

Cumulative Effects
Changes in secure habitat occur on a small portion of the available habitat in the forest. There would not be a measurable change in big game populations. The cumulative effects of past and present land use patterns, as well as random natural events, have been taken into consideration in describing the existing condition. There are no reasonably foreseeable activities planned that could change the magnitude or scope of effects described above.

ALTERNATIVE 2

Direct and Indirect Effects

Cover/Forage Ratios, Habitat Effectiveness and Special Habitat Features
The Prospect Hill project would not adversely affect cover/forage ratios or HE due to the nature of the proposed activities and mitigation road storage (Table 2.1). The project area does not contain any key habitat components to be affected.

Security
There would be no change in quantity of secure habitat and spatial distribution shifts are minimal. An outlying patch of secure habitat, north of the private property, which currently adjoins the main body of

secure habitat by a thin margin, would be isolated due private property access from the new road construction. Alternatively, some small secure habitat patches within the road network would increase in size due to road storage. Overall, mitigation road closures (Table 2.1) maintain secure habitat at 54.3% of the Treasure PSU.

Cumulative Effects
Changes in secure habitat occur on a small portion of the available habitat in the forest. Project activities would not result in a measurable change in big game populations. The cumulative effects of past and present land use patterns, as well as random natural events, have been taken into consideration in describing the existing condition. There are no reasonably foreseeable activities planned that could change the magnitude or scope of effects described above.

SUMMARY
The Prospect Hill project would **not adversely affect cover/forage ratios, habitat effectiveness or security** due to limited project activities and mitigation road storage. The project area does not contain any key habitat components. Spatial shifts in security are likely to remain permanent. Some short-term displacement of big game may occur if activity occurs in travel corridors during the life of the project.

The management activities and resulting changes in habitat conditions, disclosed previously, may result in short-term displacement effects on elk. Elk numbers are not expected to change dramatically.

REGULATORY CONSISTENCY
All alternatives meet Forest Plan direction for big game species (FP Vol. 1, II-1 #6). The project area is located in the Lower Clark Fork Elk Management Unit, identified in the MFWP Statewide Elk Management Plan. The proposed project is consistent with that document.

SUMMARY GENERAL FOREST MIS STATEMENT
Based on the analysis for elk and the KNF Conservation Plan (Johnson 2004), **habitat for general forest species should provide sufficient quality and quantity of the diverse age classes of vegetation needed for viable populations**. Since sufficient general forest habitat is available, the populations of species using that habitat should remain viable.

PILEATED WOODPECKER
Data Sources, Methods, Assumptions, Bounds of Analysis
Pileated woodpecker population ecology, biology, habitat description and relationships identified by research for the northern Rocky Mountains are described in McClelland & McClelland (1999), McClelland (1979, 1977), McClelland et al. (1979), and Warren (1990). Research conducted in the Pacific and Inland Northwest is described in Bull & Jackson (1995), Bull and Holthausen (1993), Bull et al. (1992b), Bull (1987, 1980, 1975), Bull & Meslow (1977), Mellen et al. (1992), Mellen (1987), Thomas (1979), Mannan (1977), and Jackman (1974).

Pileated woodpecker occurrence data comes from recent District wildlife observation records, the Region 1 Landbird Monitoring Program (Avian Science Center, Univ. of Montana), and Forest historical data (NRIS FAUNA). The pileated woodpecker is the indicator species for OG and snag habitat on the KNF. Habitat for this species was modeled using all designated and undesignated OG habitat and ROG habitat which has currently been mapped for the Kootenai National Forest.

Effects Indicators
The Potential Population Indices (PPI) for pileated woodpeckers on the KNF has been calculated by Johnson (2003). The procedure is based on the assumption that all currently mapped effective and replacement OG habitat (both designated and undesignated) is providing suitable habitat to support nesting territories. This assumption also includes the premise that all suitable habitat is spatially distributed across the landscape in a pattern that can be incorporated into individual nesting territories. This procedure was based on territory sizes of pileated woodpeckers as described in research by McClelland (1977) for northwest Montana, and Thomas

(1979) and Bull and Holthausen (1993) for northeast Oregon. For the PPI analysis on the KNF (Johnson 2003b), ROG habitat was defined as habitat that had some OG characteristics, but did not meet the KNF Plan (1987) definition of OG, or the definition found in Green et al. (1992).

Effective OG habitat was modeled as supporting one nesting pair per 600 acres, with ROG habitat supporting one nesting pair per 1000 acres. The difference in territory size is based on research that suggests that higher quality habitat can support a breeding pair with fewer acres (McClelland 1977; Bull and Holthausen 1993). Also, allowing for larger territory sizes when habitat becomes fragmented appears reasonable, as territory sizes up to 2,600 acres have been reported for Western Oregon (Mellen et. al. 1992). There are numerous and complex interrelated factors that influence the actual size of the home range territory (McClelland 1977).

Project effects are evaluated based on impacts to important attributes of pileated woodpecker habitat, primarily to designated and undesignated OG habitat. Specific features of OG stands evaluated for project impacts include impacts to large tree availability and snag availability.

The overall assessment of habitat quality also accounts for potential negative factors discussed in the OG habitat analysis that relate to size and connectivity, and include fragmentation, edge effect and interior habitat. Risk to firewood cutting is also evaluated.

The analysis boundary for project impacts to individuals and their habitat is the Treasure PSU. The boundary for cumulative effects and determining trend or viability is the KNF.

AFFECTED ENVIRONMENT/EXISTING CONDITION

The modeled minimum PPI for the pileated woodpecker on the KNF is 425 nesting or breeding pairs (Johnson 2003). This is within the calculated historic range of variation for the minimum PPI of 335 to 554 breeding pairs (Johnson 1999).

A detailed summary of OG habitat for the Treasure PSU is displayed in the Old Growth section of this document. This summary indicates that approximately 5,752 acres of designated effective OG habitat, and about 1,168 acres of designated replacement habitat exist within the PSU. Existing pileated woodpecker nesting territories would likely encompass a significant portion of this OG habitat. Based solely on the quantity of OG habitat available, the Treasure PSU could support about 10 nesting territories.

No population data is available for pileated woodpeckers within the KNF. Breeding bird point count surveys have been conducted on the KNF since 1994. In this program, transects consisting of multiple bird monitoring points are set up within a wide range of habitats distributed geographically across the Forest. This survey technique is not specifically designed to census woodpecker species, although all migratory and resident bird species, detected by specialists trained in bird identification, are recorded at each point on each transect. The rate of detection can vary greatly from year to year, especially for a wide-ranging species like the pileated woodpecker, that may or may not be anywhere near a given point on a given day. During the 1994-2004 periods, the pileated woodpecker was tallied 204 times at the 2,638 individual points surveyed (USFS 2003).

There are approximately 15 pileated woodpecker nest cavities known in the Treasure PSU, and sightings are common during OG and unrelated surveys.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

Under Alternative 1, natural succession process would continue throughout existing OG stands, and stands containing OG attributes used by pileated woodpeckers. Habitat would be provided for nesting pairs that find suitable feeding and breeding conditions provided by the structural features and overall environment within these stands. There would be no change in the PPI.

ROG habitat currently provides less suitable stand conditions for territory occupation. Over the next several

decades, in the absence of catastrophic fires or windstorms, these stands would develop better habitat features for pileated woodpeckers such as larger trees, larger snags and more down logs. Also, higher levels of decadence would develop producing better substrate for food resources such as carpenter ants and their larvae, one of the primary prey items for pileated woodpeckers in the Northern Rockies (McClelland & McClelland 1999, 1977) and in the Pacific and Inland Northwest (Bull et.al. 1992a; Bull 1987, 1975; and Bull et.al. 1980).

Under Alternative 1, no active management is expected within OG or ROG habitat, with the exception of fire suppression activities. Continued disruption of the historic pattern of frequent fires in the drier ponderosa pine/Douglas-fir cover type would continue to result in ecological changes, such as the encroachment of Douglas-fir saplings in the understory. Eventually, these sites would develop a higher percentage of Douglas-fir trees, snags and down logs more suitable as foraging habitat for pileated woodpeckers. Over the next several decades, this successional trend may result in a reduction in quality ponderosa pine nest trees. Douglas-fir was not found to be important for pileated woodpecker nest cavity excavation in the northern Rocky Mountains (McClelland & McClelland 1999, 1977; Weydemeyer & Weydemeyer 1928), in northeast Oregon (Bull 1987, 1975; Thomas 1979), or in British Columbia (Harestad & Keisker 1989).

Under this alternative, the impact of the existing road system on snags, an important attribute of the pileated woodpecker territory, would remain as described in the analysis for snags and OG habitat. The effects of edge on pileated woodpecker habitat from adjacent regeneration units would also remain as described in the OG analysis.

Cumulative Effects
Alternative 1 would not contribute any cumulative effects.

ALTERNATIVE 2
Direct and Indirect Effects
Effects to OG translate to potential impacts to the pileated woodpecker as loss of nesting and foraging habitat or reduced habitat quality. Habitat impacts from this alternative include an increased edge effect resulting from road construction or reconstruction. Road use would be restricted and wood cutting would not be allowed behind the gate by the permittee, so effect to snags would be minimal.

Pileated woodpeckers have been observed in OG stand 11_D, where much of the road construction would occur. Nesting is not confirmed in this stand however. Basal area, canopy closure, tree size, species composition and cavity habitat are not expected to significantly change or diminish on NFS land through implementation of this project, though edge effects may reduce the quality of a limited amount of prime OG. Stand 11_D may be able to support one nesting pair, as it is 319 acres of effective OG and has several smaller effective OG stands less than ¾ mi away. Based on the expected impacts to OG acres, the PPI in the stand, in Treasure PSU, or on the Forest is not expected to change. Project activities (e.g. tree falling, road construction or mineral exploration) are likely to cause pileated woodpeckers to temporarily move away from immediately disturbed areas, but are not expected to result in permanent displacement.

Grizzly bear mitigation would restrict road construction and access during April 1st - June 15th, which may mitigate for potential pileated woodpecker nesting. The stand would be monitored for nesting during the months of April and May previous to implementation. If monitoring reveals nesting activity within 300 feet of the proposed construction route, road construction would be further suspended until after the end of breeding season, July 15th.

Cumulative Effects
Alternative 2 would reduce the quality of OG stand 11_D, but would not significantly reduce the old growth characteristics within the stand. Road construction and use for access to the undeveloped private land and for mineral exploration is not expected to result in high traffic flow on roads through or adjacent to OG, or to contribute to reductions in snag or down wood density. On the PSU scale, no projects in the past, present, or foreseeable future have been planned to affect OG and this project would not contribute significantly to any

changes in the cumulative effects of forest management on the PPI estimate. At the Forest scale, the project would have a minute impact within the cumulative effects of forest management on the quantity or quality of OG and the PPI estimate. Stochastic natural forest dynamics, fire suppression and general forest use such as recreation and firewood cutting would likely continue at recent levels, which may have negative cumulative impacts to OG and pileated woodpecker populations.

REGULATORY CONSISTENCY

All alternatives are consistent with Forest Plan direction for OG, snags and down wood, and maintenance of diverse age classes of vegetation for viable populations (FP II-1 #7). The proposed activities in designated OG would not reduce the amount and distribution of OG below Forest Plan requirements.

SUMMARY OLD GROWTH, SNAG AND DOWN WOOD HABITAT MIS STATEMENT

Based on the analysis for pileated woodpecker, OG and snags, and the KNF Conservation Plan (Johnson 2004), habitat for OG forest species and cavity habitat users should be provided in sufficient quality and quantity to meet the needs for viable populations. Since sufficient OG forest and snag habitat is available, the populations of species using that habitat should remain viable.

SENSITIVE SPECIES

Regulatory Framework

The sensitive species analysis in this document meets the requirements for a biological evaluation as sensitive species are administratively designated by the Regional Forester (FSM 2670.5) and managed under the authority of the National Forest Management Act (NFMA). The FS is required by the NFMA to "provide for 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." (16 U.S.C. 1604(g)(3)(B)).

The "specific land area" scale for providing diversity is established in the framework as the area covered by the Forest Plan. To implement NFMA, the FS regulations, implemented on January 5, 2005, state "The overall goal of the ecological systems by providing ecological conditions to support diversity of native plant and animal species in the planning area. This would satisfy the statutory requirement to provide for diversity of plant and animal communities based on suitability and capability of the specific land area in order to meet overall multiple-use objectives." (16 USC 1604(g)(3)(B)). The FS focus for meeting requirements of the NFMA and implementing regulations is on assessing habitat to provide for diversity of species.

The KNF Plan (1987) establishes forest-wide goals, objectives, standards, guidelines and monitoring requirements. Direction for sensitive species includes determining the status of sensitive species and providing for their environmental needs as necessary to prevent them from becoming endangered (FP II-1). The Forest Plan also requires the maintenance of diverse age classes of vegetation for viable populations of all existing native, vertebrate wildlife species (FP II-1).

Table 3.4 - Sensitive Wildlife Species on the Kootenai National Forest (Kimbell 2004, 2005)

PA - Project Area

SENSITIVE SPECIES	PRESENCE IN THE PA*	COMMENTS†
Bald Eagle (*Haliaeetus leucocephalus*)	NS	Project area is outside recovery zone or reoccurring use area.
Black Backed Woodpecker (*Picoides arcticus*)	NS	Habitat (≤10 years post-forest fire) not present in project area.
Coeur d'Alene Salamander (*Plethodon vandykei idahoensis*)	NS	Habitat (streamside talus and waterfall spray zone) not present in project area.
Common loon (*Gavia immer*)	NS	Habitat (large, herbaceous-shored lakes) not present in project area.
Fisher (*Martes pinnanti*)	NS	No recent or historic observations in PA or PSU.
Flammulated Owl (*Otus flammeolus*)	S	Observations in similar habitat (mature, dry ponderosa pine/Douglas-fir) on KNF.

SENSITIVE SPECIES	PRESENCE IN THE PA*	COMMENTS†
Harlequin Duck (*Histrionicus histrionicus*)	NS	Habitat (low-gradient stream with over-hanging vegetation) not present in project area.
Northern Bog Lemming (*Synaptomys borealis*)	NS	Habitat (moist, mossy under-story or meadow) not present in project area.
Northern Leopard Frog (*Rana pipiens*)	NS	Only known breeding site in KNF is on Fortine district.
Peregrine Falcon (*Falco peregrinus*)	NS	Habitat (vertical cliffs with overhangs) not present in project area
Townsend's Big-eared Bat *(Corynorhinus townsendii)*	S	Call detected at collapsed mine adit 1995; Potential source populations nearby.
Western Toad (*Bufo boreas*)	NS	Low population; Habitat (pooled streams, meadows) not present in project area.
Wolverine (*Gulo gulo*)	NS	Habitat (alpine wilderness) not present in PA.

*Key: K = Species is known to occur within the project area.
S = Species is suspected to occur within project area.
NS = Species is not suspected to occur within the project area, and is dropped from further evaluation.

† If no habitat exists in the project area, or no observations have been recorded in the project area or PSU for a sensitive species, it is not probable that the species would be affected by project activities. Therefore, there would be no effect on overall population numbers or indices on a PSU or Forest scale.

FLAMMULATED OWL

Data Sources, Methods, Assumptions, Bounds of Analysis

Flammulated owl population ecology, biology, habitat description and relationships identified by research are summarized in Hayward and Verner (1994). More recent research on nesting, food habits, home range and territories, and habitat quality conducted in Colorado, Idaho and Montana is discussed in Linkhart (2001), Linkhart et al. (1998), Linkhart and Reynolds (1997), Powers et al (1996), Wright (1996), and Wright et al. (1997). Flammulated owl occurrence data comes from recent District wildlife observation records and Forest historical data (NRIS FAUNA).

The KNF "A Conservation Plan: Based on The Kootenai National Forest Land Management Plan" (Johnson 2004) determines PPI for breeding pairs by dividing habitat acres by 40 acres. Using changes to OG habitat and resulting PPIs, effects of alternatives were determined.

The analysis boundary for project impacts and cumulative effects to individuals and their habitat is the Treasure PSU. The boundary for determining trend or viability is the KNF.

AFFECTED ENVIRONMENT/EXISTING CONDITION

As this species utilizes components of OG stands, see the Old Growth and Snag Habitat analyses for specific information on habitat conditions and project impacts.

A KNF status summary of the flammulated owl was documented by Johnson (1999 unpublished). The summary shows that potential habitat occurs across all eight Forest planning units. Forest-wide, there are 237,098 acres of potential habitat (ibid). Flammulated owl habitat is closely tied to mature and OG xeric ponderosa pine/Douglas-fir stands (Holt and Hillis 1987; Wright et al. 1997). Field surveys have confirmed flammulated owl presence in 6 of the 8 planning units. The population size on the KNF is unknown (ibid). District flammulated owl observation and monitoring data indicates that the species occurs within the Treasure PSU. Flammulated owl surveys, which consist of taped owl calls being used in order to draw a response from nesting birds, were conducted within the Treasure PSU in 1995 and 1997. Surveys during both years found flammulated owls in the Scenery Mountain/Cedar Creek area.
Based on the average flammulated owl pair territory size and the amount of effective OG acres, the PPI for NFS lands within the Treasure PSU is 143 flammulated owl pairs. Using the modeled nesting habitat acres from Johnson (1999 unpublished), the minimum PPI for the KNF is 5,927 flammulated owl pairs. These estimates of PPI are considered high based on actual survey results.

ENVIRONMENTAL CONSEQUENCES

Timber falling has the potential to impact flammulated owl habitat. The removal of large ponderosa pine or Douglas-fir trees can decrease the availability of early-season feeding sites, song and roost sites, and trees for snag recruitment in areas already limited in large snag abundance (Wright 1996:77). Snag removal during road construction for OSHA safety standards also removes suitable habitat for flammulated owls.

ALTERNATIVE 1

Direct and Indirect Effects

No activities are proposed under Alternative 1 (no-action), so no direct effect to flammulated owls would occur. Plant succession would continue, increasing canopy closure and increasing density of understory conifers. This plant succession could have an indirect effect on flammulated owls if they occur in the area since the owls forage in open areas within the drier ponderosa pine and Douglas-fir forest. An increasing density of understory conifers would decrease the available habitat for prey species and may impede flight maneuvers needed for foraging (Illg and Illg 1994:58).

Cumulative Effects

The existing condition includes the results from all past activities. All reasonably foreseeable FS projects in the Treasure PSU would not affect OG quantity or quality, and therefore would not contribute to impacts on the PPI for flammulated owl.

On PCTC land, harvest activities would not directly impact flammulated owl habitat, as the private timberland is not identified as suitable habitat. Other private land activities may either contribute to or eliminate habitat. Cumulatively, potential habitat could be reduced by timber harvest.

Alternative 1 (no-action), when considered in association with the planned activities on both public and private lands in Treasure PSU, is expected to have no cumulative effects that would impact the flammulated owl because it would not change the current availability of nesting and foraging habitat, potential nesting territories or increase predation risk. Suitable nesting and foraging habitat would still occur on NFS lands, and sufficient habitat would remain within the Treasure PSU and Forest-wide to support a number of nesting territories. Cumulatively, the timber harvest activities on public and private lands and the removal of large over-story trees could reduce potential nesting and foraging sites. However, the maintenance of effective OG stands and maturation of ROG stands should provide reliable habitat for the flammulated owl population.

ALTERNATIVE 2

Direct and Indirect Effects

No timber harvest units, improvement harvest, or slash and burn units are proposed in Alternative 2. From analysis of OG and snag impacts, 0.4% of large (≥19" dbh) trees and 0.9% of large snags in OG stand D_11 would be removed for this project. The 319 acre stand PPI is 8 breeding pairs. Proposed activities would not reduce the amount of flammulated owl habitat in the stand, but may reduce quality due to increased edge effects. Edge effect and canopy removal affect a total of 36.6 acres, an amount that could negatively affect one nesting pair. The designation of approximately 40 additional acres of old growth would ensure continued habitat for a potential breeding pair of flammulated owls.

Grizzly bear mitigation would restrict road construction and access during April 1st - June 15th, which may mitigate for potential flammulated owl nesting. The stand would be monitored for nesting during the months of April and May previous to implementation. If monitoring reveals nesting activity within 300 feet of the proposed construction route, road construction would be further suspended until after the end of breeding season, July 31st.

Cumulative Effects

The existing condition includes the results from all past activities. All reasonably foreseeable FS projects in the Treasure PSU would not affect OG quantity or quality, and therefore would not contribute to impacts on the PPI for flammulated owl.

On PCTC land, harvest activities would not directly impact flammulated owl habitat, as the private timberland is not identified as suitable habitat. Other private land activities may either contribute to or eliminate habitat. Cumulatively, potential habitat could be reduced by timber harvest.

Alternative 2 and other planned activities on both public and private lands are expected to have no adverse cumulative effects that would impact the flammulated owl. Potential suitable habitat is distributed across the KNF (Johnson 1999:15-16), and sufficient habitat across the KNF should remain. Designation of OG in mitigation of this project would assure that additional quality habitat would be available for flammulated owl in the future.

REGULATORY CONSISTENCY

All alternatives meet Forest Plan direction for sensitive species (FP II-1 #6), are consistent with Forest Plan direction for OG below 5500' (FP Vol. 1 II-1 #7; II-7; II-22 & 23; Appendix 17; and Kootenai FSM 2432.22 Supplement No. 85), and meet Forest Plan standards for snags (FP II-1 #8; II-22 & 23; and Appendix 16).

STATEMENT OF FINDINGS

The proposed action is **likely to impact individuals and/or their habitat, but would not contribute to a trend toward federal listing or loss of species viability**. This determination is based on analysis of OG habitat in the project area and Treasure PSU and project effects to flammulated owl PPI within the project area and the PSU. OG structural integrity would not be affected significantly. However, increased edge effects may lead to reduced quality of habitat. An additional designation of OG habitat would provide additional habitat to supplement decreased quality OG.

TOWNSEND'S BIG-EARED BAT

Data Sources, Methods, Assumptions, Bounds of Analysis

Townsend's big-eared bat population ecology, biology, habitat description and relationships identified by research are described in the following: Reel et al. (1989), Perkins and Schommer (1991), Kunz and Martin (1982), Montana Natural Heritage Program (MNHP 1993), Christy and West (1993), Ross (1967), Whitaker et al. (1977), Thomas and West (1991), and Pierson et al. (1999). Townsend big-eared bat occurrence data comes from recent District wildlife survey records and Forest historical data (NRIS FAUNA) and other agencies (MNHP).

All known caves, mines or tunnels, lakes and OG were located within the Treasure PSU. Caves, mines and tunnels were located through District records, field surveys and mineral maps. OG stands were identified using the Kootenai National Forest Old Growth Stand Layer.

The analysis boundary for project impacts to individuals and their habitat is the Treasure PSU. The boundary for cumulative effects and determining trend or viability is the KNF.

AFFECTED ENVIRONMENT/EXISTING CONDITION

As this species utilizes components of OG stands, see the Old Growth and Snag Habitat analyses for specific information on habitat conditions and project impacts.

District, Forest and MNHP Townsend's big-eared bat observation and monitoring data indicate that they are present, though rare. A KNF status summary of the Townsend's big-eared bat was documented by Johnson (1999). Surveys of the KNF (1993-1995) by Hendricks et al. (1995, 1996) have located the species in all Forest planning units (Johnson 1999) but no key roosting sites been located. Population size on the KNF is unknown.

Townsend's big-eared bats are known to feed along forest edges, and can be associated with either dry or wet type coniferous forests. The species show a preference for OG forest for roosting habitat (Thomas and West 1991). Young and mature forests are used for feeding (Ibid), with primary foraging areas near lakes (Grindal 1995). The species has been documented in the Treasure PSU, more specifically within the Herbert, Luken-Hazel, and Double Mac mine areas in the Prospect and Granite Creek drainages.

At least 16 mines or caves exist within the Treasure PSU. As the Townsend's big-eared bat has the potential to roost in tree cavities (Perkins and Schommer 1991; MNHP 1993), the larger diameter snags or trees with cavities in the area could be used for summer roosting. Designated and undesignated effective OG stands and the remaining timbered habitat in Treasure PSU provide suitable roosting habitat in the form of large snags with cavities, as well as abundant foraging habitat across the forest landscape.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

Under Alternative 1 no activities are proposed and no Townsend's big-eared bats would be directly disturbed by any timber harvest or associated slashing and/or underburning. No direct effects to Townsend's big eared bats would be expected. Plant succession would continue on many of the sites, increasing canopy closure and density of under story conifers. This plant succession may have an indirect effect on Townsend's big eared-bats since they forage in open areas within forests and the increasing density of under story conifers may decrease the available habitat for prey species. It may also impede flight maneuvers needed for foraging. If a wildfire was to occur, potential key roosting habitat (caves or mines) are not likely to be impacted. There would be no expected change in the existing condition with implementation of the no-action alternative. On NFS lands, no direct effect to cavity habitat potential would occur.

Cumulative Effect

The PCTC harvest may remove potential roosting habitat by the removal of snags and large trees in harvest units. There are no federal activities in the Treasure PSU planned for the foreseeable future that would affect OG. Alternative 1, when considered in association with the past, planned and continuing activities on both public and private land is expected to have no cumulative effects that would impact the Townsend's big-eared bat. Cavity habitat potential and PPL is not expected to change significantly at the PSU or Forest scale.

ALTERNATIVE 2

Direct and Indirect Effects

Under Alternative 2, road construction activities have the potential to disturb or reduce day roosting habitat (trees and snags with cavities or thick bark). However, edge habitat created may improve foraging opportunities for bats that use the area. Disturbance or mortality of bats could occur if snags utilized by bats are cut down. Effects would be site-specific, affecting individuals rather than colonies, and are not likely to negatively affect the viability of Townsend's big-eared bats.

During 1995, surveys by the Montana Department of Environmental Quality (DEQ) recorded the calls of Townsend's big-eared bats at the collapsed Herbert mine adit, the Luken-Hazel mine, the Double Mac mine and near middle Granite Creek. The classification of bat species using recorded calls is notoriously difficult and subjective, and accuracy is not 100%. Regardless, Townsend's big-eared bats are suspected on the KNF. Clearing of the Herbert mine adit could result in the creation of roost habitat for bats, with potential for use by Townsend's big-eared bat. If the adit is stable, the installation of a bat-friendly gate would allow access to roosting habitat within the passage. After completion of the mineral exploration portion of the project, if conditions are favorable, a bat gate would be required at the entrance of the adit.

An additional 40 acres of OG would be designated with implementation of Alternative 2. This increase would offset the reduction in quality of OG from road construction. This maintenance of OG habitat would provide large-diameter tree and snag habitat through time, and snag levels would be maintained at a minimum of 40% through time to provide cavity habitat.

Cumulative Effects

Road construction and the removal of dead standing trees, as well as the removal of live trees with cavities, depending on their diameter, could reduce potential summer roosting sites for the bat.

Implementation of Alternative 2 and other reasonably foreseeable activities described under Alternative 1

may slightly increase cavity habitat potential at the PSU or Forest scale. Cumulatively, when other activities including timber harvest, discussed under Alternative 1 and all past, present and reasonably foreseeable activities on both private and federal lands in the Treasure PSU are considered, habitat on federal lands is considered sufficient to provide cavity habitat to cavity dependant species. On NFS lands, cavity habitat potential is expected to manage for a PPL above 40 %, which is thought to be the minimum needed to maintain self-sustaining populations of snag-dependent wildlife (Thomas 1979:72).

REGULATORY CONSISTENCY

All alternatives meet Forest Plan direction for sensitive species (FP II-1 #6), are consistent with Forest Plan direction for OG below 5500' (FP Vol. 1 II-1 #7; II-7; II-22 & 23; Appendix 17; and Kootenai FSM 2432.22 Supplement No. 85) and meet Forest Plan standards for snags and down wood (FP II-1 #8; II-22 & 23 and Appendix 16).

STATEMENT OF FINDINGS

The proposed action is **not likely to impact individuals or their habitat and would not contribute to a trend toward federal listing or loss of species viability** for Townsend's big-eared bat. This determination is based on analysis of OG habitat in the project area and Treasure PSU and project effects to Townsend's big-eared bat habitat within the project area and the PSU. OG structural integrity would not be affected significantly. Increased edge effects may lead to increased foraging opportunity, and the clearing of the mine adit entrance may create additional roosting habitat. Designation of OG in mitigation of this project would assure that additional quality habitat would be available for Townsend's big-eared bat in the future.

THREATENED, ENDANGERED and PROPOSED SPECIES

Regulatory Framework

The Endangered Species Act (ESA) of 1973 declares that all Federal agencies "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to section 4 of this Act." The ESA (Section 7) requires federal agencies to ensure that any agency actions (any action authorized, funded, or carried out by the agency) are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species. Agencies are further required to develop and carry out conservation programs for these species.

The NFMA (36 CFR 219.19) directs the FS to manage habitat to maintain viable populations of existing native and desired non-native vertebrate species. A viable population is defined as one that has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area, the Kootenai National Forest.

A current species list for the KNF was obtained from the FWS web site (http://montanafieldoffice.fws.gov) on March 19, 2007. The FWS concurred with potential listed species distribution maps and resulting consultation areas for the KNF (FWS 2001). Species status in the influence area of the proposed project is shown in Table 3.5.

Table 3.5 - Threatened, Endangered and Proposed Wildlife Species: Project Area Status

AA – Analysis Area

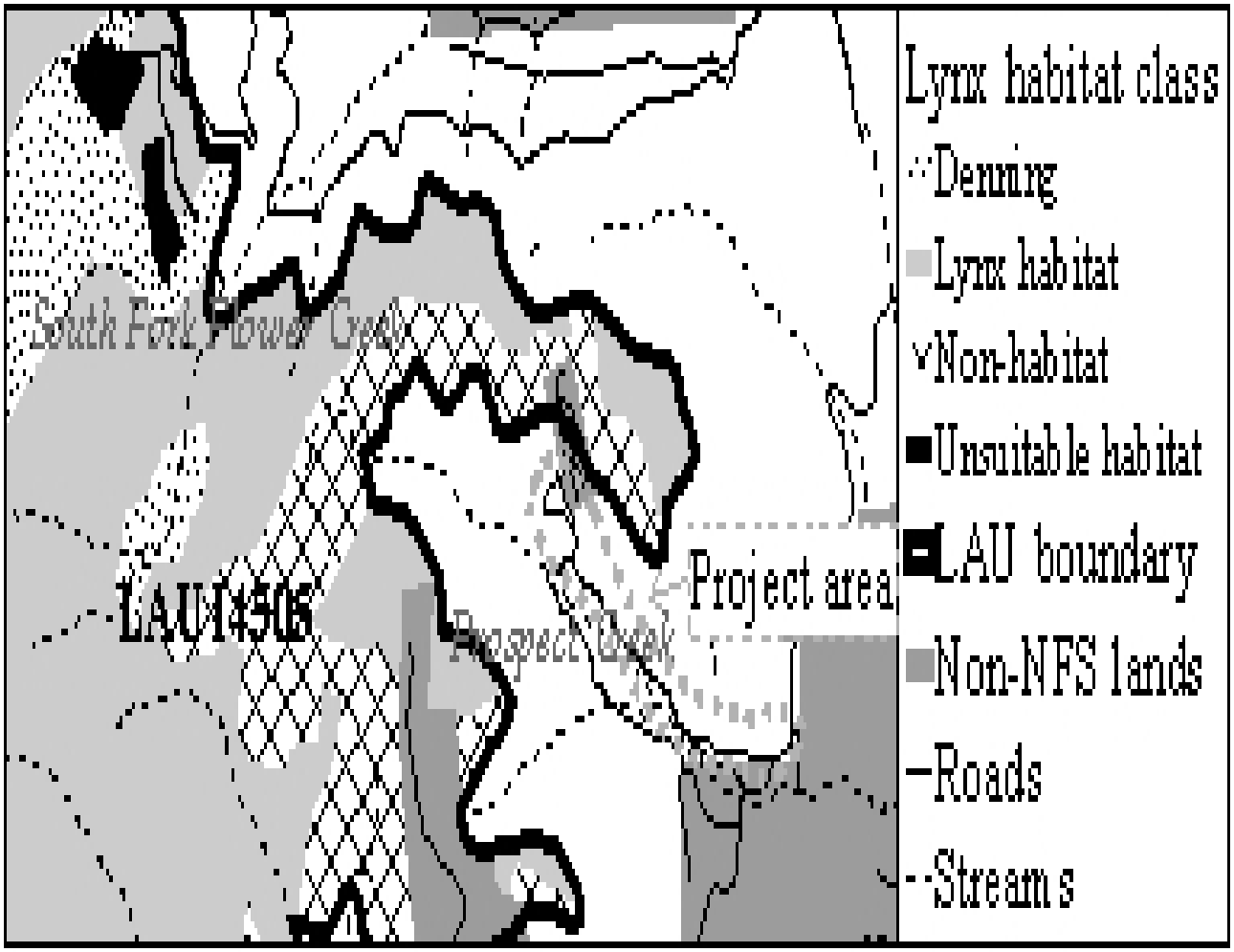
SPECIES	STATUS	PRESENCE IN THE AA*	AA LOCATION**
Gray Wolf (*Canis lupus*)	Endangered	S	2
Grizzly Bear (*Ursus arctos*)	Threatened	K	2
Canada Lynx *(Lynx canadensis)*	Threatened	NS	1

* Key: K = This species is known to occur within the project area.
S = Suitable habitat exists and species is suspected to occur within project area.
NS = No Suitable habitat, species is not suspected to occur within the project area. No further analysis required.
**Analysis Area location Key:
1 = Analysis Area is outside Recovery Zone or reoccurring use area, or FWS agreed to consultation area (FWS 2001)
2 = Analysis area is inside Recovery Zone or reoccurring use area, or FWS agreed to consultation area (FWS 2001)

The private land parcel and the proposed action associated with this project fall within the Cabinet-Yaak Ecosystem (CYE) grizzly bear recovery zone (FWS 1993) Bear Management Unit (BMU) 2, and a portion of

the parcel, but none of the proposed action, falls within the lynx analysis unit (LAU) 14505 (KNF Lynx Task Force 1997). As none of the action would take place within an LAU and the land surrounding the private parcel within LAU 14505 has been designated "non-habitat" (Figure 1), **lynx will not be analyzed for effects for this project.**

Figure 1 - Location of Project Area in Relation to Lynx Habitat Types within LAU 14505



GRIZZLY BEAR

Data Sources, Methods, Assumptions, Bounds of Analysis

Grizzly bear population ecology, biology, habitat description and relationships identified by research are described in the FWS Grizzly Bear Recovery Plan (FWS 1993), the annual progress reports for CYE grizzly bear research (Kasworm et al. 2003-2006), and a Kasworm and Manley (1988) paper on grizzly and black bear ecology in the Cabinet mountains. Grizzly bear management situations as defined by the Interagency Grizzly Bear Committee (IGBC 1986) are also included. Grizzly bear occurrence data comes from recent District wildlife observation records, forest historical data (NRIS FAUNA) and other agencies (FWS, MFWP). The analysis boundary for project impacts to individuals and their habitat is BMU 2 and the Cabinet Face grizzly bear outside the recovery zone (BORZ) reoccurring use polygon (Wittinger et al. 2002). The boundary for cumulative effects and making the effects determination is BMU 2 and the Cabinet Face BORZ polygon.

AFFECTED ENVIRONMENT/EXISTING CONDITION

Inside Recovery Zone

Grizzly bear home ranges have extended into the project area historically (Kasworm and Manley 1988) and

currently (Kasworm et al 2006). According to the FWS 2005 Research and Monitoring Progress Report (Kasworm et al 2006), grizzly bear population in the Cabinet portion of the CYE is estimated at 15 animals, and is estimated at 40 for the entire CYE. Grizzly sows with cubs have been confirmed within BMU 2 during 3 of the last 5 years, but an overall low survival rate estimate for cubs (57.1% ± 17.8% of total cubs produced), paired with late female reproductive maturity (age 6.6 ± 0.6 years) in the CYE (Kasworm et al 2006) indicates that the population may still be sensitive to nominal mortality and habitat loss. The finite rate of population increase (λ) for the CYE from 1983 through 2005 is estimated at 0.929 ± 0.128 (Kasworm et al 2006), which suggests a declining population. See the FWS 2004 and 2005 Research and Monitoring Progress Reports (Kasworm et al. 2005, 2006) and the 2006 Rock Creek Biological Opinion (BO, FWS 2006) for detailed current discussions on the CYE grizzly bear population status.

The goal for grizzly bear management on the KNF is to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery. An integral part of the goal is to implement measures within the authority of the FS to minimize human-caused grizzly bear mortalities. This goal is accomplished by achieving five objectives common to grizzly bear recovery as described by Harms (1990), and by a sixth objective specific to the KNF concerning acceptable incidental take (McMaster 1995). A number of measures are used to gauge whether the objectives are being met. The following analysis describes the potential effects, including cumulative effects of the selected action by examining how these measures are implemented and, thus, how the objectives relating to grizzly bear recovery are met.

Objective 1: Provide Adequate Space to Meet the Spatial Requirements of a Recovered Grizzly Bear Population.

Refer to Table 3.6 for specific habitat component measurements during the discussion of Objective 1 analysis.

Table 3.6 - Habitat Components in BMU 2 - Before and After Project Implementation

HABITAT COMPONENT	BEFORE	DURING & AFTER
HE (% of BMU)	71.2	71.4
Linear ORD (miles/square mile)	0.29	0.27
Core (% of BMU)	76.5	77.0
OMRD (% of BMU > 1 mi./sq.mi.)	19.6	18.9
TMRD (% of BMU > 2 mi./sq.mi.)	14.8	13.4

ORMD – Open Motorized Route Density TMRD – Total Motorized Route Density

A. **Habitat Effectiveness (HE):** HE is the percentage of secure habitat in a given area. For FS purposes, secure habitat is all federal land within a BMU, excluding all MS-3 land, further than ¼ mile from open roads and major activities. HE is calculated as a percentage of the BMU and should be maintained at ≥ 70%. HE is at an acceptable level in BMU 2 currently, and would increase during and after the project due to mitigation road storage (Table 2.1). Refer to the project file for maps showing the results of GIS analysis.

B. Core Areas: The requirements of a core area include:

1) No motorized access (roads or trails) during the active bear season, and
2) At least 0.3 miles distance from open or gated roads.

The goals of federal agencies are to:

1) Attain a core area of 55% in all high priority BMUs, and
2) Incur no net loss of core area on federal ownership within all BMUs.

Refer to the project file for maps showing the results of this analysis.

BMU 2 existing core habitat is well above management guidelines. Though a section of the proposed road would be constructed in existing core habitat, road storage in BMU 2 that is scheduled before road development would increase core habitat overall.

C. Open Motorized Route Density (OMRD): OMRD is calculated on a BMU basis using moving

windows analysis. The goal is for no-net increase in OMRD on NFS lands within BMUs. Refer to the project file for maps showing the results of this analysis.

OMRD would decrease during and after the implementation of the project, which is consistent with the goal of no-net increase.

D. Total Motorized Route Density (TMRD): TMRD is calculated on a BMU basis using moving windows analysis. The goal is for no-net increase in TMRD on NFS lands within BMUs. Refer to the project file for maps showing the results of this analysis.

TMRD would decrease during and after the implementation of the project, which is consistent with the goal of no-net increase.

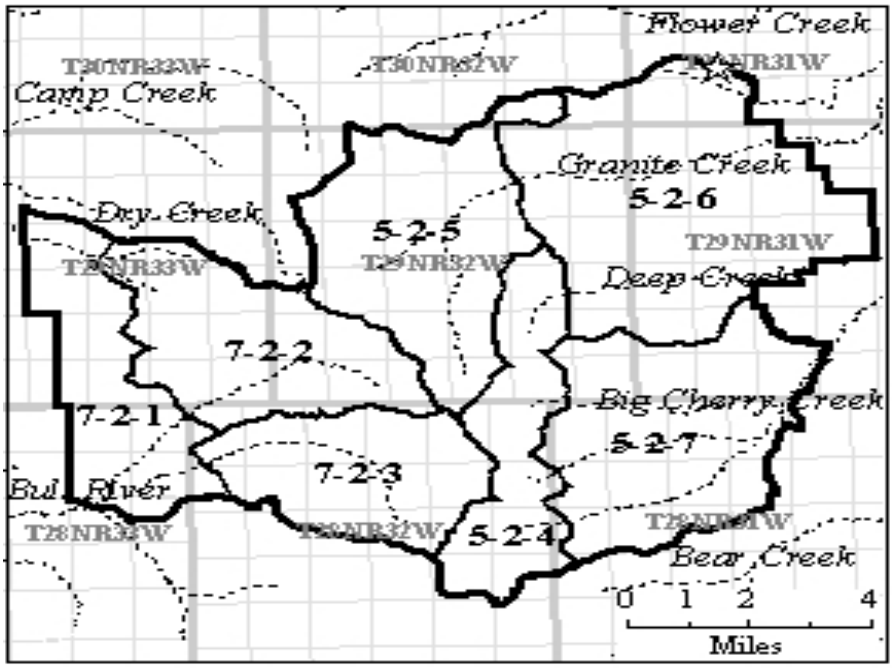
E. Linear Road Density: The linear open road densities (ORDs) in bear analysis areas (BAAs) within BMU 2 are displayed in Table 3.7. Figure 2 display the specific locations of BAAs within BMU 2.

Table 3.7 - BMU 2 Linear Open Road Densities

BAA*	EXISTING ORD (mi/ mi^2)†	ALTERNATIVE 2 ORD (mi/ mi^2) †
5-2-4	0	0
5-2-5	0	0
5-2-6	0.12	0.09
5-2-7	0.14	0.14
7-2-1	0.04	0.04
7-2-2	0	0
7-2-3	0	0

† Calculations rounded to the nearest 10th

Figure 2 - Locations of BAAs within BMU 2 in Relation to the Project Area



Linear ORD in BMU 2 is well below the recommended maximum of 0.75 miles/mi^2 and would decrease during and after the project due to mitigation road storage (Table 2.1). The project area is within BAA 5-2-6. Grizzly bears may be displaced during the project due to human presence and activities, but road storage and ORD decrease in BAA 5-2-6 affords more acreage away from the project area for bear habitat.

Objective 2: Manage for an Adequate Distribution of Bears Across the Ecosystem.

A. Opening Size: Proposed timber harvest units, either individually or in combination with existing un-recovered units should normally be designed to be less than or equal to 40 acres. The project area does not include timber sales. Design criteria of the project leave riparian areas and ridgelines intact.

B. Movement Corridors: Unharvested corridors >600 feet in width should be maintained between proposed harvest units and between proposed and un-recovered existing harvest units. As there are no harvest units included in the project area, corridors greater than 600 feet wide would be maintained as in the existing condition.

C. Seasonal Components: In areas with important seasonal components such as spring range, the guideline is to schedule proposed timber harvest activities to avoid known spring habitats during the spring use period (April 1 to June 15) and known denning habitats during the winter (October 15 to April 15). Den sites are not known to exist within the analysis area. All proposed project activities that take place in spring bear range would avoid the spring bear use period (4/1-6/15). The proposed project would take place in spring range in Alternative 2 but would be mitigated with timing restrictions.

D. Road Density and Displacement (Core) Areas: These are discussed under Objectives 1 and 6.

Objective 3 - Manage for an Acceptable Level of Mortality Risk.

Most human-caused grizzly bear mortalities on the KNF have resulted from interactions between bears and big game hunters (Kasworm and Manley 1988). Grizzly bear vulnerability to human-caused mortality is partially a function of habitat security. Therefore, mortality risk can be partially assessed by the use of habitat factors that maintain or enhance habitat security.

A. Opening Size: See Objective 2.

B. Movement Corridors: See Objective 2.

C. Road Density: See Objective 1 and 6.

D. Displacement: See Objective 1 and 6.

Attractants

Following the requirements outlined in the introduction, this project would not create any attractants such as garbage sources that increase the risk of conflict with humans.

Taking into consideration the status of the habitat components listed previously, mortality risk to the bear is generally low throughout most of BMU 2. It is important to note that human-caused grizzly bear mortality is also a function of other factors, such as the regulation of big game hunting, which are beyond the authority of the FS to control. Regulation of hunting is the responsibility of the State of Montana. Cumulatively, risk of mortality would not change appreciably due to implementing the project.

Objective 4 - Maintain/improve habitat suitability with respect to bear food production.

Riparian habitats are generally considered to be valuable feeding sites. The proposed road construction does include riparian harvest and would follow KNF riparian management guidelines, Montana Streamside Management Act (HB 731) and INFS guidelines. Adherence to riparian area standards would ensure protection of the food resources in this important zone.

Objective 5 - Meet the Management Direction Outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for Management Situations 1, 2 and 3)

Meeting Objectives 1-4 has been determined to meet the intent of the Interagency Grizzly Bear Guidelines (Buterbaugh 1991).

Objective 6 - Meet the Interim Management Direction Specified in the July 27, 1995, Incidental Take Statement (McMaster 1995).

A. Open Road Density: Manage the density of open roads within the Forest Plan standard. See Objective 1 for details.

B. Open Motorized Trail Density: Do not increase the existing density of open motorized trails in the affected BMU. Alternative 2 would have no effect on existing motorized trail density.

C. Total Motorized Access Route Density (TMARD): Manage all motorized access routes (open and restricted roads and motorized trails) in the affected BMU to avoid a net increase over the existing density. See Objective 1 for details.

D. Existing Core Area Size: Manage the amount of Existing Core Area in the affected BMU to avoid a net decrease. See Objective 1.

Cumulative Effects

Past projects along with current, active projects are considered as part of the existing condition. Commercial timber thinning and fuels reduction units for the Treasure Interface Stewardship Project, implemented in 2002, were located along Road #618 and affected existing conditions in the immediate vicinity of the present proposed action. Mitigation for the future Mines Management Inc. (MMI) Montanore Project is also considered part of the existing condition, as these actions affect BMU 2. A record of decision (ROD) has not yet been issued for this project, though Noranda Montanore Project documents, i.e. Environmental Impact Statement (EIS), ROD and BO, in addition to current EIS analysis, have produced sufficient information to draw from. The Snowshoe Mine reclamation, a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Project, would affect BMU 2 in the foreseeable future, though it was not subject to the National Environmental Policy Act (NEPA) process and limited analysis is available for effects. Cumulatively, the potential exists to displace grizzly bears to core areas and other areas not affected by the activities.

Past harvest has provided a variety of age classes and successional stages across the project area. This is providing habitat conditions favorable for grizzly bear and for forage such as huckleberries and big game. ORDs have dramatically dropped in the past several years as a result of closing roads through decisions intended to facilitate grizzly bear recovery. Core habitat has increased across the landscape, providing large core areas from Canada south to the Kootenai River.

In the summer of 1994, large wildfires occurred in the project area. Roads that would normally be closed were opened for fire suppression activities. The access to these areas was limited to fire suppression personnel and rehabilitation personnel. Immediately following the activities associated with the fires, the roads were either gated or bermed to their original condition. The effect of opening these roads was that if animals were in the area they would be displaced to other secure areas. The duration for these activities was approximately 2.5 months, from late summer to mid fall.

Basic road maintenance, pre-commercial thinning, mushroom picking, prescribed burning, timber hauling, wildlife habitat improvement projects and various recreational uses are additional activities that have occurred and would continue to occur within the project area. These activities are generally not considered to have adverse impacts on wildlife species. These activities may incidentally affect wildlife use within some areas on a temporary basis, but are not likely to affect the viability of this species.

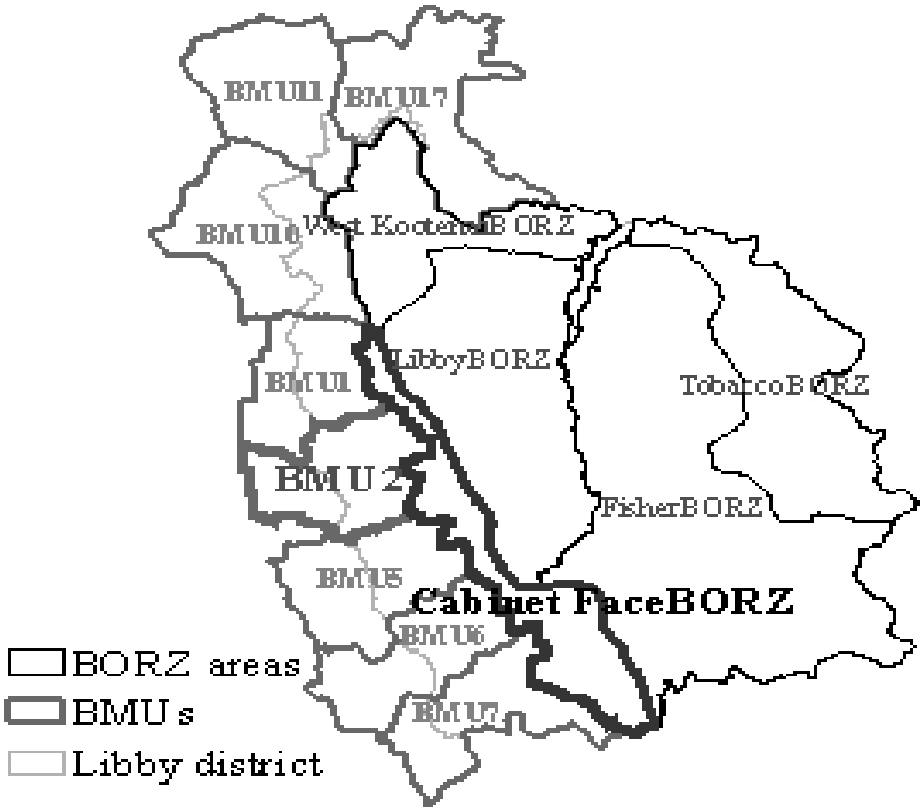
Outside Recovery Zone

Grizzly bear reoccurring use areas outside the recovery zones (BORZ polygons) have been identified for the CYE (Wittinger et al. 2002). The FWS has identified three factors falling under FS jurisdiction that contribute to "taking" (ESA Section 9) of grizzly bears that apply in these areas. They are:

1) Access management;
2) Food attractants (human and livestock food storage and garbage);
3) Livestock presence.

About 0.3 miles of the project's new road construction is in the Cabinet Face BORZ polygon (Figure 3). No mortalities have been recorded in recent years within the Cabinet Face BORZ, and there have been no recent observations of females with cubs in this area.

Figure 3 - BORZ Polygons as Related to BMU Locations, with the Prospect Hill Project's Grizzly Bear Analysis Areas, BMU 2 and the Cabinet Face BORZ, in Bold



Johnson (2003) reviewed access management conditions and research for areas outside the recovery zone with reoccurring grizzly bear use. The access management baseline conditions for the Cabinet Face BORZ polygon were 3.2 mi/mi^2 of linear open road density and 4.7 mi/mi^2 of linear total road density. He concluded that these numbers had the potential to impact very few grizzly bears. Road densities have been reduced since that review.

Table 3.8 - Existing Condition of ORD and TMRD, Livestock and Food Attractants in the Cabinet Face BORZ

INCIDENTAL TAKE PARAMETER	EXISTING CONDITIONS
Linear ORD	2.2 mi/mi^2
Linear TMRD	3.9 mi/mi^2
Livestock	Present
Food Attractants	Present

As the amount of new road construction (~0.3 mi) is minuscule relative to the existing length of roads in the Cabinet Face BORZ (~303 mi), the project would not have an noticeable effect on ORD or TMRD values. Existing condition numbers would be unchanged by the project.

Livestock are present in the Cabinet Face BORZ polygon. There are 8 allotments classified as cow/calf in the BORZ polygon. No known mortalities or conflicts due to livestock grazing are known for grizzly bears within the Cabinet Face BORZ area. The project would not contribute to or detract from livestock grazing.

Food attractants are present in the Cabinet Face BORZ polygon in the form of residential food and waste storage. As mentioned in the introduction, mitigation for this project includes voluntary compliance with guidelines for attractant use and storage on NFS lands, though enforcement on private land is carried out by the FWS. If violation is reported by the FWS, the project permit would be revoked.

Direct and Indirect Effects
Inside the recovery zone, new and existing core areas created by mitigation road storage (Table 2.1) would provide displacement habitat around and outside the project area. Displacement would also be reduced by requiring that operations not begin until June 15th, after bears have moved from lower elevation spring habitat. The project would not cause additional incidental take because OMRD, TMRD and core standards are met in BMU 2. Increased activity in the area of the re-opened portal, under the scope of this permit, would be temporally and spatially constrained, and is not expected to influence bear habitat further than its point source. Road access and human activity on NFS and private land within grizzly bear habitat could potentially increase mortality risk with increased probability of human-bear encounters. However, under the direction of the project permit, alternative habitat and attractant mitigation should minimize any risk of increased mortality.

Outside the recovery zone, the project would not cause additional incidental take, as current ORD and TMRD are maintained in the Cabinet Face BORZ polygon. Traffic flow on larger roads and other human activities would not be increased significantly due to this project.

STATEMENT OF FINDINGS
The proposed action **may affect, but is not likely to adversely affect the grizzly bear**. This determination is based on analysis of grizzly bear habitat parameters in and outside of the recovery zone, accounting for mitigation measures such as bear attractant management, road storage and timing conditions. Road density values would be reduced and core habitat and habitat effectiveness would increase during and after this project due to road storage, resulting in no increase in incidental take within the recovery zone. No change in habitat parameters would occur outside the recovery zone. Some displacement may occur due to localized project activities, but seasonal constraints and establishment of new core areas should minimize impacts.

GRAY WOLF
Data Sources, Methods, Assumptions, Bounds of Analysis
Strategies to protect and recover wolf populations in Montana, as well as the ecology, biology and habitat descriptions are outlined in the Northern Rocky Mountain Wolf Recovery Plan (FWS 1987). The Northwest Montana (NWMT) Recovery area is one of three wolf recovery areas identified for the Northern Rocky Mountain wolf population (FWS et al. 2004). The KNF is within the NWMT Recovery Area. Information for this recovery area is provided by the Rocky Mountain Wolf Recovery 2006 Annual Report (Sime et al. 2007). Wolf occurrence data comes from recent District wildlife observation records, Forest historical data (NRIS FAUNA) and other agencies (FWS, MFWP).

Measurement indicators for this wolf analysis include the following key habitat components found in the Wolf Recovery Plan (FWS 1987):

1) Sufficient, Year-Round Prey Base for Big Game or Alternate Prey
This component can be measured by adhering to Forest Plan big game management recommendations. For this planning area, elk management recommendations were applied. They include road densities, opening sizes, key habitat features, movement areas and security levels.

2) Suitable and Somewhat Secluded Denning and Rendezvous Sites
Sensitivity to disturbance at den sites and subsequent abandonment varies greatly among individual wolves. MFWP encourages land management agencies to consider habitat security and the locations of wolf dens and rendezvous sites in their future planning activities in the same context as considering the locations of ungulate winter range or bald eagle nests (Sime 2002). Assumptions with this method would include maintaining the habitat integrity of the denning and rendezvous sites. Recommendations in Sime (2002) paper were to identify the proposed action and any past actions that have occurred near a den site and discuss them with the consultation biologist to determine the course of action for each specific situation. Den and rendezvous sites can be protected by enacting activity and timing restrictions on

proposed activities within the denning/rendezvous site areas. These restrictions would limit operating periods to the fall or winter seasons when these sites are unoccupied.

3) Sufficient Space with Minimal Exposure to Humans
This component is associated with reducing the risk of human-caused mortality to wolves. Human disturbance and accessibility of wolf habitats (i.e. road densities) are the principle factors limiting wolf recovery in most areas (Leirfallom 1970; FWS 1978, 1987 all in Frederick 1991; Thiel 1978). These components can be generally measured by maintaining open road density standards required by the Forest Plan as well as maintaining any security habitat in the big game habitat recommendations.

The analysis boundary for direct, indirect and cumulative impacts to transient wolves and their habitat is the Treasure PSU. Cumulative and indirect effects would be assessed on this PSU as well.

AFFECTED ENVIRONMENT/EXISTING CONDITION

At the end of 2006, 18 radio-collared wolves from 14 different packs or pairs, in addition to 2 uncollared packs, were being monitored in Northwest Montana (FWS 2007). There are currently 6 packs (3 breeding packs) using the KNF for all or part of their territories. These packs had a total 30 wolves at the end of 2006 (ibid).

There are no known established packs, denning or rendezvous sites within the Treasure PSU, and wolves have not been observed in the area, though a single track was detected in 1997 by a biologist doing surveys for the proposed Treasure Mountain Ski Area. Potential denning and rendezvous sites are available, however there are no known sites on the PSU and therefore no special restrictions are necessary within the PSU to avoid disturbance of den or rendezvous sites. No human-caused mortalities have been documented in the PSU.

Prey Base: The Treasure PSU supports elk summer and winter habitat. Most other ungulate prey species are also found in the Treasure PSU. Together, this mix of species provides a good year-round prey base for wolves. Elk were chosen as the MIS for this PSU and are a key prey item for wolves. The management recommendations for this species are being met in this PSU (see MIS section for details).

Sufficient Space with Minimal Exposure to Humans: ORDs by MA currently meet Forest Plan standards within this PSU. Security habitat recommendations for elk are within recommended levels (see MIS section for details).

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

No road construction or access management is proposed in this alternative. This alternative maintains current conditions for prey habitat and human access within the planning area. Not implementing proposed road restrictions would maintain existing habitat security. A number of existing young timber stands would develop cover values over time.

Cumulative Effects

Past timber harvest and road construction projects and natural events have created much of the existing habitat conditions found within the PSU.

Prey Base: Past analyses (over the last 10 years) in the PSU show that big game habitat management directions are being met.

Timber Harvest: With the current Douglas-fir bark beetle infestations, there is the potential for small salvage timber sales. In addition, blowdown salvage sales may occur after wind events. Salvage activities would follow Forest Plan and Forest-wide Blowdown Salvage DN/FONSI (USDA Forest Service, 1998b) direction. Treatment acres are not expected to exceed 40 acres over the next ten years.

Salvage sales and associated activities can result in the loss of hiding cover and create localized disturbances. It is expected that ongoing and reasonably foreseeable salvage harvest and associated activities within the Treasure PSU would cumulatively contribute localized and minor changes to availability of hiding cover. During logging operations, there may be short-term disturbance to the wolf and their prey species.

There are no ongoing timber sales on State land within the PSU. Ongoing timber harvest on private land includes both regeneration and selective silvicultural prescriptions. The amount of new road construction is expected to be minor. Both state and private landowners generally restrict public use on their roads. Potential effects to wolves from ongoing timber harvest and road construction activities on private land would be minor.

Private Land Development: Land development, including the construction of roads, the clearing of vegetation, the construction of residences and the installation of improvements can create a variety of changes to the landscape. Depending on the magnitude, type and location of developments and the amount of private land on the landscape, these activities can have varied effects, including the loss of hiding cover and localized disturbance on wolves and their prey species.

Private land occupies approximately 20% of the PSU and is intermixed with public land. Forage openings and cover blocks are well distributed across non-forest service land in the PSU.

Development of other lands within the PSU could potentially reduce the amount of hiding cover. However, the remaining levels would still meet recommended levels for big game. Some private land development can result in the loss of habitat and decreases in habitat security through road construction. Recent trends in land development would suggest that it would continue to occur at an increasing rate, which may have impacts on wolves and their prey species within the analysis area over the next ten years.

Hunting: On-going hunting activities are regulated by the MFWP. The FS influences hunter access through road management. Hunting activities within the PSU would cumulatively contribute to minor short-term effects (during the general hunting season) to habitat security. Effects from hunting vary with activity levels and can include short-term disturbance. Mortality risk to the wolf is increased through hunting. The level of hunting within the analysis area is not expected to significantly change due to the proposed action. Hunting activities on State and private land vary with area, but access is limited and use levels are low. With the generally limited amount of these activities on private and State lands, potential effects to the wolf would be minimal.

ALTERNATIVE 2

Prey Base: As discussed in the effects analysis for elk, this alternative would maintain habitat conditions for elk, the wolves' main prey base. Therefore, prey conditions for wolves are likely to be maintained with this alternative. All habitat management recommendations for elk are being met with this alternative.

Denning/Rendezvous Sites: There are no known denning or rendezvous sites within the PSU. Suitable habitat for denning or rendezvous sites would remain available following all alternatives.

Sufficient Space with Minimal Exposure to Humans: ORDs by MA meet Forest Plan standards in this alternative. Effects would be limited to avoidance of activity areas and transient use could still occur.

Cumulative Effects

Refer to Alternative 1 for cumulative effects.

STATEMENT OF FINDINGS

The proposed action would **not affect the gray wolf or its habitat** based on analysis of recent and historic wolf sightings data in Treasure PSU, effects to prey base and mitigation road closures (Table 2.1). Proposed road restrictions would increase habitat security within the Treasure PSU. Mortality risk to the wolf is not expected to increase and activities would not affect any known denning/rendezvous sites. The project area is

not within the home range of a known wolf pack, but there may be short-term avoidance around areas of activity by transient wolves. The proposed action meets Forest Plan big game management recommendations.

MIGRATORY BIRDS

Executive Order #13186 (January 10, 2001): "Responsibilities of Federal Agencies to Protect Migratory Birds" was issued by President Bill Clinton in furtherance of the purposes of the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Acts, the Fish and Wildlife Coordination Act, the Endangered Species Act and the National Environmental Policy Act. This order requires including effects of federal actions on migratory birds as part of the environmental analysis process. On January 17, 2001, the USDA Forest Service and the USDI FWS signed a Memorandum of Understanding to complement the Executive Order.

The NFMA requires that Forest Plans "provide for the diversity of plant and animal communities based on suitability and capability of the specific land area in order to meet overall multiple-use objectives." (16 (SC 1604(g)(3)(B)).

AFFECTED ENVIRONMENT

Neotropical migratory birds are those bird species that migrate to more northerly latitudes to breed on the KNF each summer. During fall, these species migrate south for the winter months. Of the approximately 205 bird species known to occur on the KNF as breeders, migrants, winter visitors or transients, about 70 species could be classified as Neotropical Migratory Land Birds (Al Bratkovich, Libby District Wildlife Biologist and Forest Land Bird Monitoring Program Coordinator, pers. comm. 1999).

ENVIRONMENTAL CONSEQUENCES

Responses of migrant birds to tree clearing and road construction depend upon their individual habitat preferences and needs. Tree clearing removes forest cover used by some species (e.g. brown creeper, golden-crowned kinglet, hermit thrush) and at the same time creates grass, forbs, and shrub habitat used by other bird species (e.g. American kestrel, calliope hummingbird, chipping sparrow). This activity also produces "edge" habitat that still other bird species use (e.g. dark-eyed junco, western tanager, Townsend's warbler). Edge habitat often is similar to forest stands created with partial cutting (e.g. commercial thinning, shelterwood). Species using edge are often found in partial cut stands, so this management practice may provide additional habitat for these species (Hutto and Young 1999).

Effects Common to All Alternatives

Management indicator species have been designated for the KNF. These MIS species represent the habitat needs for migratory birds. As habitat for MIS species is being maintained, it is assumed that sufficient habitat and populations of Neotropical Migratory Land Birds is also being maintained.

REGULATORY FRAMEWORK and CONSISTENCY

There are no specific goals or standards for migratory land birds in the KNF Plan. It does contain the goal to: "Maintain diverse age classes of vegetation for viable populations of all existing native, vertebrate, wildlife species." (FP, Vol. 1, II-1, goal #7) All alternatives are consistent with the KNF Plan, as a wide range of successional habitats would be available. The alternatives are in compliance with the Executive Order titled "Responsibilities of Federal Agencies to Protect Migratory Birds". In addition, as habitat for MIS species is being maintained in the Treasure PSU, and across the KNF, their habitat contributes to the maintenance of habitat and populations of Neotropical Migratory Bird species.

INTRODUCTION

This report analyzes the existing condition and potential effects from proposed forest management on the watershed resource in the project area and downstream receiving waters. The proposed action involves limited timber harvest and construction of approximately 0.8 miles of road. The project also includes required mitigation in the form of road storage and road restrictions. See Chapter 2 for a complete description of the alternatives.

ANALYSIS AREA

The analysis area (project area) for watershed includes all lands in Prospect Creek, Big Cherry Creek and Libby Creek watersheds (see map in map section of this document).

DESIRED CONDITION

The following is a general description for the desired condition of stream systems in the project area. The natural characteristics of a watershed, such as annual precipitation, soil types, geology and vegetative cover would determine to what extent the ground disturbing activities may affect channel morphology, flow regime, water quality and ultimately downstream beneficial uses.

Under natural conditions, a stream system is in a balanced state, neither static nor chaotic. It is continually changing in response to natural cycles of precipitation/runoff, geologic decomposition and vegetative succession. Normally, these changes are of low degree and short duration, so that over time the stream is maintained by its physical, chemical and biological components. Natural events outside the routine cycle do occur, however, and may lead to stream changes beyond the normal short-term fluctuations. For example, unusually high levels of rain or snow may result in higher than average peakflows, or higher than average winds may result in wind thrown trees in the channels or wildfires may result in increased flows or erosion. Increased or diverted flows can result in bank cutting, bedload movement, scour and deposition. Increased sedimentation would alter flow patterns and velocities.

The desired condition is one of dynamic stability. The streambed and banks are stable, with naturally occurring disturbances providing short-term fluxes in the overall stability. Riparian vegetation contributes to stream bank diversity and stability; provides organic energy to the food chain; moderates stream temperatures both in summer and winter; provides input of large organic debris to the stream for streambed stability, sediment storage, and pool forming structures; provides filtering areas for down slope eroding sediment; and provides small organic debris for ground cover and soil nutrient cycling.

Water quality parameters, such as temperature, turbidity, dissolved oxygen, pH, alkalinity and mineral content would be maintained at their natural high quality levels, in accordance with state water quality laws. Wegner (1999) discusses the benefits of completing road storage and decommissioning activities that will help to improve the water quality and decrease the amount of detrimental soil conditions in the project area. Completion of this work would help to remove Libby Creek from the state of Montana's 303d list of impaired water bodies.

There are over 45 miles of perennial stream in the project area. The remaining stream channels in the project area are intermittent in nature and comprise 29% of the channel network. The desired condition would be to improve riparian vegetation, which helps to increase shade, filter sediment from overland flow and provide cover for aquatic organisms in the wetland and stream channels. Existing sediment sources, particularly those associated with roads, would be eliminated through road storage activities, and by bringing roads into compliance with INFS standards and best management practices (BMPs). A Roads Analysis Process (RAP) has been completed for the Libby Creek Basin (report in project file). That document indicates that approximately 18 miles of road in the Libby Creek watershed should be placed into a hydrologically stable condition to help the sub-watersheds begin to recover from past activities. Please see Table 2.0 for a list of the roads in this project and Appendix 5 for a discussion on the techniques used to complete the activities.

BMPs have proven to be a cost effective treatment to help restore and maintain channel stabilities by

improving stream crossing structures to a size where they would pass woody material and bedload, thus not constricting the channel where it meets a road. The implementation of road BMPs also helps reduce sediment delivery from road surfaces and ditches to live streams. This helps to lower sediment inputs to streams but also helps to off-set changes in flow dynamics caused by the efficient routing of captured water by road networks. Please refer to Appendix 2 for a discussion of the BMP process used on the Libby Ranger District, and Appendix 7 for a list of specific BMPs for this project.

Concerns and Opportunities

Water quality is the principle watershed concern in the project area. Past management activities include timber harvest, mining and road construction, which are the major factors influencing both water and soil quality. The following are general objectives for watershed opportunities:

1) Maintain/improve water quality;
2) Minimize erosion, sedimentation and soil compaction;
3) Maintain/improve the integrity of riparian zones and wetlands;
4) Identify and correct all existing unnatural sources of sediment.

Libby Creek is included on the state of Montana's 303d list of impaired water bodies. It is listed as only partially supporting aquatic life and cold water fishery. Sources of impairment are listed as: silviculture, agriculture, removal of riparian vegetation, land development, pastureland and resource extraction. Probable causes of impairments are: flow alteration, metals, other habitat alterations, siltation and nutrients. Big Cherry Creek is also included on the 303d list as only partially supporting aquatic life and cold water fishery. Sources of impairment include resource extraction and silviculture. Probable causes of impairment include metals, other habitat alterations and siltation. The Libby Creek drainage is listed as a priority watershed for the protection of bull trout and other native fish species.

MANAGEMENT DIRECTION

State of Montana Water Quality Laws

The Montana Department of Environmental Quality (DEQ) is responsible for compliance with water quality laws on all lands. The Forest Service (FS) has a Memorandum of Understanding (MOU) with the State that allows the FS to be in control of water quality issues in National Forest System (NFS) lands. The following standards, guidelines, and direction are used to guide the FS in the implementation of this project in respect to water resources. It must be recognized that these standards relate only to NFS lands. Private landowners (including corporate landowners like PCTC) adhere to a different set of standards.

Kootenai National Forest Plan/INFS

The Kootenai National Forest (KNF) Plan was developed in 1987 and amended in 1995 by the Inland Native Fish Strategy (INFS). The standards and guidelines identified in those documents form the basis for this analysis. A complete list of standards and guidelines associated with the Forest Plan (FP) and INFS is included in Appendix 1. Where appropriate, standards would be included as mitigation and included in this report and into any decision that should result from this assessment. Please also see the Fish Populations and Habitat report for a discussion on INFS.

ANALYSIS METHODS

Measurement and Issue Indicators

The following indicators were used to describe the existing condition for streams in the project area, and subsequent impacts of the proposed activities on those indicators. Although some of the indicators have a numerical standard associated with them, others are discussed only in qualifiable terms based on best professional judgment.

Hydrology (Changes in Flow Volume)/Geomorphology (Instream Channel Conditions)

The KNF Plan contains water yield guidelines based on instream resource values (Guidelines for Calculating Water Yield Increases, Appendix 18, KNF Plan). The amount of road density and equivalent clearcut acres (ECAs) changes also tier to the discussion of changes in stream flow volumes. Stream

geomorphology conditions are based on data collected using techniques by Rosgen (1996). There are no FP standards for stream width-to-depth (W/D) ratios. Based on the current INFS direction (which was developed for streams draining the west side of the Cascade Mountains), a stream that is functioning appropriately should have a W/D ratio of less than or equal to 10. Based on current geomorphologic data from reference locations on Libby Ranger District (analysis in project file), the W/D ratio can be variable and is determined by the surveyed channel type. Based on those findings, A, E and G channel types have W/D ratios less than 12. Channel types that fall into the B, C, D and F categories have W/D greater than 12. The INFS standard for percent stable banks is greater than 80 percent stable.

The channel systems in the project area watersheds generally have bankful widths of less than 20 feet. Using the standard INFS guidelines, this results in a desired pool frequency of 56 pools per mile or approximately 1 pool every 94 feet. A review of data collected from reference reaches on the Libby Ranger District indicates that for streams of this channel geomorphic type and size there should be a pool every 35 feet, and a piece of large woody debris (LWD) every 20 feet. Bank stability in riffle sections of the channel should occur over 96% of the reach. There is no reference data available for larger stream systems such as Lower Libby Creek which has an average bankful width of 60 feet. The INFS standards for channels of this size are 1 pool every 293 feet.

Riparian Management Objectives (RMOs)
INFS identifies numerous riparian management objectives (RMOs) using data from stream inventories. Included in this analysis are: pool frequency, large woody debris (LWD) and water temperature. These objectives have been determined to be good indicators of ecosystem health, and represent a good starting point to describe the desired condition for stable streams and fish habitat. Please see the Fish Populations and Habitat section for a more detailed discussion of RMOs. The following categories were developed from the RMOs with specific attention to the water resource: Water Quality and Riparian Habitat Conservation Areas (RHCA).

Water Quality (Temperature, Sediment, Nutrients and Contaminants)
The KNF Plan, as amended by INFS, contains numerical standards for temperature but does not contain any standards for water quality other than a statement to meet or exceed State water quality standards. There are no standards for sediment in the FP. For purposes of this analysis, a qualitative assessment of existing and potential sediment is included, based on landtypes, stream channel types and existing sediment sources. There are no numerical standards for nutrients and contaminants in the FP. Indicators are based on a qualitative assessment of levels from various sources and on the determination of water quality limited segments as identified in the State of Montana's 303(d) list of impaired water bodies.

Riparian Habitat Conservation Areas (RHCAs)
Disturbance history of riparian areas is of concern as it pertains to direct impacts to stream channels. An RHCA map for streams in the project area has been completed and is included in the project file.

Data Collection and Analysis

Rosgen (1996) developed a classification system which is used to morphologically describe stream systems operating within states of dynamic equilibrium. The classification process addresses questions such as sediment supply, stream sensitivity to disturbance, potential for natural recovery, channel response to changes in flow regime and fish habitat potential. Information on Prospect Creek is very limited. Water quality data was collected on the lower reaches in 1976, Rosgen channel typing and RMO data was collected on ten sites (four on the mainstem Prospect Creek and six on Rabbit Creek, a tributary) in 1998.

Data has been collected on both Big Cherry and Libby Creeks over a period of many years. Data collection includes snorkeling, redd counts, electroshocking, fish trapping, Rosgen channel typing, RMO data collection, Pfankuch channel stability surveys, stream temperature data loggers, ISCO suspended sediment sampling, a

nonpoint source stream reach assessment (Tralles MWQB) and core sampling. This data is kept in the district watershed files.

AFFECTED ENVIRONMENT

A. Analysis Area

The project area is situated within the Libby Creek drainage, specifically the Prospect Creek portion of the Big Cherry Creek watershed. Big Cherry Creek originates on the east slope of the Cabinet Mountains. The highest point in the drainage is Snowshoe Peak at 8,738 feet elevation. Before reaching Libby Creek, at an elevation of 2,402 feet, Big Cherry Creek picks up seven tributary streams, the largest of which is Granite Creek. Land ownership in the drainages is displayed in Table 3.9. Timber production, mining, recreation, land development, fishing and hunting are the primary land uses in the drainages.

Table 3.9 - Land Ownership

DRAINAGE	FOREST SERVICE	PLUM CREEK	OTHER PRIVATE	STATE OF MT	TOTAL (ACRES)
Prospect	2,931	146	928	0	4,005
Big Cherry*	23,538	645	2,456	62	26,701
Libby	121,271	10,717	14,394	3,636	150,017

* That portion of the Big Cherry Creek drainage downstream of and including Granite Creek. The Big Cherry Creek drainage is almost 55,000 acres in size when all lands are included.

The upper portion of the Big Cherry Creek drainage, including a small portion of the headwaters of Prospect Creek, lies within the Cabinet Mountains wilderness area. Although mining has had a fairly substantial impact on portions of this area, the majority remains unroaded. That portion of the drainage, outside of the wilderness area, has been drastically altered. Three tributary streams combine to form the mainstem of Prospect Creek, with the middle tributary considered the main channel. Private lands are situated in the lower portions of the drainage, 5 of the 7 miles of stream channels in the lower portion are on private lands. The upper portions of each of the three tributaries are on NFS lands. With the exception of the mainstem Prospect Creek, the other tributaries are either dry draws or intermittent streams. Overall, approximately 60 % of the stream length in the analysis area is on NFS lands, the remainder is located on private lands.

B. Water Resources

Consumptive use of water within the project area is primarily by wildlife and grazing. Non-consumptive uses include maintenance of amphibian and macroinvertebrate biota. There are numerous surface and groundwater rights on file in the Libby Watershed. Beneficial uses identified by the Montana Department of Health and Environmental Sciences under their B-1 classification include: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers; and agricultural and industrial water supply.

Libby Creek is included on the state of Montana's 303d list of impaired water bodies. It is listed as only partially supporting aquatic life and cold water fishery. Sources of impairment are listed as: silviculture, agriculture, removal of riparian vegetation, land development, pastureland and resource extraction. Probable causes of impairments are: flow alteration, metals, other habitat alterations, siltation and nutrients. Big Cherry Creek is also included on the 303d list as only partially supporting aquatic life and cold water fishery. Sources of impairment include resource extraction and silviculture. Probable causes of impairment include metals, other habitat alterations and siltation.

C. Climate

The climate of the analysis area is strongly seasonal. The mean annual precipitation is 22 inches in the lower elevations where the proposed action would occur. The largest amount of precipitation falls as snow during the winter. Snowfall is heaviest at higher elevations and normal snow pack is retained into May.

The area is sometimes subjected to strong warm-frontal storms during the winter months which bring heavy rain, warm temperatures and strong winds. Depending on storm intensity and soil and snow pack moisture

conditions, these storms can produce very high stream discharges. These are commonly called "rain-on-snow" (ROS) events. In addition to causing high stream discharges, the high rate of water input to the soil can generate unstable conditions on hillslopes (Sidle et al. 1985). The effects of ROS events are magnified in drainages where large amounts of the forest canopy have been removed. These large openings allow more wind and rain to reach the snow pack which results in a more rapid melt and runoff and a "flashier" hydrologic response with shorter time of concentration and higher peakflows. Flow frequencies can be significantly altered in these basins such that higher flows become more common and baseflows and low flows are reduced. During such high flows, stream channels may be altered by bank erosion, downcutting, and redistribution of sediment and LWD (Harr 1981). The majority of large landslides and large streamflows occur during these events.

ROS events occurred on the KNF in 1990, and more recently during the fall and winter of 1995-96 and 2004. These events caused extensive damage to road drainage and stream crossing structures throughout the KNF. Major channel alterations also occurred to some stream systems as a result of extensive bank cutting and sediment movement. ROS events are common in the Big Cherry and Libby Creek drainages but are not so common in Prospect Creek.

D. Stream Channel Types

Rosgen (1996) developed a classification system that is used to morphologically describe stream systems operating within states of dynamic equilibrium. The classification process addresses questions such as sediment supply, stream sensitivity to disturbance, potential for natural recovery, channel response to changes in flow regime, and fish habitat potential. Stream channel morphology is the ultimate integrator of hillslope and stream channel responses to land management activities within a drainage basin. Therefore, it is the primary indicator of water resource effects. A stream channel has an upper level of tolerance to changes in the geomorphic processes. Channel aggradation or incision, stream bank cutting, and increasing rates of mass wasting are indicators of exceeding a geomorphic threshold. For a selected hydrologic event, the risk of upsetting geomorphic equilibrium and initiating adverse water resource effects is greatly increased as the watershed disturbance approaches the upper level of this tolerance.

Stream channels are variable in how they respond to changes in the natural levels of runoff (peakflows) and/or the amount of sediment that is input into the stream system. The response of streams to increased levels of these items, above natural levels, is dependent on the makeup of the stream channel and how that particular stream channel recovers from disturbances. The response of streams to imposed change is not uniform among stream types. The variability that exists is displayed in Table 3.11, where interpretations are shown for sensitivity to disturbance, recovery potential, sediment supply, streambank erosion potential and vegetation as a controlling influence. The major stream types found in the analysis area are discussed below.

"**A**" stream types are found in valley types that due to their inherent channel gradients (>4%) exhibit a high sediment transport potential and relatively moderate in-channel sediment storage capacity. "A" stream types are well entrenched, have a low W/D ratio and are totally confined. LWD plays an important roll in energy dissipation and sediment storage. "A" stream types are described as high energy/high sediment supply streams due to their inherently steep channel slopes and narrow/deep channel cross sections. One of the sample sites were this channel type.

"**B**" stream types tend to be very stable, with a low sensitivity to disturbance such as increased peakflows or sediment, and also have an excellent recovery potential once the cause of the disturbance is corrected. These stream types have natural armoring in the form of larger materials with less fine materials that would potentially erode. These stream types exhibit rapids-dominated bed morphology. Stream bank erosion rates are normally low as are the channel aggradation/degradation process rates. Five of the sample sites were this channel type.

"**E**" stream types are considered evolutionary in terms of fluvial process and morphology. While "E" stream types are considered highly stable systems, provided the floodplain and the low channel W/D

characteristics are maintained, they are very sensitive to disturbance and can be rapidly adjusted and converted to other stream types in relatively short time periods. One of the sample sites were of this channel type.

"**F**" stream types are the typical entrenched meandering channels. "F" stream channels can develop very high bank erosion rates, lateral extension rates, significant bar deposition and accelerated channel aggradation and/or degradation while providing for very high sediment supply and storage capacities. Three of the sample sites were this channel type.

E. Vegetation

Under natural conditions, the type and degree of vegetative cover within a watershed is largely defined by the climate and soils that allow it to grow and reproduce. Natural levels of mortality due to wind events, insects and diseases, and fire do occur and can drastically alter the vegetative composition of the watershed. Depending on the degree of mortality and rate of stand decomposition, impacts to stream systems can be significant (Bethlahmy 1975; Tiedemann et al. 1975). Land development, especially timber harvest and road construction, has influenced vegetative cover throughout the project area. The impact of these activities is discussed in the existing condition portion of this analysis.

F. Riparian Areas and Wetlands

The condition of the riparian area is vital to maintain a functional, healthy interface between the terrestrial ecosystem and the aquatic ecosystem. The loss or damage of riparian areas can affect fisheries habitat by limiting the amount and quality of detritus biomass input. Changes in sediment, water temperature, bank stability and streamflow regime can also occur if large percentages of the riparian areas in a watershed are damaged or harvested.

Dennis (1989) summarized research efforts and stated that standing dead trees in the riparian zone were an important source of stream shading, and should be retained within the riparian corridor. King (1993) discussed research conducted on sediment production and transport in forested watersheds in the Northern Rocky Mountains. He states that LWD from the riparian areas accounted for almost half of the stored sediment in headwater streams.

There are approximately 12 miles of intermittent and perennial stream channels in the Prospect Creek drainage. It is estimated that there are 5 miles of fisheries streams and 2 miles of perennial non-fisheries streams with the remainder being intermittent in nature. Fisheries use is known to occur in Prospect Creek and Rabbit Draw and are suspected to occur in perennial sections of the southernmost tributary as well.

There are many small isolated wetlands scattered throughout the project area. Some of these wetlands have been "enhanced" (through blasting) in the past by the FS. Other wetlands in the area are associated with streams and are narrow strips along the stream banks. Along "A", "B" and "E" type stream systems, narrow wetlands occur that are about twice as wide as the active stream channel. These areas also act as floodplains. These wetlands can support vegetation such as cattails, willow, dogwood, sedges and reedgrass. All of these wetlands provide habitat and forage for a variety of wildlife and are effective filters of sediment from off-site erosion. They also store water and sediment during over-bank flows and release water during low flow periods. There are no wetlands impacted by the proposed activity.

EXISTING CONDITION OF THE WATERSHED

Past Management

Timber harvest, road construction, mining and land development have been the principle management activities in the project area on both private and NFS lands. A high degree of road construction and timber harvest has occurred on both FS and private timber lands throughout the drainage. Table 3.10 displays the existing amount of acres managed in the analysis area. This analysis includes the recent development and harvest activities on the developed Lukens Hazel Mine property.

Mining has been extensive throughout the Libby Creek drainage including Prospect and Big Cherry Creeks. The larger mining ventures included the Lukens Hazel Mine in the Granite Creek drainage and the Snowshoe Mine in the Big Cherry (Snowshoe Creek) drainage. Mining also occurred in the Prospect Creek drainage, including a portion of the Lukens Hazel complex and the Herbert Mine. Mining still occurs to a limited extent, with the majority of the mining in the form of sluicing, panning and suction dredging.

Table 3.10 - Water Yield Results 2007

DRAINAGE	ACRES	EXISTING PFI**	ECA*** USFS	ECA OTHER	ROAD DENSITY
Prospect	4,005	22.2	194	806	2.24
Big Cherry*	23,538	4.5	699	1,640	1.09
Libby	150,017	4.0	17,744	10,435	2.82

* That portion of Big Cherry Creek from Libby Creek up to and including Granite Creek
** PFI = Peakflow Increase (%) *** ECA = Equivalent Clearcut Acres

Hydrology (Changes in Flow Volume)/Geomorphology (Instream Channel Conditions)
Because the greatest risk of degrading channel function occurs during high flow periods, it is the increase in magnitude and duration of peakflows that concerns land managers the most. Timber harvest often alters normal streamflow dynamics, particularly the volume of peakflows (maximum volume of water in the stream) and baseflows (the volume of water in the stream representing the groundwater contribution). The degree these parameters change depend on the road density, percentage of total tree cover removed from the watershed, and the amount of soil disturbance caused by the harvest, among other things. For example, if harvest activities remove a high percentage of tree cover and cause light soil disturbance and compaction, rain falling on the soil would infiltrate normally. However, due to the loss of tree cover, evapotranspiration (the loss of water by plants to the atmosphere) would be much lower than before. Thus, the combination of normal water infiltration into the soil and decreased uptake of water by tree cover results in higher stream flows. In general, timber harvest on a watershed scale results in water moving more quickly through the watershed (i.e. higher runoff rates, higher peak and baseflows) because of decreased soil infiltration and evapotranspiration. The creation of openings in a forested canopy would tend to increase snow deposition (Christner and Harr 1982) and wind speeds (Chamberlin 1982). An increase in wind speeds could increase the rate of snowmelt during cloudy and rainy conditions resulting in greater streamflow (Harr 1981).

Water yield increases due to timber harvest and road construction activities are a function of canopy reduction and miles of road constructed. Hydrologic responses to these activities would depend on the natural characteristics of the watershed. They can include: increases in snowpack depth, melting rates, surface runoff, subsurface flow interception and landform energy aspects. As discussed under the streamflow regime section, ROS events can occur in the project area drainages. Water yield estimates for the project area were determined using the KNF beta version of the Equivalent Clearcut Acres Calculator (ECAC). This process is a GIS interface with management activity databases (Oracle and TSMRS) that allows watershed specialists to model (estimate) the current ECA within a watershed of interest. The model calculates disturbances based on the "ECA" procedure. For example, a 100-acre harvest area with 100 percent canopy removal would equate to 100 ECAs; a 100-acre harvest with a 52% crown removal would equate to 44 ECAs. The ECAC model calculates ECA for a specified watershed based on the most recent and most impactive (greatest crown removal) management activities associated with roads, timber harvest, prescribed fire and wildfire. The ECAC model does not model peakflows or sediment production and transport. Watershed specialists must use additional models, indices, measures, monitoring, site-specific data and experience to analyze cumulative watershed effects.

The ECAC Model was not designed to develop estimates of flow. The development of flow estimates from ECAC output generally involves separating watersheds by size class and precipitation regime that had already been run through the R1-WATSED model and comparing their results with the ECAC process to look at water yield estimates. This procedure has allowed a more simplified analysis path based on ECAs to generate water yield estimates that have been validated by comparison with the R1-

WATSED model output. Regression lines created from R1-WATSED outputs are used to determine the number of ECAs required to generate a 1% increase in peakflows and also the number of ECAs that recover each year in a watershed. Copies of the regression graphs are included in the project file.
The ECAC Model was designed as a quick-analysis tool to enable watershed professionals to estimate the potential effects of forest management (harvest and roading). The utility of the Model is that it offers a quick and consistent method of providing information on past and proposed management activities. The values generated by the model are used, in concert with other water resource information, to interpret the potential effects to a stream channel as a result of implementing a proposed land management activity. Values generated by the model are not to be considered as an absolute measure against verifiable standards, nor by themselves provide an answer as to the effects of implementing the proposed land management activity. Please see Appendix 8 for a more detailed discussion of the models used in this analysis.

Road systems increase the amount of compacted soil in the watershed and increase the size of the peakflow and advance the timing of the runoff for the watershed. The roads act as "tributaries" that intercept and redirect surface and subsurface water that would normally be filtered by the forest duff and soils (Wemple 1994). This redirected water is transported to the creek via the road ditches in larger quantities and shorter time periods. This leads to earlier and larger peakflows than would naturally occur. Roads are also one of the greatest sources of aquatic habitat degradation. Roads significantly elevate onsite erosion and sediment delivery, disrupt subsurface flows essential to the maintenance of baseflows and can contribute to increased peakflows. Road densities and water yields for the project watershed and the down stream receiving waters (Big Cherry and Libby Creeks) are displayed in Table 3.10. There are approximately 425 stream crossings in the Libby Creek watershed.

From the data that has been collected to date, channel conditions are mostly stable, and stream banks are well armored where no riparian harvest has occurred. There are numerous locations of in-channel erosion in the lower Big Cherry and Libby Creek watersheds. Adequate floodplain is available in Prospect Creek, but floodplains along the mainstem of Big Cherry and Libby Creeks have been encroached by development and road construction.

Increased peakflows can also impact channel geomorphology. Rosgen channel typing and RMO data was collected on 10 sites in the Prospect Creek drainage in 1998. The vast majority of streams in the project area are in a stable morphological state. Stream W/D ratios and channel bankful widths follow a normal pattern of increasing, as the drainage area above the site increases, indicating that the channels are not changing drastically to meet the added inflow as tributaries are added to the system. All of the survey sites meet the desired W/D ratio based on channel morphology research (Rosgen 1996). Bank stability measurements at the sample locations are above that of data collected for reference locations of the same channel type across the Libby Ranger District at all locations. Bank stability is of prime importance in maintaining quality habitat conditions and reducing sediment introductions into the water column. The number of existing pools is below what would be expected in only one site on Prospect Creek and it was very close to meeting the criteria.

Water Quality (*Sediment, Nutrients and Contaminants*)

Sediment

Erosion is a natural process of geologic decomposition that occurs in all watersheds, and all stream systems need to transport this sediment downstream. There are three basic types of erosion: detachment and routing of individual soil particles from the land surface, mass movement such as landslides and slumps, and detachment and mobilization of stream channel banks or substrate material.

Sediment can refer to a wide range of stream channel particle sizes (i.e. silt, sand, boulder, etc). All of the erosion processes can produce sediment throughout the range of size classes. In general, the larger particle sizes are produced through bank cutting or mass wasting. Finer particles, suspended in flowing water, are the main concern in relation to water quality. Management activities have the potential to alter

these erosion processes and cause increases in sediment concentrations within the water column and the stream bottom substrate.

Timber harvest and road construction activities that remove forest canopy increase snowpack depths and melting rates, resulting in increases in surface runoff. These same activities cause varying degrees of soil exposure, soil compaction and surface runoff routing. Given the right conditions, this additional runoff and suspended sediment can be transported to stream channels. Increases in surface flow during runoff events generally result in an increase in peak stream flow. As this peak discharge approaches magnitudes and durations beyond normal conditions, bank cutting, bedload movement and mass slope failure can occur.

Rosgen (1996) developed a classification system that is used to morphologically describe stream systems operating within states of dynamic equilibrium. The classification process addresses questions such as sediment supply, stream sensitivity to disturbance, potential for natural recovery, and channel response to changes in flow regime. Forty-five sites in the project area (eight sites in the Prospect watershed) were analyzed using the Rosgen channel typing method. The major channel type found in the project area is "B4".

Stream channels are variable in how they respond to changes in the natural levels of runoff (peakflows) and/or the amount of sediment that is input into the stream system. The response of streams to increased levels of these items above natural levels is dependent on the makeup of the stream channel and how that particular stream channel recovers from disturbances. The response of streams to imposed change is not uniform among stream types. Table 3.11 lists the interpretations for the stream's sensitivity to changes in flows and sediment, recovery potential, natural sediment sources from the stream channel, and stream bank erosion potential for the geomorphic stream types found in the assessment area.

Table 3.11 – Stream Channel Sensitivity Data

ROSGEN STREAM TYPE	SENSITIVITY TO INCREASED PEAKFLOWS and/or SEDIMENT	RECOVERY POTENTIAL*	NATURAL SEDIMENT SOURCES from STREAM CHANNEL	STREAMBANK EROSION POTENTIAL
Prospect F4	extreme	poor	very high	very high
Prospect B3	low	excellent	low	low
Prospect F6	very high	fair	high	very high
Rabbit B6c	moderate	excellent	moderate	low
Rabbit B4c	moderate	excellent	moderate	low
Rabbit E4b	very high	good	moderate	moderate
Rabbit B4a	moderate	excellent	moderate	low
Rabbit A4a	extreme	very poor	very high	very high

*The recovery potential assumes natural recovery once the cause of instability is corrected.

Nutrients and Contaminants

Because of the low road crossing density on perennial streams in the project watershed, nutrients and contaminants are very low concerns in respect to water quality. Libby Creek is included on the state of Montana's 303d list of impaired water bodies. It is listed as only partially supporting aquatic life and cold water fishery. Sources of impairment are listed as: silviculture, agriculture, land development, removal of riparian vegetation, pastureland and resource extraction. Probable causes of impairments are: flow alteration, metals, other habitat alterations, siltation and nutrients. Big Cherry Creek is also included on the 303d list as only partially supporting aquatic life and cold water fishery. Sources of impairment include resource extraction and silviculture. Probable causes of impairment include metals, other habitat alterations and siltation.

Riparian Habitat Conservation Areas (RHCAs)

Roads within riparian zones reduce shading and disrupt LWD sources beyond the life of the road. These effects degrade habitat by increasing fine sediment levels, reducing pool volumes, increasing channel migration and exacerbating seasonal temperature extremes. The largest road impacts in the project

watersheds come from road crossings and long sections of road within RHCAs. Approximately 60% of the riparian areas in the project areas have experienced some level of timber removal; the tributaries have seen greater levels of management with approximately 75 % the tributaries having seen management activities.

ENVIRONMENTAL CONSEQUENCES

Under natural conditions, a stream system is in a state of dynamic equilibrium. A stream channel develops over time by adjusting to changes in climate, flow regimes and sediment inputs. Timber management activities can upset this balance by directly impacting the stream channel or adjacent stream banks. For example, road construction across stream channels can immediately increase sediment concentrations in the streamflow and harvest activities in riparian areas may add slash material to the channel, cause bank sloughing to occur or reduce shading leading to modified water temperatures.

The cumulative effects of altering upslope runoff/erosion processes increase the possibility of indirectly changing the natural balance of the stream system. A reduction in the forest canopy can increase snow packs and melting rates. Heavy equipment operation could compact soils, thereby accelerating surface runoff. Skid trails and roads could intercept surface and subsurface flows and route this water down slope. Riparian harvest activities may decrease the ability to filter upslope erosion or alter channel geomorphologic processes by reducing LWD in the channel. It can also affect water temperature regimes and eliminate stream habitat cover. Vegetation removal can also destabilize marginally stable slopes by increasing the subsurface water load, lower root strength and alter water flow patterns on the slope. Road crossings can also partially constrict or channelize flows and limit a streams ability to maintain pools. As streamflow or sediment concentrations increase, the natural energy balance within the streamflow changes. Stream channels that are out of equilibrium exhibit varying degrees of bank cutting, channel scour, sediment deposition and channel braiding.

Management activities that disrupt the natural balance of stream systems may do so for as little as one day, or may continue for many decades. Surface erosion production from newly constructed roads normally drops rapidly within one to four years following construction. Although the level of erosion drops considerably with time, some lower level of increased erosion occurs as long as the roads are on the landscape. Increases in surface runoff due to timber removal may take 70-90 years for hydrologic recovery to occur.

Timber harvest activities such as road building and use, skidding logs, tree harvesting and burning increase the amount of bare, compacted soil exposed to rainfall and runoff resulting in higher rates of surface erosion. Some of this hillside sediment can reach streams via roads, skid trails and/or ditches. Appropriate management precautions such as avoiding timber harvest in wet seasons, maintaining buffer zones below open slopes and skidding over snow can decrease the amount of surface erosion. Harvest activities can also greatly increase the likelihood of mass soil movements occurring, particularly along roads and on clearcuts in steep terrain. Increased surface erosion and mass soil movements associated with timber harvest areas can result in an increase of sediment inputs to streams. Fine sediments infiltrate into streambed gravels affecting aquatic populations (Chamberlain 1982).

EFFECTS

The hydrology analysis accounts for all land disturbing activities (past, present and proposed) within the project watershed and the larger receiving watersheds (Big Cherry and Libby Creeks). The effects analysis is based on the proposed activities displayed in Chapter 2. All proposed logging systems would be conducted through tractor harvest methods. Alternative 1 is the no-action alternative, which implies that none of the activities displayed in Chapter 2 would be conducted. Alternative 2 is the proposed action.

ALTERNATIVE 1

Direct and Indirect Effects

Timber harvest and road construction activities, as proposed with this EA, would not occur under the no-action alternative. However, natural changes in climate and vegetation would continue to occur. Vegetative regeneration would continue on existing harvest units resulting in lower surface runoff and melting rates.

Existing roads and skid trails would continue to intercept subsurface flows although sediment delivery from cut and fill slopes would decrease to a lower but constant level as stabilization and revegetation occurred.

Cumulative Effects
There is no planned timber harvest activity in the Prospect Creek or Big Cherry Creek watersheds in the near future. There is planned timber harvest activity in the Libby Creek watershed by Plum Creek Timber Company (PCTC) and Montana Department of State Lands (DNRC). As proposed, through 2010, PCTC plans to complete 162 acres of ECAs with no new road construction. DNRC plans to complete 48 acres of ECAs in 2010. The harvest delay would give the watershed some recovery but that has not been taken into account for this analysis due to the great variability in the timber industry. The results displayed in Table 3.12 assume that all the activities would be completed in 2007 and ongoing vegetative recovery would continue.

Table 3.12 - Alternative 1 - Water Yield Results

DRAINAGE	ACRES	PREDICTED PFI**	ECA*** USFS	ECA OTHER	ROAD DENSITY
Prospect	4,005	22.2	194	806	2.24
Big Cherry*	23,538	4.5	699	1,640	1.09
Libby	150,017	4.0	17,744	10,645	2.82

* That portion of Big Cherry Creek from Libby Creek up to, and including Granite Creek
** PFI = Peakflow Increase (%) *** ECA = Equivalent Clearcut Acres

Watershed Condition Discussion
There would be no change over the existing condition in the Prospect and Big Cherry Creek watersheds. The proposed PCTC and DNRC activities in the Libby Creek watershed would technically add to the peakflow level but in fact the amount of natural vegetative recovery would far surpass the planned harvest resulting in an actual decrease in peakflow volume. This level of water yield increase (decrease) would be very difficult to separate from the amount of natural variability in the system and should be considered insignificant in the Libby Creek watershed.

ALTERNATIVE 2
Activities associated with this alternative include approximately 0.8 miles of road construction and associated timber harvest on 4 acres resulting in the creation of an additional 4 ECAs in the project watershed. The road storage projects listed in Chapter 2 are also included in this proposal. In order to conduct timber harvest, landings and skid trails must be constructed, although exact locations are unknown at this time. Direct impacts are associated with activities within stream channels and/or riparian areas. Indirect impacts are associated with activities outside of these areas, which can influence water and sediment levels. Cumulative impacts would also include the activities from Alternative 1, discussed previously.

Direct and Indirect Effects
This alternative includes the construction of approximately 0.8 miles of road to access the land holding with no new stream crossings. The road storage work listed in Table 2.1 totals 1.8 miles and would result in the roads being undriveable but in a stable hydrologic condition. The road projects are designed to improve the stability of two existing crossings in the project area. Road densities would slightly increase in Prospect Creek and drop slightly in both Big Cherry and Libby Creeks. The activities would have a short-term detrimental effect on water quality but would result in long-term beneficial effects as a result (Wegner 1999).

Cumulative Effects
As discussed previously for Alternative 1, there is no planned timber harvest activity in the Prospect Creek or Big Cherry Creek watersheds in the near future. There is planned timber harvest activity in the Libby Creek watershed by PCTC and DNRC. As proposed, through 2010 PCTC plans to complete 162 acres of ECAs with no new road construction. DNRC plans to complete 48 acres of ECAs in 2010. The results displayed in Table 3.13 assume that all the activities would be completed in 2007 and ongoing vegetative recovery would continue.

Table 3.13 - Alternative 2 - Water Yield Results

DRAINAGE	ACRES	PREDICTED PFI	ECA USFS	ECA OTHER	ROAD DENSITY
Prospect	4,005	22.2	198	806	2.25
Big Cherry	23,538	4.5	703	1,640	1.03
Libby	150,017	4.0	17,744	10,645	2.79

Watershed Condition Discussion

Due to the location and size of the amount of proposed harvest and road construction in the Prospect Creek drainage, there would be no change over the existing condition in both the Prospect and Big Cherry Creek watersheds. The proposed project and cumulative harvest activities would technically add to the peakflow levels in all drainages but in fact the amount of natural vegetative recovery would far surpass the planned harvest resulting in an actual decrease in peakflow volume. This level of water yield increase (decrease) would be very difficult to separate from the amount of natural variability in the system and should be considered insignificant for all watersheds.

Additional discussion of the ground disturbing activities in the project watersheds have been evaluated through the following categories: Hydrology/Geomorphology and Water Quality.

Hydrology/Geomorphology

The proposed activities are located away from the Prospect Creek channel and are small enough that their influence on hydrology would be surpassed by the natural vegetative recovery in the watershed. The application of RHCA buffers would help to assure that there are no in-channel disturbances that could upset their existing condition. The stream crossing removal to be completed in conjunction with the activity would ultimately help to lower the crossing density in the watershed and thus lower the chances of road failures.

Two existing sources of sediment would be mitigated to insure that levels of sediment leaving watersheds in the project area do not cause additional impairment to the water quality limited section in the Libby Creek watershed. In the long-term, after the roads are placed into storage, there would be an overall reduction in sediment in the Prospect watershed.

Water Quality

All proposed activities would follow standards and guidelines prescribed by INFS. These standards and guidelines would prohibit timber harvest, including fuel wood cutting, in the RHCA along Prospect Creek. There is no harvest proposed adjacent to stream channels. Therefore, no additional change in water temperatures is expected from the existing conditions.

MITIGATION MEASURES

Roads – Alternative 2 would require the 1.8 miles of road storage work listed in Table 2.1. This work would need to be done when the proposed new road building begins. Timing for these activities would need to be pre-established, between the land owner and the FS, so that the necessary mitigation is done in a timely manner. All road work would be overseen by FS personnel.

DESIGN FEATURES

The KNF Plan states that "Soil and water conservation practices as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22, May 1988) would be incorporated into all land use and project plans as a principal mechanism for controlling nonpoint pollution sources; meeting soil and water quality goals; and to protect beneficial uses. Activities found not in compliance with the soil and water conservation practices or State standard would be brought into compliance, modified, or stopped." (Kootenai National Forest Plan, pg II-23). Montana State Water Quality Standards require the use of Reasonable Land, Soil, and Water Conservation Practices (analogous to BMPs) as the controlling mechanism for nonpoint pollution. Use of BMPs is also required in the Memorandum of Understanding between the Forest Service and the State of Montana as part of our responsibility as the Designated Water Quality Management Agency.

CONSISTENCY WITH THE FOREST PLAN AND REGULATORY FRAMEWORK

Forest Plan Consistency

The proposed activities in Alternatives 1 and 2 are consistent with the FP for the water resource. They meet the requirement of "*maintaining or improving*" the factors listed as the probable causes for the listed section of Libby Creek and Big Cherry Creek. There would be no change over the existing condition in the Prospect and Big Cherry Creek watersheds. The proposed PCTC and DNRC activities in the Libby Creek watershed would technically add to the peakflow level, but in fact, the amount of natural vegetative recovery would far surpass the planned harvest resulting in an actual decrease in peakflow volume. Forest Plan consistency is measured through the implementation of: Guidelines for Calculation Water Yield Increases (Forest Plan - Appendix 18) and Best Management Practices (Appendix 2).

Riparian Habitat Conservation Areas

Riparian Habitat Conservation Areas (RHCAs) and the Montana Streamside Management Zone Act (SMZ) help protect streams, riparian areas and fisheries habitat. The proposed action would use the default RHCA widths (or larger) as outlined in the Forest Plan. All proposed activities would follow standards and guidelines prescribed by INFS. There is no harvest proposed adjacent to stream channels.

Montana Water Quality Act Consistency

The Montana Water Quality Act requires that we protect, maintain or improve water quality to the level necessary to support beneficial uses. Libby Creek is included on the state of Montana's 303d list of impaired water bodies. It is listed as only partially supporting aquatic life and cold water fishery. Sources of impairment are listed as: silviculture, agriculture, removal of riparian vegetation, land development, pastureland and resource extraction. Probable causes of impairments are: flow alteration, metals, other habitat alterations, siltation and nutrients. Big Cherry Creek is also included on the 303d list as only partially supporting aquatic life and cold water fishery. Sources of impairment include resource extraction and silviculture. Probable causes of impairment include metals, other habitat alterations and siltation. The Libby Creek drainage is listed as a priority watershed for the protection of bull trout and other native fish species.

In a letter dated September 22, 1994, the State of Montana Water Quality Bureau states: "Since these streams are water quality limited none of the causes of impairments may increase. This does not mean additional harvest activity cannot occur. It does mean that if additional management activity occurs a major objective of that activity should be to improve the situation or at the very least not impede current recovery."

As discussed previously, Alternative 2, which includes the road storage projects, would maintain beneficial uses in the project watershed and would not impede recovery of the Libby Creek drainage.

INTRODUCTION

Potentially affected watersheds in the Prospect Hill project area include Prospect Creek, Big Cherry Creek, and Libby Creek (see map). Existing conditions were determined through surveys and review of existing data sources to develop effects analysis for fisheries resources in project area watersheds. Effects to fish populations were assessed based on effects to habitat. This analysis was done to the nearest point of effect for all threatened, endangered and/or sensitive species.

REGULATORY FRAMEWORK

Clean Water Act

Libby Creek is a Water Quality Limited Segment (WQLS - see Water Resource section). It is listed as only partially supporting aquatic life and cold water fishery. Sources of impairment are listed as: silviculture, agriculture, removal of riparian vegetation, land development, pastureland and resource extraction. Probable causes include: flow alteration, metals, other habitat alterations, siltation and nutrients. The water quality limited listing includes all upstream tributaries to the listed segment. Because Libby Creek has been listed, activities from this project cannot further impair the listed uses in the WQLS.

Endangered Species Act

The Endangered Species Act (ESA) of 1973 declares that *"...all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."* Under the Act, Federal agencies must consult with the Secretary of the Interior whenever an action authorized by such agency is likely to affect a species listed as threatened or endangered. Bull trout and white sturgeon are currently the only two listed fish species on the Kootenai National Forest (KNF) as threatened and endangered, respectively, under the ESA.

National Forest Management Act

The National Forest Management Act (NFMA) directs that the Forest Service (FS) must "provide for the 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" (16 USC 1604(g)(3)(B)).

Executive Order

Executive Order 12962 mandates disclosure of effects to recreational fishing.

Forest Service Manual

Forest Supervisors FSM 2670.45 directs that the Forest Supervisors shall:

1) *Ensure that legal and biological requirements for the conservation of endangered, threatened, and proposed plants and animals are met in forest land and resource management planning; ensure compliance with procedural and biological requirements for sensitive species.*

2) *Develop quantifiable recovery objectives and develop strategies to effect recovery of threatened and endangered species. Develop quantifiable objectives for managing populations and/or habitat for sensitive species.*

3) *Make recommendations to the Regional Forester for critical or essential habitat designation on NFS lands.*

4) *Determine distributions, status, and trend of threatened, endangered, proposed, and sensitive species and their habitats on forest lands.*

5) *Coordinate forest programs with other federal agencies, states, and other groups and individuals concerned with the conservation of threatened, endangered, proposed, and sensitive species.*

6) *Ensure that consultation and conferencing requirements pursuant to Section 7 of the Endangered Species Act of 1973, as amended are met in all forest programs and activities.*

Kootenai Forest Plan

The Inland Native Fish Strategy (INFS) amended the Kootenai Forest Plan (FP) in 1995 (USDA Forest Service 1995). INFS establishes stream, wetland and landslide-prone area protection zones called Riparian

Habitat Conservation Areas (RHCAs), setting standards and guidelines for managing activities that potentially affect conditions within the RHCAs. INFS also established Riparian Management Objectives (RMOs) that provide guidance with respect to key habitat variables.

Sensitive species are managed under the authority of the NFMA and are administratively designated by the Regional Forester (FSM 2670.5, Kimbell 2004). Threatened and endangered species are under the jurisdiction of the United States Fish and Wildlife Service (FWS) under the authority of Section 7 of the ESA. The FS is directed to maintain viable populations of native species and to avoid actions that may cause a species to become threatened and/or endangered. Threatened, endangered and sensitive fish species identified to exist on the KNF are displayed in Table 3.14. The table includes presence or absence of species in the project area.

Table 3.14 – TES Fish Species of the Kootenai National Forest

STATUS	SPECIES	PRESENCE in PROJECT AREA/ DOWNSTREAM RECEIVING WATERS
Threatened	Bull trout *Salvelinus confluentus*	Not Suspected
Endangered	White sturgeon *Acipenser transmontanus*	Found only below Kootenai Falls
Sensitive	Westslope cutthroat trout *Oncorhynchus clarki lewisi*	Known
	Columbia basin redband trout *Oncorhynchus mykiss gairdneri*	Not Suspected

Data Sources, Methods and Assumption

Libby Ranger District records and the Montana Fisheries Information System (MFISH) were reviewed to determine current known fish and amphibian distribution in the project area. Fisheries surveys conducted in the past have found westslope cutthroat trout only distributed through the upper middle reaches of Prospect Creek (above Road #618). Libby District electrofishing surveys are on file at Canoe Gulch Ranger Station. Genetic analysis has not been competed on Prospect Creek. There appears to be a pure westslope cutthroat trout population above Road 618 on NFS lands. Past electrofishing surveying on the lower segments of Prospect Creek have identified the only fish present as rainbow/cutthroat hybrids.

There is one known barrier on the mainstems of Prospect Creek. The barrier occurs on Road #618 (Photo 1) just below the suspected pure westslope cutthroat population. The barrier is significant in keeping exotic fish stocks such as brook trout and coastal rainbows from invading the isolated pocket of cutthroat.

Photo 1

There have been only limited amphibian surveys conducted in the project area. There are a number of small wetlands and streams that are suspected of containing amphibian species. Electrofishing surveys conducted in 2005 found western spotted frogs to be common in the reach above Road #618. Past electrofishing surveys in Granite Creek have found tailed frogs and pacific tree frogs within a few miles of the proposed project. Interim RMOs as established by INFS as standards for forested systems include pool frequency, large woody debris (LWD), temperature and width/depth (W/D) ratio. Actions that retard attainment of these RMOs, whether existing conditions are better or worse than objective values, are inconsistent with INFS.

Default RHCAs would be delineated on all known streams, ponds, lakes, wetlands, landslides and landslide-prone areas within the project area. RHCA widths are defined by whether a stream is fish bearing and/or perennial, and by the size of the waterbody. Widths of RHCA buffers are based on current scientific literature that documents them to be adequate to protect streams from non-channelized sediment inputs and provide for other riparian functions. These riparian functions include delivery of organic matter, large woody debris recruitment and stream shading. No road construction or mining activities would take place in the RHCAs. If RHCAs are discovered during construction then an onsite visit by the Hydrologist or Fisheries Biologist will designate proper buffer size.

AFFECTED ENVIRONMENT

Fish Population Status

A detailed map of the project area can be found in the map section at the back of this document

Presently there is a small population of westslope cutthroat trout in the upper reaches of Prospect Creek. There are bull trout, brook trout, mixed redband rainbow, coastal rainbow, and westslope cutthroat x rainbow hybrids in the lower drainages including Big Cherry Creek and Libby Creek. The project area is far removed from these streams that there would be immeasurable effects to these other systems.

Historical data on fisheries abundance and distribution exists for some drainages in the project area. This data is limited and was accounted for from the late 1800s. The data that exists are historic articles from local newspapers. Information gives fishing stories as well as fish stocking by the local Rod and Gun Club. The data is on file at Libby Ranger District in the historical archives. Information from State and Federal agencies is limited. Fishing stories in The Western News indicates large populations of fish in most drainages across the KNF. It is also evident by articles that the Libby Rod and Gun Club were stocking fish extensively in lakes and streams. Stocking seemed to be random and included both native and non-native fishes. For more information on fish stocking refer to the Fish Populations and Habitat project file.

THREATENED, ENDANGERED and PROPOSED FISH SPECIES

White Sturgeon (Acipenser transmontanus)

Description of Population and Habitat Status

The white sturgeon is restricted to 168 miles of the river between Cora Linn Dam in Canada and Kootenai Falls in Montana. They migrate freely throughout the area, but are uncommon upstream of Bonners Ferry, Idaho (Apperson and Anders 1991; Graham 1981). Above Bonners Ferry there are very few fish - in 1980 Graham (1981) estimated only 1 to 5 individuals.

Operation of Libby Dam is considered the primary cause for the white sturgeon decline (Holton 1980; Apperson and Anders 1991). Overt or inadvertent harvest of the species by anglers is thought to be virtually non-existent, and a no-kill harvest regulation is in effect throughout the range of this population.

Description of the Population within the Project Area

The proposed activities are situated over 13 stream miles from Kootenai Falls. Further, no riparian or upland activities immediately adjacent to sturgeon habitat are proposed and as such the proposed activities would have **no effect on white sturgeon or its habitat**.

Bull Trout (Salvelinus confluentus)

Description of General Population and Habitat Status

Bull trout are native to the upper Columbia River basin in northwest Montana. Bull trout require clean, cold, complex and connected habitat. The fish has declined by perhaps more than 50% because of disruptive land management practices, expansion of introduced fish populations, non-sustainable recreational harvest and loss of habitat connectivity (Lee et al. 1997; MBTSG 1998). Forest management, mining and dam operations have adversely affected spawning and rearing habitat conditions for bull trout in the Kootenai River Section 7 Consultation population. Current bull trout habitat is also inhabited by non-native brook trout that threaten the persistence of bull trout by hybridization and interspecific competition.

Management Goals and Objectives

INFS amended the Kootenai Forest Plan on August 30, 1995. This interim strategy was designed to provide additional protection for existing populations of native trout, outside the range of anadromous fish, on 22 National Forests in the Pacific Northwest, Northern and Intermountain Regions. Implementing this strategy was deemed necessary as these species were at risk due to habitat degradation, introduction of exotic species, loss of migratory forms and over-fishing. As part of this strategy, the Regional Foresters designated a network of priority watersheds. Priority watersheds are drainages, which still contain excellent habitat, or assemblages of native fish, provide for meta population objectives or are watersheds that have excellent potential for restoration. The priority watersheds on the KNF include Rock Creek, Vermilion River, Bull River, lower Yaak River, Wigwam River, West Fisher Creek, Phillips/Sophie Creeks, Pipe Creek, Libby Creek, Lake Creek, Silver Butte Fisher River, Quartz Creek, O'Brien Creek, Grave Creek and Callahan Creek.

INFS also established RMOs and RHCAs. RMOs are habitat parameters that describe good fish habitat. Where site-specific data is available, these RMOs can be adjusted to better describe local stream conditions. These RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of riparian goals is measured. RHCAs are portions of watersheds where riparian dependent resources receive primary emphasis. The RHCAs are defined for four categories of stream or waterbody, dependent on flow conditions and presence of fish. The RHCAs are areas within specific management activities that are subject to standards and guidelines in INFS in addition to existing standards and guidelines in the Kootenai Forest Plan.

There is no known bull trout use in Prospect Creek. They are known from Big Cherry Creek and Libby Creek, however these fish are disjunct from the project area and there would be **no effect to bull trout**. They will not be considered further in this analysis.

SENSITIVE FISH SPECIES

Westslope Cutthroat Trout *(*Oncorhynchus clarki lewisi*)*

Description of General Population and Habitat Status

The distribution and abundance of westslope cutthroat trout has declined from historic levels across its range, which includes western Montana's Kootenai River drainage. Westslope cutthroat trout persist in only 27% of their historic range in Montana. Due to hybridization, genetically pure populations are present in only 2.5% of that range (Rieman and Apperson 1989). Introduced species have hybridized or displaced westslope cutthroat trout populations across their range. Hybridization causes loss of genetic purity of the population through introgression. Some of these remaining genetically pure populations of westslope cutthroat trout are found above fish passage barriers that protect them from hybridization, but isolate them from other populations. Westslope cutthroat trout still have strong numbers on the KNF.

Westslope cutthroat trout exhibit both migratory and resident life histories on the KNF. Westslopes are capable of traveling over 100 miles on their spawning migration. Migratory fish typically rear in their natal streams until their third year, at a length of 7-9 inches, when they migrate to either a larger stream or lake to reach sexual maturity. Resident fish are significantly smaller than their migratory counterparts. Sexual maturity is attained at either age 4 or 5, length of 4-16 inches at which time these fish migrate back to their natal streams to spawn. Westslopes can typically reach lengths in excess of 20 inches and weigh in excess of three pounds. Common lifespan for this species is seven years. Westslopes feed primarily on aquatic insects in streams and larger zooplankton in lakes.

Habitat fragmentation and the subsequent isolation of conspecific populations is a concern for westslope cutthroat trout due to the increased risk of local and general extinctions. The probability that one population in any locality will persist depends on habitat quality and proximity to other populations (Rieman and McIntyre 1993).

Description of the Population within the Project Area

Historically, pure strain westslope cutthroat trout were likely distributed throughout Prospect Creek, Big

Cherry Creek and Libby Creek. The suspected pure westslope cutthroat trout population within the project area is composed of a resident component that rears and spawns mostly in the upper segments of Prospect Creek. Further genetic analysis would need to be conducted on fish in the stream to determine if they are pure strain westslope cutthroat trout. For this analysis, the headwater reaches of Prospect Creek will be considered a pure strain westslope cutthroat trout stream.

Environmental Baseline - Species Indicators and Habitat Indicators

The following species indicators refer to the entire project area population above the Road #618. The lower population is disjunct due to channelization and intermittence of the stream. Downstream effects from the project would be immeasurable on this population of fish. Electrofishing data from Libby Ranger District personnel is the main source for species composition. FS hydrologic and habitat inventories have been conducted across watersheds in the project area.

1) **Subpopulation Size:** No population data exists for streams in the project area. There are no past or present redd surveys in the drainages, high muddy water make surveying in the spring extremely difficult. Based on electrofishing data, habitat, and barrier inventories this subpopulation is thought to be **Functioning at Risk**.
2) **Growth and Survival:** There is insufficient data to determine growth and survival rates of fish in the project area watershed. Field data including Libby District electrofishing has provided information on multiple year class fish. The man-made barrier on Road #618 is keeping the pure population isolated from possible migration from downstream hybrids. The largest problem facing these fish is the relatively small area of stream where fish exist.
3) **Life History Diversity and Isolation:** The upper headwaters in the project area probably contain resident fish only. Furthermore, this population appears to be successfully spawning and maintaining viable populations.
4) **Persistence and Genetic Integrity:** The headwater populations of westslope cutthroat trout are disjunct with the cutthroat trout populations in the mainstems of Prospect Creek, Big Cherry Creek and Libby Creek. Spawning habitat exists in this drainage and fish are utilizing the spawning gravels to populate available habitat. However, rainbow trout have invaded the lower drainages and have hybridized with westslope cutthroat trout. Overall, westslope cutthroat trout seem to be holding their own in these upper reaches of stream.

AMPHIBIANS

The **Long-Toed Salamander** (*Ambystoma macrodactylum*) is the most common salamander in western Montana and is found in a variety of habitats from sagebrush to alpine. They typically breed in ponds or lakes, usually those without fish. Adults go to the breeding ponds immediately after snowmelt and in western Montana are usually the first amphibians to breed. Following breeding, they move to adjacent uplands. Eggs hatch in 3-6 weeks and metamorphosis takes 2-14 months (Reichel and Flath 1995).

The long-toed salamander is suspected to occur in the project area. No formal surveying has been completed in the area. There are a number of small isolated wetlands that probably contain breeding salamanders. Because these salamanders are so prolific it is reasonable to suspect them in the project area.

The **Pacific Tree Frog** (aka: Pacific chorus frog) (*Pseudacris regilla*) is only regularly found in the water during the breeding period in spring. They announce their presence during this time by calling frequently at night and sporadically throughout the day. Following breeding, they move into adjacent uplands and are rarely seen. In western Montana, they breed in temporary ponds in lower elevation forests and intermountain valleys shortly after snowmelt. Eggs hatch in 2-3 weeks and tadpoles take 8-10 weeks to metamorphoses (Reichel and Flath 1995).

The Pacific tree frog is known from the project area. Fisheries electrofishing surveys found the frogs in Granite Creek. The presence of wetlands and small pounds in Prospect Creek would be good habitat for spawning frogs.

The **Columbia Spotted Frog** (*Rana luteiventris*) is the most common frog in western Montana and is very common on the KNF. Spotted frogs are regularly found at water's edge in or near forest openings, wetlands at or near treeline are also used.

Breeding takes place in lakes, ponds (temporary and permanent), springs and occasionally backwaters or beaver ponds in streams. All egg masses in a particular pond are often found in the same location at the margin of the pond. Young and adult frogs often disperse into marsh and forest habitats, but are not usually found far from open water (Reichel and Flath 1995).

The spotted frog is known from the project area. Electrofishing surveying in 2005 found the spotted frog in a number of small pools in Prospect Creek above Road #618. It is highly likely that the spotted frog is the most prolific amphibian species within the project area. As mentioned previously, many sites still need to be surveyed in the project area. It is highly likely that more spotted frogs would be found in wetlands across the project area.

The **Rocky Mountain Tailed Frog (***Ascaphus montanus*) is a fairly common amphibian in northwestern Montana in suitable stream habitat and is very common on KNF mountain streams. Tailed frogs are unique in that they spend their entire lives in small streams and have adaptations that allow them to thrive in that environment.

Breeding takes place in late summer where eggs are attached to the underside of rocks in a stream. Tadpoles have a unique suction disk mouth that allows them to stick to the rocky substrate in high velocity water. It may take a tadpole up to 3 years to metamorphose depending on water temperature. Sexual maturity is attained at 6 or 7 years of age which is the longest of any North American amphibian (Reichel and Flath 1995). Males have a specialized cloacal tail which they use for internal fertilization (the only North American amphibian to do so) (Werner et all 2004).

The tailed frog is known from the project area. Electrofishing in Granite Creek found these frogs, they are also known from other Libby Creek drainages. The tailed frog is highly prolific amphibian species within the project are.

REPTILES

The **Common Gartersnake** (*Thamnophis sirtalis)* is one of the most common snakes in Montana (Reichel and Flath 1995), as well as the KNF. The snakes become active early and are often seen in the spring. After breeding they may move several miles from a den to their summer active sites. During the day and warm nights common garter snakes forage around wetlands or in the water. They often prey on amphibians, fish and snails and are a major predator on tadpoles (Werner et al. 2004).

The common gartersnake is suspected from the project area. These snakes are well disturbed throughout the Libby Ranger District.

The **Terrestrial Gartersnake** (*Thamnophis elegans*) is also common in Montana and is one of Montana's most adaptable reptiles being found at the highest elevation of any snake in Montana and also being found in the lowest elevations of the state. Their habits are similar to the common gartersnake. The major difference between the common and terrestrial garter snake are some forms of feeding mechanisms and also coloration (Werner et al. 2004).

The terrestrial gartersnake is suspected in the project area. The species is less common then the common gartersnake, but habitat in the project area would be highly desirable for this species.

WATERSHED EXISTING CONDITION

Westslope cutthroat trout are the only potentially affected fish species in the project area. This analysis will center on their habitat needs. This population of potentially pure strain westslope cutthroat trout exists only

above the barrier culvert on Road #618 in the upper reaches of the drainage.

This section compliments the existing condition narrative in the watershed and soils section of this document. In an effort to minimize repetition, only select watershed condition information is summarized as it relates directly to the local threatened, endangered and sensitive fish populations. For a thorough review of the existing hydrologic condition, the reader is referred to the Water Resources specialist report.

HABITAT INDICATORS

The following descriptions correspond to the 19 habitat indicators listed on the FWS matrix for bull trout, KNF-2670-BT3 (FWS, 1998). Existing conditions for each habitat indicator are described and rated at a single scale - the CRB 7th code HUCs, which contain the entire Prospect Creek drainage. Stream habitat data is fairly extensive for Prospect Creek. The bulk of the information collected has centered on habitat and species composition.

1) Temperature: Functioning/Functioning at Unacceptable Risk.

Riparian harvest on NFS lands along the mainstems of project area streams has varied depending on the location of the stream. Riparian harvest has occurred extensively on private land coupled with extensive grazing and channelization. Although stream temperatures have not been measured, it is expected that temperatures above Road #618 are functioning due to lack of management. However, on private lands below Road #618 the stream runs through many pastures and is used more like a ditch then a stream. Riparian vegetation is lacking and stream temperatures are most likely exceeding the 59° limit for trout during the summer months. Also, streams that come from the Cabinet Mountains are more likely to be cool and promote salmonid comfort zone where streams would be **Functioning**. That is until they reach Libby Creek or Big Cherry Creek where high amounts of management and riparian harvest has occurred. Therefore, the streams in the lower segments would be **Functioning at Unacceptable Risk.**

2) Sediment: Functioning at Risk

The existing road system consists of 6 stream crossings in the Prospect Creek drainage. Looking at other streams in the project area, like Libby Creek and Big Cherry, there are many road crossing structures. These factors, coupled with a high road density in the drainage and a high RHCA road density, has severely affected the lower segments of project area streams. Stream surveys have shown that drainages are having trouble maintaining pools throughout all reaches. The RMO for pool quality and quantity just within Prospect Creek was not met in 50% of measured reaches. These numbers are much lower for the main stems of Libby and Big Cherry Creek. Lower segments of the streams are also being impacted by private land, channelization and grazing within the RHCAs. The streams are showing signs of high amounts of bedload in areas shown by the intermittent nature of the middle reach of the drainages. The upper reaches of Prospect Creek, above Road #618, seem to be functioning, leaving more pools and more complexity with cooler water temperatures.

3) Nutrients and Contaminants: Functioning /Functioning at Unacceptable Risk

The upper drainages are **Functioning** with regard to this criterion. However, the middle and lower drainages flow through many pastures and developed land. It is highly likely that excessive organic nutrients are entering the streams. Because of the large amount of development in these reaches, this factor would be **functioning at Unacceptable Risk** in these reaches which compromise the majority of the stream channels.

4) Physical Barrier: Functioning Risk

There is one barrier culvert on Prospect Creek where Road #618 crosses the stream. There are a number of barrier culverts existing in the Libby Creek drainage that are far removed from this project. The structure on Prospect Creek has been on the road system for a number of years (probably in excess of 30 years). Fish populations continue to exist in fair numbers above the pipe. This culvert would be left in place to protect the potential pure westslope cutthroat population above the structure (until genetic work proves the condition of the population).

5) Substrate: Functioning at Risk

The dominant substrate size class is small cobble to gravel in most of the middle and lower reaches of Prospect, Big Cherry and Libby Creek. Gravel substrates are inherently unstable. Large flows could easily move these substrates, which can cause significant bedload movement. This has occurred a number of times in both Big Cherry and Libby Creek. It is possible the same could occur in Prospect Creek.

6) Large Woody Debris: Functioning at Risk/Functioning at Unacceptable Risk

Large woody debris (LWD) was measured in project area streams as part of fisheries habitat information. The RMO for this criterion (Table 3.11) was dependent on the size of the stream being measured. Table 3.11 shows the amount of LWD found during sampling in Prospect Creek. The small sample size had one site that did not satisfy the RMO which equates to 25% of sampled locations. The mainstems of Big Cherry and Libby Creek are both known not to meet this RMO.

7) Pool Frequency: Functioning at Risk

Pool frequency was measured at the same time as LWD. The RMO (Table 3.11) was met in 3 out of the 4 sampled sites in Prospect Creek. Pool generation in small streams is directly related to production of LWD in RHCAs. Although the RMO for LWD was mostly met in measured reaches, future production of LWD in RHCAs would be limited in some stream reaches due to the high amount of riparian harvest on private land. Fine sediment would continue to be produced from private land management and would continue to negatively impact pools throughout the lower drainage.

8) Pool Quality: Functioning at Unacceptable Risk

Quality pools are pools that are deep (usually over 3 feet) and have sufficient cover to hide fish. Fisheries habitat inventories measured numerous pools in measured reaches in Prospect Creek. Overall, the surveys found deep pools to be totally lacking. Deep pool creation in small streams is very difficult, many of the streams lack the hydrologic power to create and maintain pools of this depth. Another factor affecting pools in these drainages is the high amount of bedload movement and the large amount of private land and channelization. Big Cherry and Libby Creeks do not meet the RMO for pool quality. These streams are high energy-high bedload streams. Deep pools do not have a tendency to stay or be created in these systems.

9) Off Channel Habitat: Functioning at Unacceptable Risk

High densities of roads in the RHCAs have limited streams ability to make adjustments and create off channel habitat. The large number of stream crossings in the drainages would continue to increase the probability of culvert failure. The high amount of channelization on private land has removed almost all off channel habitat in the middle and lower reaches. The upper fish bearing portion of Prospect Creek has only limited amounts of off channel habitat due to the relatively small amount of watershed and the dry area where the stream occurs.

10) Prime Habitat (Refugia): Functioning at Unacceptable Risk

There are very few areas of high quality habitat due to extensive riparian roading and timber harvest and channelization in the middle and lower portions of streams. The upper reaches of Prospect Creek above Road #618 are the only portion of refugia left in the drainage.

11) Pool Width/Depth Ratio: Functioning at Risk

The majority of pools measured in the project area were shallow and wide. The streams are having a hard time moving bedload. The middle and lower reaches of the streams have a high amount of human activities which has caused extensive damage to hydrologic function. Pool creation in these channelized reaches is very difficult; bedload movement would continue to fill pools.

12) Stream Bank Condition: Functioning at Risk

The set standard for stream bank stability is those banks that have greater then 80% linear stability.

District surveying found bank stability to be very good in 3 of the 4 sampled sites in Prospect Creek (Table 3.11). The amount of activity on private land is negatively affecting stream bank condition. This would continue into the future as impacts increase with subdivision of land.

13) Floodplain Connectivity: Functioning at Risk/Functioning at Unacceptable Risk
Floodplains in the project area remain mostly intact with some minor alterations in the upper drainage in Prospect Creek. The middle and lower reaches of streams have roads and private land encroaching or bisecting on the floodplain. Channelization and grazing are the largest impacts to riparian function in these areas and cause this criterion to be **Functioning at Unacceptable Risk**.

14) Peak and Base Flows: Functioning/Functioning at Risk
Peakflows normally occur in May but can occur anytime between November and June. Analysis of data collected in the lower Libby Creek since 1995 shows the lower drainage is not very stable through high flow events. Road densities in Prospect Creek (Table 3.10) are considered to be moderately high, 2.24 mi/mi^2 of watershed area, the current harvest levels in Prospect Creek equate to about 1,000 equivalent clearcut acres (ECAs) for approximately a 22% increase in peakflows.

Rain-on-snow events (ROS) occurred on the KNF in 1990, and more recently during the fall and winter of 1995-96. These events caused extensive damage to road drainage and stream crossing structures throughout the KNF. Channel alterations caused by ice flows associated with the ROS events occurred to most stream systems on Libby Ranger District and resulted in streambed scouring. Monitoring of these basins after the ROS event in February of 1996 showed that most perennial channels on the district downcut approximately 2-3 inches.

15) Drainage Network: Functioning at Risk/Functioning at Unacceptable Risk
Road densities in the project area range from extremely high to extremely low. The upper reaches of Libby Creek and Big Cherry Creek have very little roading due to the Cabinet Mountain Wilderness. However, as we move down the drainages we increase in road densities and have **Unacceptable Risk** conditions. Although no road parallels Prospect Creek there still exist 6 stream crossings. The upper drainage above Road #618 is in fairly good shape. However, the lower drainage has had channelization and riparian grazing. Most of the lower drainage network has been altered by human activities in some way.

16) Road Network: Functioning at Unacceptable Risk
The drainages contain a high amount of roading both in RHCAs and total road density in the middle and lower reaches of project area streams. There exists a fair amount of barrier culverts (especially in Libby Creek). Overall the amount of road in the drainage is higher then standards.

17) Disturbance History: Functioning at Risk
Existing ECAs are estimated at 25% of the drainage. The mainstem Prospect Creek is showing signs of stress from this high amount of ECAs. Existing water yields are not within FP standards. They are, however, within 8% in the Libby Creek Drainage. The overriding factor in the drainage is the amount of human activity within the drainages. Libby Creek has seen extensive mining that has left many streams in an un-natural state and having to deal with large amounts of bedload. The high densities of road (Table 3.10) would continue to impact stream channels within the Libby Creek drainage.

18) RHCAs: Functioning at Unacceptable Risk
Timber harvest has occurred throughout the project area. Past surveying found both one and two sided harvest along the length of the mainstems of project area streams. The lower reaches have been channelized and grazed heavily. The stream banks have been modified and riparian vegetation has been removed.

19) Disturbance Regime: Functioning at Risk
Natural disturbance regimes are stable in the project area. Windstorms resulting in blowdown have

been minor, generally associated with clearcuts. Fires have been relatively small with no major wildfires occurring in several decades. Again, the lower segments of streams continue to be impacted heavily from human activities.

Integration of Species and Habitat Conditions: Functioning at Risk
The quality of trout habitat throughout the middle and lower reaches of the drainages has been compromised. RHCAs harvest, grazing, channelization, and high densities of road and high densities of stream crossings has likely been a contributing factor to the high water temperature and high fine sediment load. Road construction in riparian areas, along the mainstems of larger streams, has affected natural channel movement and riparian vegetation. Additional impacts to tributaries have occurred through riparian harvest and road construction. Major events have occurred in these drainages over the past 10-20 years (large windstorms, 100-year storm events, etc) although minor, isolated impacts were seen. Genetic analysis needs to be completed to determine the possible existence of genetically pure populations of westslope cutthroat trout in upper Prospect Creek. The lower drainage is dominated by private land with the associated impacts.

DESIRED FUTURE CONDITION
As a result of the analysis, it was determined that the upper reaches of Prospect Creek are restoration priority. This is due to the suspected pure strain westslope cutthroat trout population and past management in riparian areas. The data for each measured reach of stream in the project area (Table 3.15) was compared to the INFS Interim Riparian Management Objectives.

Table 3.15 - Stream Geomorphology Data for Project Area Streams
Gray shading means sites do not meet current INFS guidelines

INFS – RIPARIAN MANAGEMENT OBJECTIVE STANDARDS							
BANKFULL WIDTH (FT)		POOLS/FOOT		LWD/FOOT (> BFW)		BANK STABILITY (%)	WIDTH/DEPTH RATIO
< 10		1 per 55		1 per 250		> 80	< 10
10 to 20		1 per 94		1 per 250		> 80	< 10
20 to 25		1 per 112		1 per 250		> 80	< 10
25 to 50		1 per 203		1 per 250		> 80	< 10
PROSPECT CREEK							
SITE	YEAR	ROSGEN TYPE	BF (FT)	POOLS/FOOT	LWD/ FOOT	% BANK STABILITY	W/D RATIO
1 – Mainstem	1998	F4	13.2	1/45	1/44	44	21.09
2- Mainstem	1998	B3	8.43	1/57	1/25	100	13.98
3 – Mainstem	1998	F6	4.41	1/23	1/45	100	13.03
4 – Mainstem	1998	B3	6.95	1/47	1/6.6	100	21.81

*These figures were determined by converting the desired number of pools and LWD from pools/LWD per mile to pools and LWD per foot. For purposes of this analysis only individual reaches of each stream were measured rather than the entire channel length. Those figures that are shaded do not meet INFS RMO standards.

The fish habitat data collected shows that some conditions currently meet or exceed interim RMOs with the exception of pool frequency and stable bank in the measured reaches. The desired future condition would be all RMOs meet or exceed INFS standards. This would require future fisheries restoration work to construct habitat enhancement structures in the drainage. As of this analysis, this work is unfunded and would be competed when funds become available. This work would be completed by hand above Road #618 on NFS land. Associated with this work would be some level of sedimentation from excavating the structures. The detrimental effects from this project would be of short-term. Sediment would drop out quickly after the construction of the structures. The overall effect would be positive from the creation of pools and adding complexity to fisheries habitat.

Fish passage is a Regional priority and there is one existing road crossing structure in Prospect Creek that does not fulfill this requirement. This structure would be left in its current condition. It is known that downstream waters have a mix of fish that could threaten this population of westslope cutthroat trout.

ENVIRONMENTAL CONSEQUENCES

To remain productive, a fish population must have relatively stable habitat conditions over time. Forest management actions produce changes that are similar in kind and intensity to natural environmental variability. However, human-caused changes tend to persist for longer periods, either because they are more widespread, or because they add to natural factors that are already affecting fish productivity. Fish species vary in their tolerance for, and reaction to, adverse or positive environmental changes. Further, the response of one species may act as an additional negative effect on another species. Native trout species (bull trout, redband rainbows and westslope cutthroat trout) are particularly vulnerable to habitat changes and to sediment effects (Weaver and Fraley 1991).

The project area provides a small amount of recreational fishing on NFS lands. Alternatives that degrade fish habitat can limit the number of adult fish available for fishing. Alternatives that change the current accessibility to fisheries resources can also impact recreational fishing opportunities. There may be some short-term adverse effects to fish habitat as a result of proposed road building and maintenance. However, these effects are not expected to affect entire fish populations and would not result in a long-term trend in fish abundance. As long as INFS and best management practices (BMPs) are met for given activities within an alternative, there should be no effect to recreational fishing. None of the alternatives decreases access to fishing in any areas. There are no other known potential effects to recreational fishing.

ALTERNATIVE 1

Direct and Indirect Effects

Vegetation previously harvested would continue to mature over time resulting in gradually decreasing water yield for all watersheds. This recovery should improve overall watershed conditions to some extent. Private land management would however, continue to decrease water quality. If wildfires are successfully suppressed and no prescribed burning occurs, fuel loadings would increase resulting in an increasing risk of high intensity fires, which could affect watershed conditions. Douglas-fir bark beetle infestation would continue for 2-5 years. The risk of insect and disease activity would therefore remain high or increase. Wildfire potential and intensity would also remain high or increase. Wildfire potential and intensity would also remain higher than historic conditions. Existing roads would continue to channel surface flow and sediment to the streams. This would keep flows elevated until a majority of vegetative recovery has occurred and hydrologic recovery begins. If these problems were not corrected, they would continue to contribute to aquatic habitat degradation. Peakflow increases would never fully recover to a natural condition with the existing road system in place.

Cumulative Effects

Cumulative effects in the project area include past and current effects of increased peakflows and input of fine sediments to the watersheds from past timber harvest, road-building activities and natural events. These activities would incrementally affect fisheries habitat and fish populations. However, due to past BMPs and INFS, the level of effects would be similar to what currently exists and would not decrease the viability of native fish populations within the project area.

If fisheries restoration work to construct habitat enhancement structures in the drainage was to occur there would be some level of sedimentation from excavating the structures. The detrimental effects from this project would be of short-term. Sediment would drop out quickly after the construction of the structures. The overall effect would be positive from the creation of pools and adding complexity to fisheries habitat.

STATEMENT OF FINDINGS/FOREST PLAN CONSISTENCY

The no-action alternative is consistent with INFS because existing conditions would remain stable. However, problems that would likely develop associated with aquatic habitat (e.g., sediment, pools, fish barriers, etc.) would need to be addressed in the near future to promote long-term recovery of the Prospect Creek watershed.

ALTERNATIVE 2
Direct, Indirect and Cumulative Effects
Road Building and Mineral Exploration
The proposed action was designed to meet the purpose and need and address issues and concerns identified internally and by the public.

Activities associated with the proposed action include new road construction which would tie into open NFS Road 5252 for the private land owner to explore for minerals on and have reasonable access to his private property. Other activities associated with this proposal include road storage and implementation of BMPs.

This alternative includes ~ 0.8 miles of new permanent road construction, BMP work on nearly 0.7 miles of road and 1.8 miles of stored road. A list of roads to be stored can be found in Table 2.1.

Presently, there is a small but self-sustaining population of westslope cutthroat trout in Prospect Creek. There has been no genetic analysis of fish from the upper reaches of the drainage. This population of fish is suspected as being pure strain westslope cutthroat trout.

Other watersheds supporting fish populations that would be affected by timber harvest include Libby Creek and Big Cherry Creek. These drainages would have an increased ECA of < 1% and a PFI of < 1% from management in Prospect Creek. This amount of change would result in an undetectable change to conditions in the Libby Creek system.

Riparian values in the project area such as temperature, filtration of sediment and contaminants, LWD recruitment and stream bank condition would not be compromised due to the implementation of INFS RHCAs and BMPs. The implementation of RHCAs would insure that this project would not retard the attainment of RMOs.

Sediment produced by road building and storing activities would be mitigated by design through the implementation of the RHCA buffers and BMPs.

Road Construction, Reconstruction and BMPS
This alternative would result in approximately 2.6 miles of road related disturbance, including 0.8 mile of new road construction. No stream crossings would be created or improved to in the project area. The existing fish barrier would be left in place to isolate the suspected pure westslope population.

BMP work would be conducted on 0.7 miles of road in the Prospect Creek drainage. Surface flow and sediment that is channeled to streams by roads would be reduced with BMP work. This would accelerate hydrologic recovery and reduce the potential for further habitat degradation. Roads to be put into storage sum to 1.8 miles. The drainage network would be partially restored and the likelihood of sediment introduction from failed culverts would also be reduced.

Watershed Restoration Work
The bulk of the watershed restoration proposed with this alternative includes road storage. Stored roads total 1.8 miles in the Libby Creek watershed. Roads slated for storage are listed in Table 2.1.

This alternative includes the creation of pools in the upper reaches of Prospect Creek. Surveys have found that the stream is lacking large, deep, complex pools. The pool creation would be completed by hand in the drainage and would cover over 1 mile of stream. Even though the work is currently unfunded and would be completed when funds became available, the effects of this work has been accounted for in this analysis.

FOREST PLAN CONSISTENCY
The proposed activities implement default INFS RHCAs to protect riparian resources and function. The action alternative does not propose harvest or burning in RHCAs nor would there be a significant increase in

peakflows within the project area. Road storage would remove approximately 1.8 miles of road from the Libby Creek drainage. These factors would prevent retarding the attainment of RMOs which in the case of pool frequency and quality is presently exceeded within the project area. Based on these factors it is determined that Alternative 2 is consistent with INFS and the Forest Plan.

STATEMENT OF FINDINGS FOR ALL ALTERNATIVES

Threatened, Endangered and Sensitive Species

This assessment constitutes the biological assessment of threatened and endangered species as well as the biological evaluation for sensitive species.

Alternatives 1 and 2 would have **No Effect on White Sturgeon**. This conclusion is based on the lack of evidence linking forest management to sturgeon viability.

Based on the analysis, Alternatives 1 and 2 would have **No Effect on Bull Trout.** This determination is based the fact that bull trout do not use Prospect Creek or Lower Big Cherry and Libby Creek.

Based on the analysis, Alternative 2 **May Impact Individual Westslope Cutthroat Trout but Would Not Likely Contribute to a Trend Towards Federal Listing of the Species** due to the construction of the pool habitat within the drainage.

INTRODUCTION

This report analyzes the existing condition and potential effects from proposed activities on the soils resource in the project area and incorporates by reference the water resource analysis. The analysis area (project area) includes lands in the Prospect Creek watershed. The proposed action involves road construction, associated right-of-way clearing of approximately 12 trees, the open of the mine portals and exploration of the mine claims. The project also proposes road storage activities for the action alternative.

REGULATORY CONSISTENCY

National Forest Management Act

The National Forest Management Act (NFMA) requires that the effects of management systems not produce substantial and permanent impairment of the productivity of the land; and in addition, insure that timber will only be harvested from NFS lands where soil, slope or other watershed conditions will not be irreversibly damaged (36 CFR 1604(g)(3)(C) and 36 CFR 1604(g)(3)(E)). Soil resource management would be consistent with these goals.

Kootenai National Forest Plan/INFS

The Kootenai National Forest (KNF) Plan was developed in 1987 and amended in 1995. The standards and guidelines identified in those documents form the basis for this analysis. A complete list of standards and guidelines associated with the Forest Plan is included in Appendix 1. Where appropriate, standards would be included as mitigation and included in this report and included in any contract that should result from this assessment.

Forest Service Guidelines

Forest Service (FS) policy (FSM 2500 – Watershed and Air Management R-1 Supplement No. 2500-99-1, Effective 11/12/1999, Chapter 2550 Soil Management, 2554 Soil Quality Monitoring) establishes guidelines that "design new activities that do not create detrimental soil conditions on more than 15% of an activity area. In areas where less than 15% detrimental soil conditions exist from prior activities, the cumulative detrimental effect of the current activity following project implementation and restoration must not exceed 15%". The relative consistency of the proposed action alternatives to current Forest Plan (FP) standards and FS policy are detailed in an upcoming section.

AFFECTED ENVIRONMENT

The analysis area is underlain by the Belt Rock formation. These rocks are thousands of feet thick and were originally sands, silts, clays and carbonate materials laid down in what was once glacial Lake Kootenai during the Precambrian time period. The watersheds in the analysis area can be divided into two parts, those areas that were influenced by continental glaciers and those areas affected by alpine glaciation. The approximate location of the division is the existing roadless boundary along the east face of the Cabinet Mountains. In the lower portions of the watershed, the Cordilleran Ice Sheet scoured and moved deposits of gravel, glacial tills and glacial lake silts to form the existing rounded landforms. In the upper portions of the watershed, the U-shaped, steep valleys and sharp alpine ridges were formed when alpine glaciers removed soft surface materials, leaving only the hardest rock layers exposed. Geologic activities far distant from northwest Montana had a hand in the construction of the watershed as eruptions from Mount Mazama approximately 6,700 years ago to the recent eruption of Mount St. Helens in 1982 all deposited ash over the area helping to create the existing soil mantle. Mining activities have been ongoing since the white man first entered the Kootenai drainage in the early 1800s. Gold, silver and copper have been the most sought after minerals and are still attracting mining companies to this day in the Libby watershed. Placer mining techniques (going through streambed materials) have been used on many streams in the analysis area. These techniques have left numerous stream channels in a very unstable condition compared to streams that have not been affected by these activities. The Flower Creek watershed contains two reservoirs maintained by the City of Libby for drinking water.

Landtype information was obtained from the Soil Survey of Kootenai National Forest Area, Montana and Idaho (1995). The landforms identified through this inventory are differentiated by a number of criteria

including: topography, geology, habitat types, soils and climate. These elements would determine the relative suitability of each landtype for various management activities. The landtypes identified within the larger watersheds are listed in Table 3.16. Please see Appendix 3 for a more detailed description of these landtypes.

Table 3.16 displays the sensitivity of these landtypes to management actions such as timber harvest and road construction. It also displays the potential of these soils for erosion and the feasibility of eroded soil being delivered to streams. Landtypes found in the project area include 322 and 355.

Table 3.16 - Sensitivity of Soil Types in the Analysis Area to Disturbance

SED. - sediment

LANDTYPE	TIMBER MGMT & PRODUCTIVITY		ROAD CONSTRUCTION & MAINTENANCE			SOIL EROSION & SEDIMENTATION	
	TRACTOR OPERATION	SEDIMENT HAZARD TIMBER	CUT/FILL SLOPES	ROAD SURFACE	SEDIMENT HAZARD ROADS	*SOIL EROSION	SED. DELIVERY EFFICIENCY
101**	soil damage	severe	none	tread	severe	mod/sev	high
102**	soil damage	moderate	none	ruts	severe	mod/sev	low
105	wetlands		none	none	moderate	mod/sev	low
106	soil damage	moderate	none	tread	moderate	mod/sev	low
108	soil damage	moderate	none	tread	severe	sev/sev	low
112	soil damage	moderate	slough	ruts	severe	mod/sev	low
201	rock		none	rock	moderate	slight	high
251	slope/rock	severe	none	rock	moderate	mod/sli	high
252	slope	severe	none	rock	moderate	mod/sli	high
301	none	moderate	slough	tread	moderate	mod/mod	mod
302	slope	moderate	slough	tread	moderate	mod/mod	mod
303**	rock	moderate	none	rock	slight	sli/sli	sli
322**	soil damage	moderate	none	rut	severe	mod/sev	low
323	none	moderate	slough	ruts	severe	mod/sev	low
324	none	moderate	none	tread	moderate	mod/mod	low
325	soil damage	severe	wetness	ruts	severe	sev/sev	low
328	soil damage	moderate	none	tread	moderate	mod/mod	moderate
351	slope	severe	none	tread	severe	mod/mod	high
352**	soil damage	moderate	slough	tread	moderate	mod/mod	mod
353**	soil damage	moderate	none	none	slight	sli/sli	low
355**	rock	moderate	none	none	moderate	mod/mod	mod
357**	slope	moderate	slides	rock	severe	mod/mod	high
360	rock	slight	none	none	slight	sli/sli	low
381	slope	severe	slides	tread	severe	mod/mod	high
406	soil damage	moderate	ravel	none	slight	mod/sli	low
510	slope	severe	none	none	slight	sev/sli	mod

* this column displays the susceptibility of the soil to erosion, including both the surface layer as well as the lower layer.
** these landtypes are found in the project area (Prospect Creek) while the remainder are found in the Big Cherry Creek and Libby Creek drainages.

Existing Soil Conditions

Approximately 0.35 miles of new road are to be constructed through an existing harvest unit, and 0.45 miles of new road are to be constructed in previously unharvested areas.

Timber harvest and road construction have been the principle management activities in the project watershed on both private and NFS lands. Table 3.17 displays the existing acres of managed lands. This information is presented to show the existing conditions from all past harvest and roading activities and does not account for future or proposed timber management activities. Impacts from reasonably foreseeable actions will be discussed under the Environmental Consequences section.

Table 3.17 - Harvest Acres – 2007

DRAINAGE	WATERSHED SIZE (acres)	ECAs	% of WATERSHED IN A HARVESTED CONDITION	ROAD DENSITY (miles)
Prospect Creek	4,005	1,000	25	2.24

Timber harvest and road construction activities that remove forest canopy increase snowpack depths and melting rates, resulting in increases in surface runoff and the potential for increased erosion from compacted soils. These same activities cause varying degrees of course woody debris (CWD) reductions, soil exposure, soil compaction and surface runoff routing which lowers soil productivity. Slumps can also occur as a result of intercepted subsurface flow and soil saturation. The degree that erosion occurs is due in large part to the landtypes present in the area.

Timber harvest activities such as road building and use, skidding logs, clearcutting and burning increase the amount of bare, compacted soil exposed to rainfall and runoff resulting in higher rates of surface erosion. Application of appropriate management precautions (BMPs) such as avoiding timber harvest in wet seasons, maintaining buffer zones below open slopes and skidding over snow or frozen ground can decrease the negative impacts to soil productivity. Harvest activities can also greatly increase the likelihood of mass soil movements occurring, particularly along roads and on clearcuts in steep terrain. Soil productivity, as defined by Brady and Weil (2002), is "the capacity of a soil for producing a specific plant or sequence of plants under a specified system of management." It is important to look at soil productivity to properly assess the effects of potential actions on a specific area. For instance, if timber harvest is proposed on a given area of land that was considered as having low soil productivity, additional actions may need to be taken to insure a fully stocked stand after harvest. Soil productivity levels for each landtype are classified as low, moderate, or high in USDA 1995. **No harvest or road building activities are proposed on low productivity soils with this proposal.**

The removal of trees from a site can cause temporary nutrient deficits that negatively affect physical and biological soil conditions. To avoid this, it is important to maintain both fine and CWD at all managed sites. Allowing the accumulation and decomposition of a range of sizes of woody debris maintains both short-term and long-term soil productivity. The different decomposition rates provide for the slow, continual release of nutrients. Each activity area has been assigned a VRU-specific retention level for CWD. Because the proposal includes construction of a permanent road, the land that is harvested would be removed from the timber base and does not need to meet the productivity standards for standard timber harvest units.

Please see Appendix 7 for a list of BMPs specific to this proposal.

ENVIRONMENTAL CONSEQUENCES

The soils analysis accounts for all land disturbing activities (past, present and proposed) within the project areas. The effects analysis is based on the proposed activities displayed in Chapter 2. Alternative 1 is the no-action alternative, which implies that none of the FS activities displayed in Chapter 2 would be conducted. Alternative 2 is the proposed action.

ALTERNATIVE 1

Direct and Indirect Effects

Road construction and associated timber harvest activities as proposed with this project would not occur under the no-action alternative. However, natural changes in climate and vegetation would continue to occur. Vegetative regeneration would continue on existing harvest units resulting in lower compaction due to root growth and increased soil nutrients from the decomposition of forest litter and CWD.

Cumulative Effects

There are no planned timber harvest or road construction activities in the Prospect Creek watershed in the near future (2010). The data in the existing condition section, resulting from past actions, also represents the effects of implementation of this alternative.

ALTERNATIVE 2

Direct and Indirect Effects

Alternative 2 includes the construction of approximately 0.8 miles of road to access the private land with no new stream crossings. This equates to approximately 4 ECAs in the project watershed. The road storage work

listed in Table 2.1 totals 1.8 miles and would result in the roads being undriveable but in a stable hydrologic condition. The road projects are designed to improve the stability of six existing crossings in the area watersheds. Road densities would slightly increase in Prospect Creek. The activities would have a short-term detrimental effect on water quality but would result in long-term beneficial effects as a result (Wegner 1999).

Approximately 1 acre of disturbance would occur near the mine adits. The activities associated with the mining exploration takes place on previously disturbed soils and will have little effects to the soil resource.

Cumulative Effects
As discussed previously for Alternative 1, there is no planned timber harvest activity in the Prospect Creek drainage.

Table 3.18 - Harvest Acres - Alternative 2 (2007)

DRAINAGE	WATERSHED SIZE (acres)	ECAs	% of WATERSHED IN A HARVESTED CONDITION	ROAD DENSITY (miles)
Prospect Creek	4,005	1,004	25	2.25

The construction of new road would expose new soils. Heavy equipment operation would compact the soils and accelerate surface runoff. Because the proposal includes construction of a permanent road, the land that is harvested would be removed from the timber base and does not need to meet the productivity standards for timber harvest units.

Reclamation of the site and reclamation of the segment of road leading from the existing mining road (NFS Road 5252) to the portal area would be required and part of the POO. Waste rock would be backfilled into portals and/or covered in topsoil and revegetated. The portals would be closed at the end of the project using the appropriate closure device as determined by the FS. Access to the area would change as planned under the Treasure Interface Project, but changes would occur under a differ
rent timeframe. Access changes (road storage) identified in this document would be complete before implementation of the Prospect Hill project.

MITIGATION MEASURES
Roads – Alternative 2 would require the 1.8 miles of road storage work described in Chapter 2 along with 0.7 miles of BMPs (Table 2.0).

DESIGN FEATURES
The KNF Plan states that "Soil and water conservation practices as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22, May 1988) will be incorporated into all land use and project plans as a principal mechanism for controlling nonpoint pollution sources; meeting soil and water quality goals; and to protect beneficial uses. Activities found not in compliance with the soil and water conservation practices or State standard will be brought into compliance, modified, or stopped." (KNF Plan, pg II-23). Montana State Water Quality Standards require the use of Reasonable Land, Soil, and Water Conservation Practices (analogous to BMPs) as the controlling mechanism for nonpoint pollution.

CONSISTENCY with the FOREST PLAN and REGULATORY FRAMEWORK
Forest Plan Consistency
The proposed activities are consistent with the Forest Plan for the soils resource. The Alternative 2 is expected to meet the Forest Plan standard for the protection of soils with its required mitigations implemented. Forest Plan consistency is measured through the implementation of BMPs (Appendix 2). Adherence to the FSM Regional R1 Supplement which limits detrimental soil disturbance to less than 15% of the harvest area is not required for this action because the harvest associated with the action would be for the creation of a permanent access road which would have its land base removed from the timber production standards. The activities associated with the mining exploration takes place on previously disturbed soils and will have little effects to the soil resource.

INTRODUCTION

The activities proposed under the Prospect Hill project (road reconstruction, construction and storage, mining and reclamation) have the potential to effect proposed, threatened, endangered and sensitive (PTES) plant populations.

The purpose of this analysis is to:

1) Determine if the proposed activities would adversely affect any of the PTES plant species that have the potential to occur in the analysis area, and if so, list design features to be implemented to reduce potential effects. The analysis area is the Prospect Hill project area, see map at back of document.
2) Insure that the action does not contribute to the loss of viability of any sensitive plant species or cause a trend toward federal listing;
3) Comply with USDA Forest Service Region 1 policy to insure that sensitive plant species receive full consideration in the decision-making process;
4) Comply with the Endangered Species Act.

This analysis considers the short- and long-term effects of the proposed action on:

- Existing and potential habitat,
- The welfare of existing plants.

REGULATORY FRAMEWORK

Endangered Species Act

The Endangered Species Act (ESA) of 1973 declares, "…all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." Under the Act, Federal agencies must consult with the Secretary of Interior whenever an action authorized by such agency is likely to affect a species listed as threatened or endangered.

Although no proposed, threatened, or endangered plant species are know to occur on the Kootenai National Forest (KNF) two threatened plant species are suspected to occur.

National Forest Management Act

The National Forest Management Act (NFMA) directs that the Forest Service (FS) must "provide for the 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" (16 USC 1604(g)(3)(B)).

Agency Direction

In addition Forest Service Manual (2670.5 section 19) defines **sensitive** species as "those plants and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:

1. Significant current or predicted downward trends in population numbers or density; or
2. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Effects to these **sensitive** species must be analyzed.

The Kootenai Forest Plan (USDA 1987) addresses Sensitive species under its Forest-wide management direction. In its goals, it states that we will "determine the status of Sensitive species and provide for their environmental needs as necessary to prevent them from becoming Threatened and Endangered" (Forest Plan p. II-1). It goes on to say that we will maintain diverse age classes of vegetation for viable populations of all existing native species. The plan also supports the protection and maintenance of important riparian zone features, marshes and water bodies, where Sensitive plants often exist.

ANALYSIS METHODS

The following steps were taken to complete this analysis for PTES plants:

1. The assessment of Sensitive plants and Sensitive plant habitat followed the methods outlined for the KNF by Leavell and Triepke (1995). Suitable habitats for each Sensitive species known or suspected of occurring on the KNF have been identified by consultation with Sensitive plant field guides (USDA 1992) and published and unpublished literature on Sensitive plants (Lesica and Shelly 1992; Vanderhorst 1996, 1997) as well as through extensive field experience. Probability of occurrence (Leavell and Triepke 1995) of Sensitive species was estimated, including both historic and existing conditions. Rare plant inventories were conducted subsequent to these assessments (USDA 1998). These took into consideration all rare plants and rare habitats in addition to Sensitive species. They took place in addition to other past and concurrent surveys of Sensitive plants in and around the analysis area (Vanderhorst 1996, 1997; R. Ferriel, pers. comm.). The species included in this assessment are those with a moderate to high probability of occurrence in the analysis area. The probability analyses took into consideration the following factors:
   - Past disturbance
   - Locations of known populations - District records, past surveys and the Montana Natural Heritage Program database were scanned to determine species already known to exist in the analysis area. These populations are included on the analysis map (project file).
   - Ecological requirements of the individual species (e.g. elevation, potential vegetation, landtype, lithology, shade and moisture regimes)

   Areas proposed for treatment were reviewed for places with moderate to high potential for providing habitat for PTES plant species.

2. Field surveys were completed in areas with moderate to high potential to provide habitat for PTES plants. In general, these areas are streams, wetlands, riparian zones, mesic coniferous forest with a component of mature western red cedar, moist cliffs and talus slopes, dry meadows, park-like ponderosa pine forest, and dry south facing rocky areas. Unique landscape features have more potential to provide habitat for PTES plants than more common landscape features, so these are emphasized during surveys.

3. This analysis was completed using the maps, surveys completed to date, literature, expert and personal knowledge about the requirements of each suspected plant species of concern.

AFFECTED ENVIRONMENT/EXISTING CONDITION

The habitat requirements for many sensitive plant species are often narrowly defined. When this is the case, decisions as to the probability of occurrence and the potential sites to survey are easily and confidently determined. Some sensitive plant species have wider ecological amplitudes and their potential extends through a variety of habitats.

The Prospect Hill project would affect certain lands in the Prospect Creek area (see map). Project implementation should occur over the next one to five years (except in the case of the no-action alternative).

Overall Description of the Project Area

The mine portals are located on Prospect Hill, southwest of Libby, in moderately dry forested environment. The portals are located above Prospect Creek at an elevation of approximately 3200 feet. The new road construction leads to the portals.

Habitat Descriptions of Proposed Activity Areas

Within the Prospect Hill project area, 3 recognized habitats with the potential to support sensitive plant species exists:

A. Opening within the forest;
B. Forested slopes;
C. Roadsides.

Openings Within The Forest – Openings within the forest can be caused by a number of factors: fire, disease, poor soils, rock outcrop or a high water table. The openings themselves and the zone surrounding the openings represent a dramatic change from the adjacent habitat. This change increases the potential for the establishment of sensitive plant species. Dry openings have the potential to support: *Clarkia rhomboidea, Corydalis sempervirens, Heterocodon rariflorum, Lathyrus bijugatus*, and *Lomatium geyeri*. Moist openings have the potential to support: *Botrychium* spp, *Carex* spp, *Viola renifolia*, and *Ophioglossum pusillum*.

The plant surveys did not locate any moist openings within the forest; however, a several dry openings were seen.

Forested Slopes – This is the dominant habitat in the Prospect Hill project area. Douglas-fir, larch and ponderosa pine are the primary overstory tree species. Lodgepole pine and grand fir were also found as components in the overstory.

The forested slopes tend to be warm and dry, with only small areas being cool and/or moist. This is reflected in the list of sensitive plants with the potential for existing within the forested slopes of the Prospect Hill project area: *Lathyrus bijugatus*, *Lycopodium dendroideum*, *Collema curtisporum*, and *Corydalis sempervirens*. Overall potential for sensitive plant species to exist on these forested slopes is rather low.

No sensitive plant species were found resulting from surveys in the forested slopes.

Roadsides – Over the past several years, several sensitive plant species have been discovered growing along roadsides. Many species of the *Botrychium* genus, as well as *Clarkia rhomboidea* and *Lomatium geyeri*, have been found growing in roadsides on the Libby District and on other districts of the KNF. The conditions required for these plant species vary by genus. The *Botrychium* species seem to need shade and moisture in order to become established. The *Clarkia* species needs exposed soil – as in the exposed soil of a road-cut. Sensitive plant species with a potential to exist on roadsides within the Prospect Hill project area are: several *Botrychium* spp, *Clarkia rhomboidea*, *Lomatium geyeri*, and *Heterocodon rariflorum.*

No sensitive plant species were discovered on the roadsides within the Prospect Hill project area.

POTENTIAL SPECIES

THREATENED, ENDANGERED and PROPOSED PLANT SPECIES

Currently two species in Montana, water howellia (*Howellia aquatilis)* and Spalding's catchfly *(Silene spaldingii)* are federally listed as threatened. These species are suspected to occur on the KNF, but have not been found on federal land in the KNF. The term 'threatened species' means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Table 3.19 summarizes findings for Threatened and Endangered plant species.

Table 3.19 – Threatened & Endangered Plants

SPECIES	HABITAT	CONCLUSION	JUSTIFICATION
Howellia aquatilis (Water howellia)	Ephemeral glacial ponds and abandoned river oxbows below 4500ft.	**No Effect**	Not known in the project area or found during project surveys. Ephemeral glacial ponds and abandoned river oxbows below 4500 feet are not known in the project area.
Silene spaldingii (Spalding's catchfly	Remnant Palouse Prairie and canyon grassland habitat	**No Effect**	Not known in the project area or found during project surveys. Grassland habitat not known in the project area.
Botrychium lineare (Linearleaf moonwort)	Early to mid-succession on a wide variety of habitats including: roadsides, grass under conifers, limestone shelf and grasslands.	**No Effect**	Not known in the project area or found during project surveys or on the KNF.

Table 3.20– Status of Kootenai Forest Sensitive Plant Species in the Prospect Hill Project Area

*Species not on official Region One Sensitive Plant List

COMMON NAME	SCIENTIFIC NAME	STATUS	POTENTIAL/FOOTNOTE
Round leaved orchis	*Amerorchis rotundifolia*	Suspected	Low
*Bog Birch	*Betula pumila***	Not Suspected	NS2
*Deer fern	*Blechnum spicant*	Not Suspected	NS5
Water marigold	*Bidens beckii*	Not Suspected	NS2
Upswept moonwort	*Botrychium ascendens*	Suspected	Low
Wavy moonwort	*Botrychium crenulatum*	Suspected	Low
Western moonwort	*Botrychium hesperium*	Suspected	Low
Peculiar moonwort	*Botrychium paradoxum*	Suspected	Low
Stalked moonwort	*Botrychium pendunculosum*	Suspected	Low
Watershield	*Brasenia schreberi*	Not Suspected	NS2
Big leaf sedge	*Carex amplifolia*	Suspected	Low
Creeping sedge	*Carex chordorhiza*	Not Suspected	NS2
Prairie sedge	*Carex prairea*	Not Suspected	NS2
Beaked sedge	*Carex rostrata*	Not suspected	NS2
Sheathed sedge	*Carex vaginata*	Not suspected	NS2
Common clarkia	*Clarkia rhomboidea*	Suspected	Low
Sand Spring Beauty	*Claytonia arenicola*	Not Suspected	NS5
Lichen	*Collema curtisporum*	Suspected	Low
Pink corydalis	*Corydalis sempervirens*	Suspected	Low
Clustered lady's-slipper	*Cypripedium fasciculatum*	Not Suspected	Low
Small yellow lady's-slipper	*Cypripedium parviflorum*	Suspected	Low
Sparrow's egg lady's-slipper	*Cypripedium passerinum*	Suspected	Low
English sundew	*Dorsera angelica*	Not suspected	NS2
Linear leaved sundew	*Drosera linearis*	Not suspected	NS2
Crested shieldf ern	*Dryopteris cristata*	Suspected	Low
Giant helleborine	*Epipactis gigantean*	Not suspected	NS8
Slender cotton grass	*Eriophorum gracile*	Not Suspected	NS2
*Green-keeled cottongrass	*Eriophorum viridicarinatum*	Not suspected	NS2
Western boneset	*Eupatorium occidentale*	Not suspected	NS7
Hiker's gentian	*Gentiana simplex*	Not Suspected	NS8
Moss	*Grimmia bittoniae*	Not Suspected	NS3
Howell's gumweed	*Grindelia howellia*	Not suspected	NS8
Western pearlfloweer	*Heterocodon rariflorum*	Suspected	Low
Latah tule pea	*Lathyrus bijugatus*	Suspected	Low
Geyer's biscuit root	*Lomatium geyeri*	Suspected	Low
Prickly tree clubmoss	*Lycopodium dendroideum*	Suspected	Low
Clubmoss	*Lycopodium lagopus*	Not Suspected	NS7
Bog clubmoss	*Lycopodiella inundata*	Not suspected	NS2
Moss	*Meesia triquetra*	Not suspected	NS2
Short-flowered Monkey Flower	*Mimulus breviflorus*	Suspected	Low
Lichen	*Nodobryoria subdivergens*	Not suspected	NS7
Northern adder's tongue	*Ophioglossum pusillum*	Suspected	Low
Northern beechfern	*Phegopteris connectilis*	Suspected	Low
Dwarf wooly heads	*Psilocarphus brevissimus*	Not suspected	NS2
Pod grass	*Scheuchzeria palustris*	Not suspected	NS2
Tufted bulrush	*Scirpus cespitosus*	Not suspected	NS1
Water bulrush	*Scirpus subterminalis*	Not suspected	NS2
Moss	*Scorpidium scorpiodes*	Not suspected	NS2
Flat leaved bladderwort	*Utricularia intermedia*	Not suspected	NS1, 2
Selkirk violet	*Viola selkirkii*	Not Suspected	NS7

Footnotes: NS1 - Not suspected due to lack of associated riparian habitat
NS2 - Not suspected due to lack of associated wetland habitat, floating moss mats, fens

NS3 - Not suspected due to lack of calcareous influence
NS5 - Not suspected due to lack of associated forest type
NS7 - Not suspected due to lack of subalpine or alpine habitat
NS8 - Not suspected / has not been found on the KNF

High Potential = Habitat appears to be suitable and plant known from several occurrences on the KNF, or a known site is within one mile of Project area boundary.
Moderate Potential = Habitat appears suitable and plant known on the KNF
Low Potential = Habitat appears to be suitable but plant is very rare on the KNF, or known occurrences on the forest are considerably distant or confined to specific geographic area.
Very Low Potential = Habitat appears suitable, but plant is not known to occur on the KNF.

ENVIRONMENTAL CONSEQUENCES
DESIGN FEATURES

- Apply weed control efforts as described in the Noxious Weeds section of this document.
- The finding of any additional sensitive plant populations would result in additional mitigation needs.

THREATENED, ENDANGERED and SENSITIVE PLANTS

The new road construction providing access to the existing NFS Road 5252 would go through recently logged ground. The existing road would have BMPs. Neither of these activities would occur in areas with potential for TES plant species. The two short roads segments 3 and 4) for accessing the mining claim and the west side of the private property, go up hill and away from Prospect Creek. The habitat in this area is poor for TES plant species.

Since no species have a moderate or high potential for this area and none were found during surveys than there would be **No Effects to TES Plant Populations**.

NATIVE PLANT COMMUNITIES

Direct, Indirect and Cumulative Effects

Indirect and cumulative effects to native plant communities are likely to result from the introduction and spread of undesirable non-native species. Weed species are already abundant on roads in the project area. Knapweed and hawkweed were observed along the existing NFS Road 5252, especially in the upper stretches of the road. Ground disturbing activities from road construction, road storage and mining activities would remove vegetation and expose bare mineral soil. Though many native species are adapted to colonizing disturbed soil, noxious weed species now residing throughout the project area have the advantage. Weed infestations are adjacent to almost every proposed activity area. The seed bank in native communities may already contain weed seeds that would take hold when conditions, such as soil disturbance, permit. Machinery is likely to be a primary vector, bringing weed seeds from infested roads or portions of units into native communities. Even revegetation along roads and skid trails would have effects to the native community, as nonnative, potentially invasive species can be introduced in seed mix. Additional activities in the area are likely to exacerbate negative effects to the native plant community caused by past activities. Even with design features, the native plant community is likely to be further compromised by non-native weeds.

PTES PLANT SPECIES BIOLOGICAL ASSESSMENT/EVALUATION

Consultation Requirements for Threatened and Endangered Species

In accordance with the Endangered Species Act, its implementing regulations, and FSM 2671.4, the KNF is not required to initiate formal consultation with the U.S. Fish and Wildlife Service (FWS) regarding the determination of **No Effects to the Threatened Water howellia and Spalding's catchfly**; and is not required to request written concurrence from the FWS with respect to the determination of "no effect".

CONSISTENCY with the FOREST PLAN and OTHER MANAGEMENT DIRECTION

This project is in compliance with FS policy on Sensitive species (FSM 2670.32) and the Endangered Species Act. The FS is mandated to provide for the 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 under the National Forest Management Act. A requirement similar to timber sale contract provision R1-C6.251#, Protection of

Habitat of Endangered Species, should be used in the plan of operation to modify the action as necessary to protect PTES plant populations in the event that they are missed by field surveys and found after Plan of Operations is approved.

NEED FOR RE-ASSESSMENT BASED ON CHANGED CONDITIONS

The findings of this report are based on the best data and scientific information available at the time of preparation. If new information reveals effects that may effect threatened, endangered, proposed or sensitive species, or their habitats, in a manner or to an extent not considered in this assessment; if the proposed actions are subsequently modified in a manner that causes an effect that was not considered in this assessment; if sensitive species are found to occupy activity areas, or if a new species is listed or habitat identified that may be affected by the actions, a revised biological assessment should be prepared.

INTRODUCTION

Noxious weeds are: "Those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease and being native or new to or not common to the United States or parts thereof." (FSM 2080.5) Noxious weeds generally have the potential to adversely affect native flora and fauna and their habitats. The Lincoln County Weed Control Act (MCA 7-22-2101) defines a noxious weed as "any exotic plant species established or that may be introduced in the state which may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated:

(i) As a statewide noxious weed by rule of the department; or
(ii) As a district noxious weed by a board, following public notice of intent and a public hearing."

ANALYSIS AREA

Analysis bounds for most noxious weed occurrence and impacts would include the immediate project area within Prospect Creek as well as the roads proposed for storage as shown in Table 2.1. For risk of new invaders, the analysis bounds would include the Kootenai National Forest (KNF).

ANALYSIS METHODS

Information from field surveys conducted in the summer of 2004 and 2005, and field reconnaissance conducted in 2007, are the basis for evaluation of current infestation levels and species presence. The Libby Ranger District weed files contain the survey information for individual roads in the form of field forms. Weed density and infestation size were mapped using the *Montana Noxious Weed Survey and Mapping System*. Refer to the project file for the weed surveys.

REGULATORY FRAMEWORK

Federal

The objectives of National Forest Management Act (NFMA), as well as the principals of ecosystem management, include maintaining the diversity of plants and animals existing in forest ecosystems. Implementing regulations for the NFMA state:

> "Provide for the diversity of plant and animal communities based on the suitability and capability of specific land area in order to meet overall multiple-use objectives and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to the existing in the region controlled by the plan." (16 USC 1604(g)(3)(B))

Forest Service

The Natural Resource Agenda, the Northern Region Overview, the Interior Columbia River Basin Ecosystem Management Project all highlighted noxious weeds as a serious ecological, environmental and economic threat. Invasive species have been identified by the Chief of USDA Forest Service (FS) as one of the four significant threats to our forest and rangeland ecosystems. The National Strategy and Implementation Plan for Invasive Species Management was developed to guide the FS in invasive species management. The national strategy encompasses four program elements including

(1) Prevention;
(2) Early detection and rapid response;
(3) Control and management;
(4) Rehabilitation and restoration (USDA 2004).

State

The Montana County Noxious Weed Control Law (MCA 7-2101 through 2153) was established in 1948 to protect Montana from destructive noxious weeds. This act, amended in 1991, has established a set of criteria for the control and management of noxious weeds in Montana. The noxious weed control law establishes

weed management districts throughout the state. These management districts have the responsibility to enforce the law and are defined by the boundaries of the county.

County
The Lincoln County Weed Control Act (MCA 7-22-2116) states that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his land, except that any person who adheres to the noxious weed management program of his district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section." On July 26, 1991 the KNF signed a memorandum of understanding with Lincoln County, Montana regarding noxious weed management standards. The KNF agreed to assist and cooperate with the Weed Board in fulfilling and enforcement of Montana State Weed Law (MCA 7-22).

AFFECTED ENVIRONMENT

Noxious weeds are exotic vegetation that by definition are non-native, unwanted and detrimental to desired conditions. Noxious weeds are a serious ecological and environmental threat to the natural resources. Noxious weeds displace native plant communities (including endangered species), alter wildlife habitat, lower biodiversity and reduce forage for wildlife and livestock. In some cases, noxious weeds increase soil surface runoff and sedimentation into streams.

The exact number of noxious weed species present in the project area is unknown. Weed surveys and ground reconnaissance by specialists in the project area showed the following species to be present:

spotted knapweed (*Centaurea maculosa*)
oxeye daisy (*Chrysanthemum luecanthemum*)
common St. John's-wort (Hypericum perforatum)
Canada thistle (Cirsium arvense)
sulfur cinquefoil (*Potentilla recta*)
orange hawkweed (*Hieracium aurantiacum*)
meadow hawkweed (Hieracium piloselloides)

In order to identify various levels of management toward the control of noxious weeds within Lincoln County, Montana, and the KNF, specific noxious weed species have been grouped into categories. The categories are unique to Lincoln County, Montana and the KNF and are not intended to replace the State of Montana Noxious Weed list. Table 3.21 lists the weed classification and management strategy for known noxious weeds within the Prospect Hill analysis area.

Table 3.21 - Weed Classification and Management Strategy

WEED CATEGORY	WEED SPECIES	MANAGEMENT STRATEGY
Priority 1A Potential Invaders	No known populations (not currently known to exist in Lincoln County)	Prevention, Eradication
Priority 1B New Invaders	Rush skeletonweed Tansy ragwort -1 mile away in Granite Creek	Eradication
Priority 1C New Invaders	Dalmatian toadflax within the KNF	Contain main body, eradication of populations outside main body.

Spotted knapweed is the predominant species. Densities are light through the harvest unit where the 0.40 miles (Segment 1) of proposed road construction is located near Granite Creek Road and at the southern most portal location associated with the waste rock piles. Moderate to dense populations are found on existing NFS Road 5252. Small, scattered patches of St. Johnswort, orange hawkweed and sulfur cinquefoil also occur along this road. No weeds were found on the undisturbed forested slope where the 0.40 miles of road connecting the NFS Road 5252 road to the private land is proposed to be constructed.

The roads in Table 2.1, that are proposed to be put into intermittent stored service and closed by earthen barriers, have varying densities of all of the previously listed weed species with spotted knapweed and orange and meadow hawkweeds being the most abundant.

Spotted knapweed is a biennial or perennial forb that can produce up to 18,000 seeds per plant per

year under favorable conditions. Spotted knapweed ranks as the number one weed problem on rangeland in western Montana. It is adapted to a wide range of environmental conditions. Spotted knapweed is most successful in warmer drier habitat types (USDA 1991).

Hawkweeds reproduce from seed and stolons, which are the same structures that strawberry plants use to spread. These extensive stolons allow hawkweeds to form a dense mat that crowds out all other vegetation. Areas of risk include tree plantations, general forest lands, pastures, meadows, wetlands, roadsides, dispersed and developed recreation areas. These plants are successful on all but the driest sites (USDA 2000).

Common St.John's-wort is a perennial forb that reproduces from seed and rhizomes. Spread of this weed can be rapid and intensive. Areas of risk include pastures, grasslands, wastelands, roads, tree plantations, grazeable woodlands, well-drained or heavy soils and southwest aspects (USDA 2000). Patches of this species are crowding out forage plants on big-game winter range on the District.

Sulfur cinquefoil is a long-lived perennial that has become one of the most serious invaders of the Northern Rockies. The earliest records of sulfur cinquefoil in Montana were in 1947. By 1996, sulfur cinquefoil had spread to at least 30 counties in western Montana. This rapid spread over large geographic areas is similar to the exponential spread pattern of spotted knapweed. Cinquefoil has wide ecological amplitude, but is commonly associated with spotted knapweed. It is successful in invading low-disturbance sites, and is common in natural grasslands, shrub areas and open canopy forests. Establishment and expansion are limited by shading from a dense overstory canopy (Sheley 1999, pg 282-285).

New Invaders
A small population of Tansy ragwort is located approximately 1 mile east of the Portal #1.

MANAGEMENT GOALS

The goal of noxious weed management on the KNF is to manage weeds in order to protect forests, rangelands, wilderness and adjacent farmlands, and to cooperate with private individuals and county and state agencies concerned with managing noxious weeds (USFS 1997). Preventing noxious weeds from invading new areas considered weed free is the cheapest and easiest way to control them. Spraying of herbicides is currently the most effective method of control for smaller populations once noxious weeds become established. Open roads are common vectors for weed seed dispersal. Spraying roadsides and right-of-ways can be effective in managing the spread of weeds.

Weed control measures in this project area have not included herbicide treatments of the existing mine access route or the roads planned for storage (Table 2.1). Lincoln County does treat the main Granite Creek road and the FS does treat many of the yearlong and seasonally open roads and other sites in the adjacent watersheds. Refer to project file for specifics.

Planned weed activities in the project analysis area include the following:

- Continued treatment of the Granite Creek Road ROW by the Lincoln County Weed Department;
- Continue treatment of the yearlong open roads and new invader sites by the Forest Service;
- Apply mitigation measures to all projects in the analysis area.

ENVIRONMENTAL CONSEQUENCES

ALTERNATIVE 1

Direct and Indirect Effects

No new road construction, road improvement or timber harvest would occur under this alternative, therefore, no direct or indirect effects on the spread or introduction of noxious weeds would occur due to these soil disturbing actions. Motorized access on the existing open NFS Road 5252 would likely continue at its current rate as well as the non-motorized access to the portal locations.

Cumulative Effects
The existing weed species in the project area are still expected to slowly continue to spread. Existing open roads would continue to support populations of noxious weeds; seeds would be spread by road maintenance, administrative and recreational vehicles. Closed roads would also continue to support weed populations but the rate of spread would be less. Existing weeds would be expected to continue creeping off of roadways, onto the drier, more open forested hillsides.

ALTERNATIVE 2
Direct and Indirect Effects
Alternative 2 includes the construction of approximately 0.8 miles of road, 4 acres of associated timber harvest**,** road storage work on 1.8 miles of roads and BMPs on 0.7 miles of road as listed in Chapter 2. In addition, the use of heavy equipment would be allowed for minerals exploration. All of these activities have the potential to spread noxious weed species, causing negative impacts to native vegetation and wildlife. However, vehicular access would become limited to the permittee and the FS which would reduce the impacts of this particular source of weed spread.

Road Construction
Road construction has a high potential to spread noxious weeds through severe disturbance that creates a receptive seedbed and allows noxious weeds to establish and flourish. This site disturbance can last several years on dryland sites. Once established, travel along the new road can continue to spread weeds. The weed species that currently exist on NFS Road 5252 and in the adjacent harvest unit would very likely be spread to the new road segments.

Mining and timber harvest activities, connected with the road construction, can spread noxious weeds by transporting seeds on personal vehicles and harvest equipment. Ground disturbance associated with these actions creates a receptive seedbed on disturbed land. The risk of noxious weed spread is related to the amount of disturbance.

Mitigation measures include equipment washing, seeding and fertilizing the constructed road cut and fill slopes, use of certified weed-free seed and straw, limiting soil disturbance during road construction, post construction monitoring and treatment. Treating the weeds on NFS Road 5252 prior to construction activities would reduce the amount of seed available for transport to other sites.

Road Storage
In the short-term, road storage may increase spread of on-site weed seed, and transport off-site seed into the area on equipment. Disturbance associated with these activities can create a seedbed that allows noxious weeds to re-establish and flourish. Mitigation measures include equipment washing, herbicide treatments prior to storage activities, use of weed-free certified seed and straw, seeding and fertilizing on disturbed areas, and post treatment monitoring and herbicide treatment. Monitoring has shown that herbicide treatments prior to storage work helps reduce weed densities and population size, and that the long-term benefits of road storage are a reduced rate of noxious weed spread, particularly for new invaders. There is a risk of introducing weed seeds on equipment associated with the storage even with the required equipment washing. The greatest risk is posed when equipment from outside the area is utilized for these activities, since they may bring new invaders onto these sites. The long-term effects of road storage are a reduced rate of weed spread due to these areas not being accessible to vehicle use. Once re-vegetated, roads that are stored would be fairly resistant to spread of all but the species that continue to flourish under a shaded environment, such as hawkweeds. The spread of hawkweeds may be higher through storage than the yearlong closures due to the difficulty in treating these roads once storage activities have occurred.

Cumulative Effects
Past soil-disturbing activity and vehicular traffic have helped spread noxious weeds into the project area. Surveys of roads were conducted in the project area in 2004, 2005 and 2007 to inventory noxious weed

populations. Copies of the surveys are located in the project file

Spraying of roads, in the project area, would reduce weed infestations along open roads in the short-term. These roads would be treated primarily with Tordon (active ingredient is Picloram). This treatment should have about a three year effect in reducing the density of noxious weeds, primarily spotted knapweed, St. Johns-wort, sulfur cinquefoil, oxeye daisy and hawkweeds.

Picloram is a synthetic plant growth regulator that affects plant processes that are not present in mammals. Studies have shown it to have low toxicity to large and small mammals, birds, fish and other aquatic organisms, or bees. Picloram degrades by microorganisms in the soil and photodegrades from sunlight. The length of time necessary for picloram to degrade in the soil is based on herbicide rate applied, soil moisture, organic matter content, temperature, oxygen and soil microbe activity. In the Prospect Hill project area, it is estimated to have up to a two year mortality and suppressive effect (Dow 2000). Refer to the 1997 KNF Herbicide Weed Control Environmental Assessment for further information, and the project file for a list of past herbicide treatment in the project area.

Actions proposed in this project would increase the probability that noxious weeds would spread in the project area due to the additional disturbance. Mitigation measures and design features would reduce the rate of spread.

MITIGATION MEASURES

Spraying of weeds is authorized under the Kootenai Invasive Plant Management Environmental Impact Statement and Record of Decision, April 2007. The following mitigation measures are recommended:

- The permittee would make sure that the weed treatment applicator is a licensed applicator.
- Require permittee to treat existing noxious weeds on and along NFS Road 5252 the first operational season for weed spraying (spring or early summer) prior to starting road construction.
- Require permittee to annually treat noxious weeds on and along Road 5252, including the newly constructed segments, as well as on the waste rock piles associated with the two portals on NFS land.

DESIGN FEATURES

The following design criteria are recommended:

- Pressure or steam-wash all equipment prior to moving on the sites, removing all soil and plant parts that may contain weed seed, to prevent weed spread and introduction.
- Seed and fertilize roads, cut and fill slopes with certified weed-free seed. Utilize certified weed-free straw for any mulching or sediment control work.
- Gravel brought in for road surfacing must be from an approved source, free from new invader weed species.
- Minimize mineral soil disturbance or exposure during all mechanized ground based activities, to reduce the seed bed for noxious weeds, and minimize impacts to soil productivity.
- Treat existing noxious weeds on roads to be stored prior to that activity, (if possible schedule spraying two or more seasons before activities are expected to occur to reduce the amount of viable weed seed stored in the soil.

CONSISTENCY with the FOREST PLAN and OTHER MANAGEMENT DIRECTION

Forest Service Manual (FSM) 2080.1 directs the National Forests to conform to the Federal Noxious Weed Act of 1974, as amended.

The Lincoln County Weed Control Act (MCA 7-22-2116) indicates that "it is unlawful for any person to permit any noxious weed to propagate or go to seed on his land, except that any person who adheres to the noxious weed management program of his district or who has entered into and is in compliance with a noxious weed management agreement is considered to be in compliance with this section."

The KNF has entered into a weed Memorandum of Understanding (MOU) with Lincoln County, which is a management agreement under this law. Because the mitigation measures described in this report would be followed, this project is in compliance with the MOU and the Federal Noxious Weed Act.

These actions would also help to meet the goal for noxious weed management as stated in the Forest Plan.

INTRODUCTION

Section 106 of the National Historic Preservation Act (NHPA 1966) requires *federal agencies to take into account the effects of their actions ("undertakings") on historic properties.* This act also establishes the Advisory Council of Historic Preservation (ACHP) as the oversite agency to consult with federal agencies for the review of undertakings having the potential to affect historic properties. The Region 1 Programmatic Memorandum of Agreement (PMOA) has established a process whereby this consultation is delegated to Montana State Historic Preservation Office (SHPO). The NHPA also requires that American Indian Tribes be included in consultation. These requirements are carried forward in the Forest Plan standards (Forest Plan, Vol. 2, Appendix 19).

Project area inventories and consultation, under Section 106 of the NHPA, must be completed prior to project implementation. On the Kootenai National Forest (KNF), the consultation process has been streamlined by programmatic agreements (PA), for projects meeting specific conditions. Generally, these conditions include:

1) Areas where previous inventories are adequate;
2) Adequate inventories where no historic properties are located in the project area of potential effect;
3) Particular property and project types with recurring similar impacts allowing predetermined mitigation measures.

Documentation under these agreements are submitted to the SHPO in an annual report, and may or may not be submitted prior to project implementation.

Where a proposed project is likely to adversely effect an eligible historic property and the project cannot be redesigned to avoid the property, mitigating measures must be developed. These measures must be documented and approved by SHPO and the ACHP prior to project implementation, except where streamlined by a programmatic agreement.

On the KNF, two agreements are commonly used. The programmatic agreement regarding Cultural Resource SHPO, when no inventory is necessary because of adequate previous inventory or low probability, or when no historic properties are located within the area of potential effect. In these cases, no inventory or negative reports are approved at the Forest level, and are submitted to the SHPO annually.

Historic logging or historic trail properties are treated according to the standards previously agreed to with SHPO in the KNF PA regarding Treatment of Historic Trails and Logging Remains (KNF PMOA). In these cases, consultation with the SHPO prior to project implementation is not necessary. The property and standards used are documented and sent to the SHPO on a yearly basis.

A requirement similar to timber sale contract provision C6.24, that requires project implementation to cease if a property is discovered during project implementation, would be added to the special use permit. This would allow the Forest Archaeologists to complete Section 106 consultation on property eligibility and project effects.

Both the NHPA and the Archaeological Resources Protection Act (ARPA) provides for exemption for the location of properties from public disclosure. The intent of this exemption is to protect historic properties from vandalism and looting (FSH 6209.13 11.22). ARPA also establishes civil and criminal penalties for individuals removing or damaging archaeological resources on federal lands.

ANALYSIS AREA

The analysis area for cultural resources is located in Township 30 North, Range 31 West and includes Sections 29, 32 and 33 (see map).

ANALYSIS METHODS

Analysis methods consist of a review and synthesis of all pertinent literature, records and documentation available on the history and prehistory of the project area and surrounding area. This includes previous cultural resource inventories and site forms for surveys conducted in and around the current project area.

Other sources include historic aerial photographs, KNF maps, USGS maps, mineral records and historic newspapers pertaining to the project area.

FOREST PLAN STANDARDS and GUIDELINES

Cultural resource inventories are required prior to any ground-disturbing activities, in an effort to locate and evaluate historic properties. The Forest Service (FS) and other Federal Agencies are required to address historic properties in the United States under several statutes, most notably the NHPA. These requirements are carried forward in the Forest Plan standards (Forest Plan, Vol. 2, Appendix 19).

Historic properties identified by a cultural resource inventory are evaluated for eligibility to the National Register of Historic Places. Properties that are determined as eligible are managed to either protect them in-place or to mitigate adverse project impacts. Eligibility and management provisions must be reviewed by the SHPO. This process must take place prior to impacts on the ground.

The location of historic properties is exempt from public disclosure as described in FSH 6209.13, sections 11.2 and 11.22. The purpose of this exemption is to protect properties from harm and to retain confidentiality of properties culturally significant to American Indian Tribes.

AFFECTED ENVIRONMENT

The Kootenai River was culturally and geographically divided into two bands. The Upper Kootenai territory ran from Windemere Lake, in British Columbia, southwards to near Libby, Montana. The Lower Kootenai territory covered the area from Libby, around the Big Bend of the Kootenai River, through the Bonners Ferry area of Idaho, and northwards past Kootenai Lake, British Columbia.

Gold mining began in the Lower Kootenai territory beginning in the summer of 1867 and then died out by 1874. The miners in this first rush traveled along the Kootenai River and some may have come down the Fisher via some of the same routes used by the native Americans. It is known however that in 1885 a second rush began on Libby Creek with miners coming from Thompson Falls via a route up the Vermilion River, over Lyons Gulch, through the Silver Butte drainage and over into the West Fisher to the mining camp on Libby Creek near the mouth of Ramsey Creek. In the late 1880s gold and silver claims were located in the Libby Creek drainage.

On June 13, 1891, the Nelly Bly Quartz Lode mining claim and the Iron Clad Quartz Lode mining claims were located on Prospect Hill by Jesse J. Norgard, George A. Chilson and Olaf Ohlgren. These were the earliest recorded mining claims on Prospect Hill. The area was called the 'Share Mining District'. The General Land Office Plat for T30N, R31W, surveyed August 2-20, 1893 by Daniel Mumbrue, shows Norgard's cabin and trail on Prospect Hill. In 1932, the D. and W. Mining and Concentrating Company began developing and promoting its properties on the south side of Prospect Creek. The development of this property may have lead to the interest in locating claims by Ira C. Tester, Claud Tester and William Herbert on the north side of Prospect Creek.

In September and October of 1933, Ira C. Tester, Claud Tester, and William Herbert located the initial claims of the Herbert Mines, the Flower Gold, Double T, Flower No. 2 and Prospect #1 Quartz claims. There were eventually 10 claims associated with the Herbert property. On October 20, 1933 the Herbert Gold Mining Corporation was formed and sold stock to develop the mines. In 1934 there was 300 feet of work in one of the adits at 300 feet. The original road to the Herbert Property was originally built to the D and W Mining Company between 1930 and 1933. By the year 1933 a spur road was built to the Herbert Gold Mine properties. A new road was built up the north side of Prospect Creek to the Herbert mining properties in December of 1934.

There have been 8 cultural resources inventories conducted in or near the analysis area beginning in 1985. The type of sites recorded in the project area include a historic mine and road. The cultural resource inventory follows the guidelines of the KNF Guidelines for Site Survey Strategy (November 2007).

Fieldwork for the Prospect Hill Mineral Exploration and Access Project was conducted on September 1 and October 2, 2005 and August 10, 2006. The results of the inventory were documented in 06-KO-5-02, A Cultural Resource Inventory of the Prospect Hill Mineral Exploration and Access Project. The project was submitted to SHPO in accordance with Section 106 of the NHPA. All associated sites were recorded. There was segment of a historic trail and portions of a historic mine located during this inventory. The sites were determined as not eligible to the National Register of Historic Places located during this inventory. This inventory was approved by the SHPO on February 20, 2007.

ENVIRONMENTAL CONSEQUENCES

Historic properties can be diminished in value by any change in their historical, architectural, archaeological or cultural character. Adverse impacts to historic properties can result in their damage or complete destruction, the effects of which are irreversible. In cases of partial damage, the undisturbed portion of the property may still provide valuable information.

The management intent is to identify all historic properties, evaluate their eligibility to the National Register, and avoid or mitigate any adverse effects of proposed activities. The potential exists for unidentified properties to be found and disturbed as the project proceeds. If previously undiscovered properties are found, they would be protected under conditions on Forest activities which provide for their protection. Implementation of any alternative would not result in any impacts on historic properties, as long as the Forest Plan standards are followed.

ALTERNATIVE 1

Under this alternative, no action is planned, and any unknown but existing properties, as well as those known properties would remain undisturbed outside of natural deterioration.

ALTERNATIVE 2

Direct, Indirect and Cumulative Effects

A segment of a historic mining trail was located during this project and was determined as not eligible to the National Register of Historic Places due to previous impacts over the majority of its length. A mining site was recorded and determined not eligible to the National Register of Historic Places. A feature to this site, NFS Road 5252, constructed in 1934. Since this road will be modified when it is brought up BMP standards it is anon-contributing to an ineligible site. A collapsed mining portal would be reopened to access the minerals on the private claim. Since the mine portal has loss of integrity due to the caving in of the opening, it is also non-contributing to an ineligible site. A partially collapsed powder magazine was also located and is a non-contributing feature to an ineligible site. SHPO concurred that the mining site and the trail segment were ineligible to the National Register of Historic Places on February 20, 2007.

If additional properties are encountered in the course of project implementation, a District Archaeologist would determine the eligibility of the property and project effects. The Forest Archaeologist would consult with SHPO and The Confederated Salish and Kootenai Tribes, where historic properties associated with aboriginal occupation are involved.

FOREST PLAN CONSISTENCY

The Forest Plan, in accordance with Section 106 of the NHPA, requires integration of cultural resource management into the overall multiple resource management effort. In addition, the Forest must work closely with the appropriate scientific communities and American Indian Tribes. Cultural resource inventories must be completed prior to ground-disturbing activities.

The guidelines of the Forest Plan and that of other jurisdictions were recognized in the development of all alternatives. In addition, the laws and policies that govern cultural resource protection on federal lands require consultation with the SHPO of Montana and Idaho, who serve in advisory capacities. The policies of the FS and SHPO are consistent. Assuming that the surveys and any mitigation measures developed in consultation with the Montana or Idaho SHPO are applied, the implementation of these alternatives would be in compliance with the KNF Guidelines for Site Survey Strategy, November 2007.

INTRODUCTION

Federal laws, regulations and treaties direct the Forest to consult with federally-recognized Tribes who may have concerns about federal actions that may affect religious practice, traditional cultural uses, cultural resource sites and remains associated with American Indian ancestors. The analysis area lies within the aboriginal territory of the Kootenai Tribe. The Confederated Salish and Kootenai Tribes (CKST) and the Kootenai Tribe of Idaho are the federally recognized Tribes representing the modern members of the Kootenai Tribe.

ANALYSIS AREA

The analysis area for cultural resources is located in T30N, R31W and includes sections 29, 32 and 33.

ANALYSIS METHODS

Federal guidelines direct federal agencies to consult with modern American Indian tribal representatives and traditionalists who may have concerns about federal actions that may affect religious practices, other traditional cultural uses, as well as cultural resource sites and remains associated with American Indian ancestors.

Analysis methods consists of consultation with the Tribes who have been identified as having an interest in the project area. The concerns of the CSKT and the Kootenai Tribe of Idaho were solicited through project scoping. In addition, the CSKT has provided a Tribal Liaison to work in partnership with the KNF to review project proposals and provide Tribal input. Information obtained from the CSKT and Kootenai Tribe of Idaho is taken into account to assess impact to issues related to cultural sites, traditional plants and other resources related to treaty rights. Information exchanged through consultation is considered confidential.

FOREST PLAN STANDARDS and GUIDELINES

American Indian Tribes are afforded special rights under various federal statues including:

1) The Indian Sacred Sites Executive Order 13007 of June 1996 directs Federal land managers to "(1) accomodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites", and to "maintain the confidentiality of sacred sites" where appropriate.
2) The American Indian Religious Freedom Act of 1978 preserves the inherent rights of American Indians "for freedom to believe, express and exercise" their traditional religions.
3) The National Historic Preservation Act of 1966 as amended through 1992 requires federal agencies to take into consideration the effects of their activities on cultural properties, and provides for the participation of Indian Tribes where there is the potential to affect sites culturally significant to Americans Indians.
4) The Native American Graves Protection and Repatriation Act of 1990 recognizes the rights of the Indian Tribes and Native American organizations as caretakers of human remains, funerary objects, sacred objects and objects of cultural patrimony with which they can demonstrate a reasonable biological or cultural affiliation, and conveys to such groups the rights to decide upon the disposition of such items.

In addition to the general federal statutes, the Salish (Flathead), Kootenai and Upper Pend d'Oreilles have rights under the Hellgate Treaty of 1855. The Forest Plan recognizes these treaty rights on the KNF (Forest Plan, Vol I, pg V-4). These reserved rights include the "right of taking fish at all usual and accustomed places, in common with citizens of the Territory, and of erecting temporary buildings for curing; together with the privilege of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land". The federal government has trust responsibilities to Tribes under a government-to-government relationship to insure that the Tribes' reserved rights are protected.

AFFECTED ENVIRONMENT

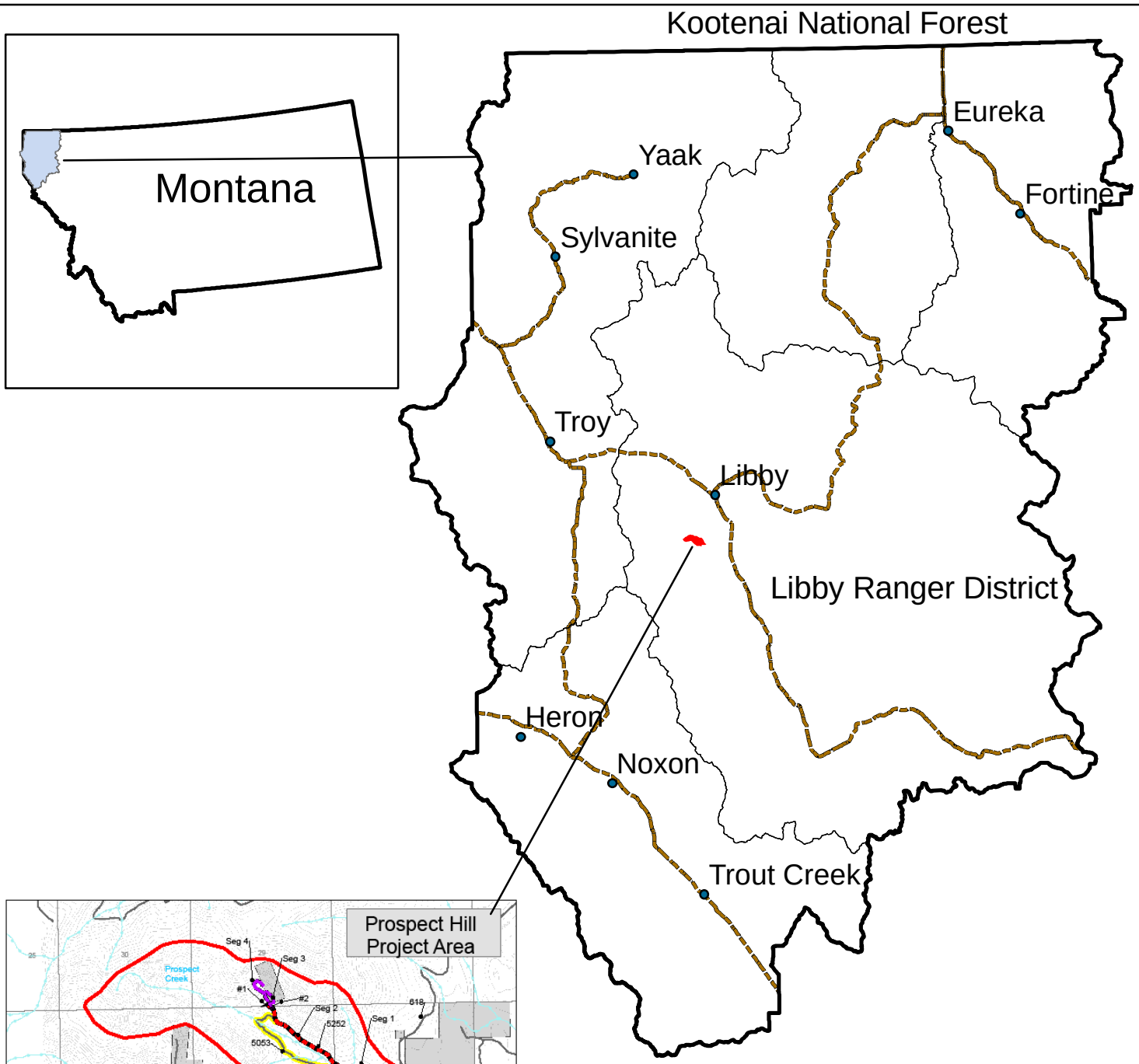
The project area is within the aboriginal territory of the Kootenai Tribe, and was occasionally used by the Salish. Consultation with the CSKT and Kootenai Tribe of Idaho centered around the project area but took into account any outside area that might affect the project area.

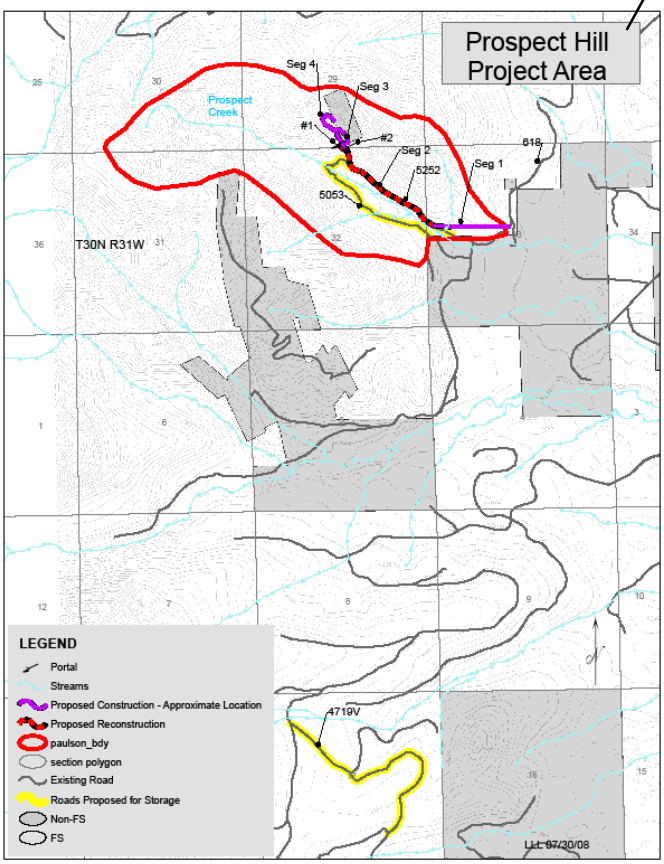
ENVIRONMENTAL CONSEQUENCES

No Tribal comments on the environmental consequences of the Prospect Hill project have been received.

Prospect Hill Mineral Exploration/Access Project EA

Maps


Kootenai National Forest
Montana
Eureka
Yaak
Fortine
Sylvanite
Troy
Libby
Libby Ranger District
Heron
Noxon
Trout Creek


Prospect Hill
Project Area
Seg 4
Seg 3
Prospect Creek
#1
#2
Seg 2
5252
Seg 1
618
5053
T30N R31W
4719V
LEGEND
Portal
Streams
Proposed Construction - Approximate Location
Proposed Reconstruction
paulson_bdy
section polygon
Existing Road
Roads Proposed for Storage
Non-FS
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LLL 07/30/08

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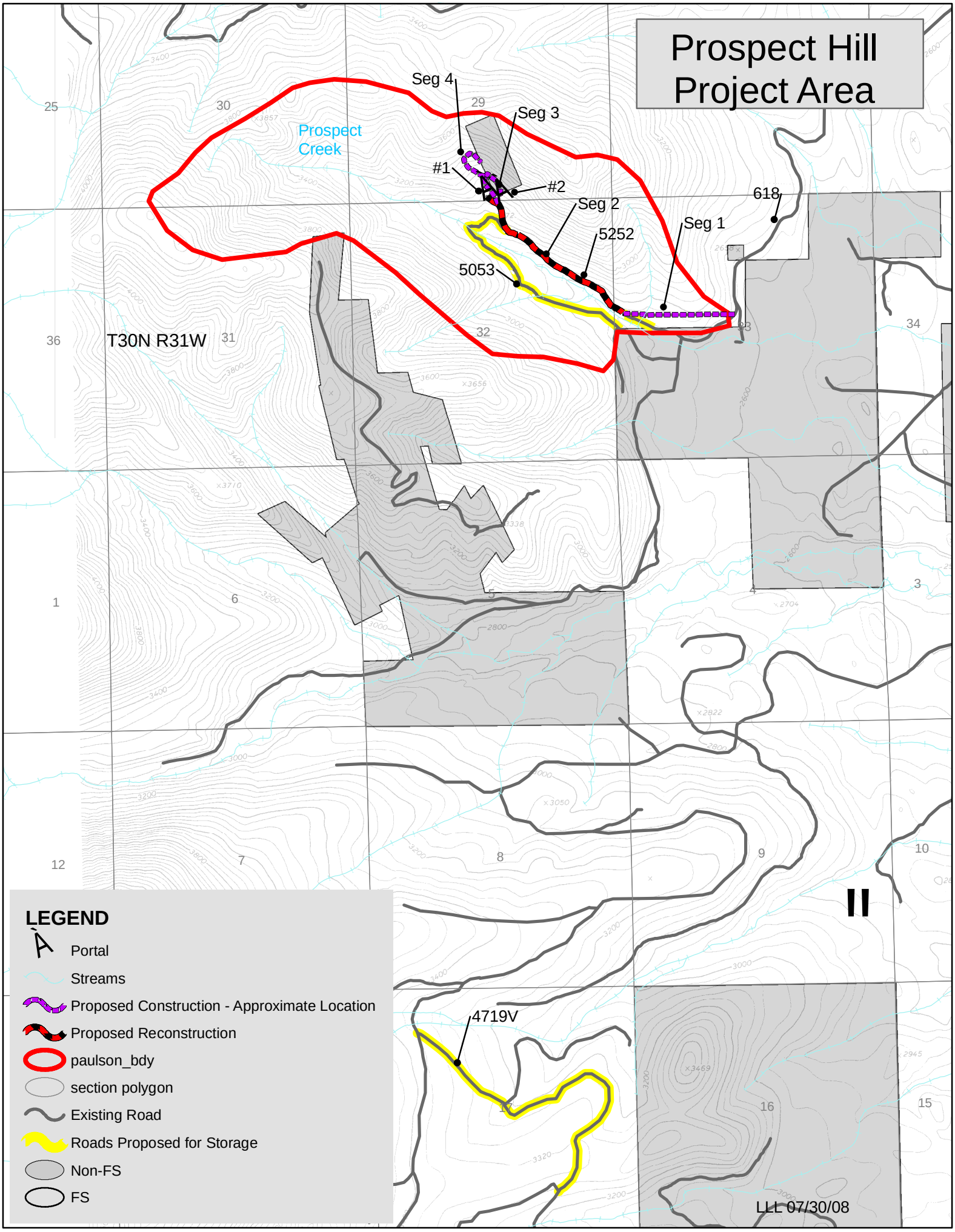
Prospect Hill
Project Area
Seg 4
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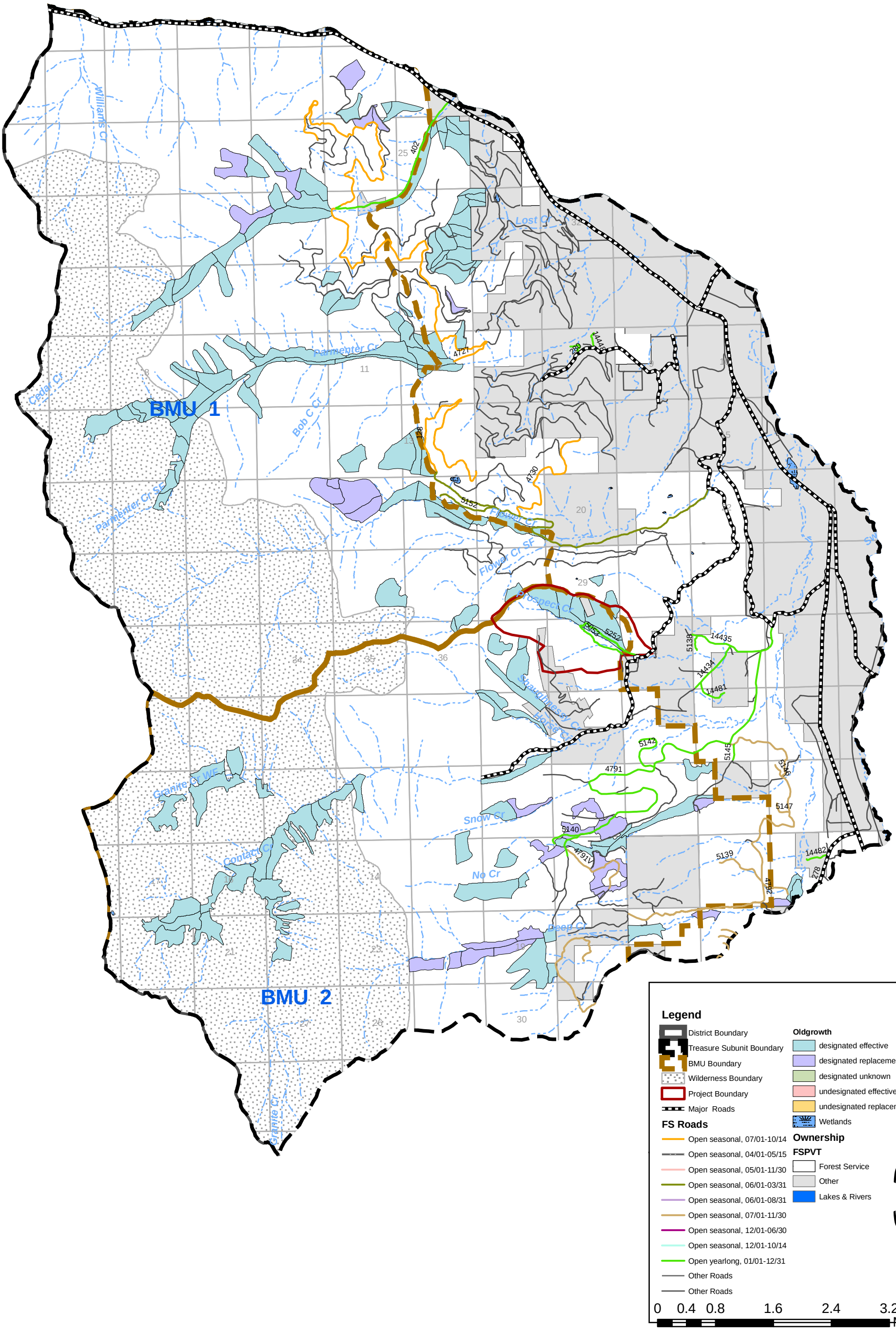
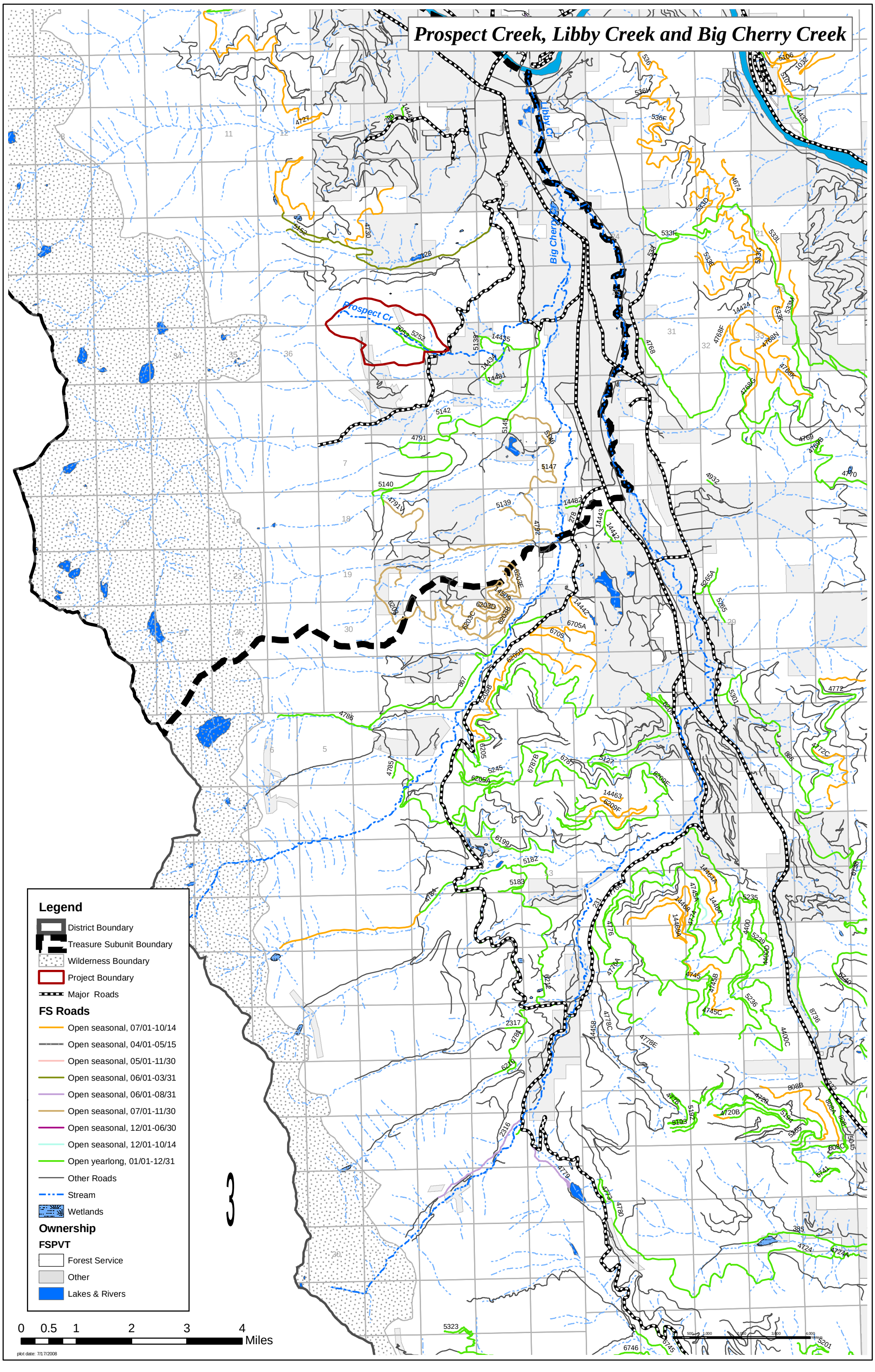
LEGEND
Portal
Streams
Proposed Construction - Approximate Location
Proposed Reconstruction
paulson_bdy
section polygon
Existing Road
Roads Proposed for Storage
Non-FS
FS
LLL 07/30/08

Prospect Hill



plot date: 7/17/2008

Prospect Creek, Libby Creek and Big Cherry Creek



Prospect Hill Mineral Exploration/Access Project EA

Appendices

Appendix 1: Forest Plan Standards and Guidelines

Kootenai National Forest Plan/INFS
Prior to 1995 the Forest Plan contained only qualitative direction, which could be used to measure existing fisheries habitat conditions or possible effects of management activities on populations or habitat (discussed below). In 1995 standards and guidelines were developed through the Inland Native Fish Strategy (INFS). This strategy is intended to provide interim direction for forest management on National Forests, including the Kootenai. The purpose of INFS is to maintain options for native fish by reducing the risk or loss of populations and reducing potential negative impacts to aquatic habitat.

Goals and Objectives (II -1 thru II-12)
The goals outlined in the Forest Plan include; Construct and reconstruct roads only to the minimum standards necessary to prevent soil loss and maintain water quality. Meet or exceed State water quality standards.

In order to accomplish these goals the following objectives were identified:

Timber
The amount of timber harvest allowed will depend on the rate of hydrologic recovery after timber has been removed. The soil and water conservation practices specified in FSH 2509.22 will be applied during Forest Plan implementation to ensure that Forest water quality goals are met.

Soil and Water
Ground disturbing activities such as road construction, road reconstruction, and timber harvest will be accompanied by mitigating measures to prevent or reduce increases in sedimentation and stream channel erosion. The amount of timber harvest allowed will depend on the rate of hydrologic recovery after timber has been removed. Soils and water conservation practices as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22) or those activities or standards, which will prevent or reduce stream sedimentation will be implemented. Examples include; location of roadbeds out of stream bottoms, design of stream crossing structures to allow water to freely pass, rock surfacing of roads at stream crossings, keeping equipment from operating in or alongside streams, and maintenance of roads to allow proper drainage. These practices will be implemented in order to maintain water quality. Each project plan for which the use of heavy equipment is required shall evaluate the effect of operating that equipment on soil productivity.

Riparian Areas
Site specifically identify and map all riparian areas on the Forest before project activity.

Forest Plan Standards
Protect and maintain important riparian zone features, marshes, and water bodies.
Soil and water conservation practices as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22) will be incorporated into all land use and project plans as a principal mechanism for controlling non-point pollution sources and meeting soil and water quality goals and to protect beneficial uses. Activities found not in compliance with the soil and water conservation practices or State standards will be brought into compliance, modified or stopped.

A floodplain/wetlands analysis will be made for all management actions involving wetlands, streams, or

bodies of water.

Each project plan for which the use of heavy equipment is required shall evaluate the effect of operation that equipment on soil productivity as described in the Soil and Water Objectives portion of the Forest Plan.

Projects involving significant vegetative removal will, prior to including them on implementation schedules, require a watershed cumulative effects feasibility analysis to ensure that water yield or sediment will not increase beyond acceptable limits. The analysis will also identify opportunities, if any exist, for mitigating adverse effects on water-related beneficial uses.

Riparian Areas (II-28 thru II-33)
The goal for riparian area management is to manage the vegetation to protect the soil and water resources and to provide high quality water and fisheries habitat.

Riparian Area Standards
Assure that there are streamside timber stands to provide for log and debris recruitment necessary for sufficient pool development and organic energy (organic debris) into the aquatic ecosystem.

Identify the riparian areas in each allotment that domestic livestock can use. Prevent livestock use of other than permitted segments of riparian areas.

Simultaneous openings resulting from timber harvest on both sides of a stream are not permitted, unless the results can be shown to be an enhancement for the riparian area.

Dozer scarification and landings are not permitted in riparian areas unless the results can be shown to be an enhancement of the riparian area.

Special uses, rights of way and cost share roads are permitted and riparian area management objectives will be incorporated into all agreements and permits.

Roads that parallel streams will be located at a distance determined by sediment transport models, and outside the 100-year floodplain.
When funds for road maintenance are limited, roads and drainage structures in riparian zones will be a top priority.

Necessary stream course crossings will insure fish passage, non-erosive water velocities and channel stability, and insure erosion control on cuts, fills and road surfaces.

Road closures will be used to protect the riparian habitat and values.

Inland Native Fish Strategy (INFS)
INFS includes eight riparian goals listed below that establish the characteristics of healthy, functioning watersheds, riparian areas, and associated fish habitats. Also included in INFS are interim riparian management objectives (RMOs) (discussed on page 8 of this report) that are indicators of ecosystem health, are quantifiable, and are subject to accurate repeatable measurements. In order to reach the goals of INFS standards and guidelines (Appendix 1 of this report) are outlined which apply to riparian habitat

conservation areas (RHCAs) and to projects and activities in areas outside RHCAs that would degrade RHCAs. All activities occurring on Forest Service lands are required to meet the standards and guidelines outlined in INFS.

Since the quality of water and fish habitat in aquatic systems is inseparably related to the upland and riparian areas within watersheds, these goals were established to maintain or restore watershed, riparian and stream channel conditions including:

1. Water quality
2. Stream channel integrity, channel processes, and the sediment regime under which the riparian and aquatic ecosystems developed.
3. Instream flows to support healthy riparian and aquatic habitats, the stability and effective function of stream channels and the ability to route flood discharges.
4. Natural timing and the variability of the water table elevation in meadows and wetlands.
5. Diversity and productivity of native and desired non-native plant communities in riparian ecosystems.
6. Riparian vegetation to: provide an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems; provide adequate summer and winter thermal regulation within the riparian and aquatic zones; help achieve rates of surface erosion, bank erosion, and channel migration characteristics of those under which the communities developed.
7. Riparian and aquatic habitats necessary to foster the unique genetic fish stocks that evolved within the specific geo-climatic region.
8. Habitat to support populations of well distributed native and desired non-native plant, vertebrate and invertebrate populations that contribute to the viability of riparian dependent communities.

Riparian Management Objectives (RMOs)

The Inland Native Fish Strategy identifies 6 parameters (RMOs) using stream inventory data for pool frequency, large woody debris, bank stability and lower bank angle, width to depth ratio, and water temperature. These objectives have been determined to be good indicators of ecosystem health and represent a good starting point to describe the desired condition for fish habitat. These RMOs for stream channel conditions provide the criteria against which attainment or progress toward attainment of the riparian goals are measured. Actions that reduce habitat quality, whether existing conditions are better or worse than objective values, would be inconsistent with the purpose of this interim direction (INFS EA, pg E-3).

# of pools - Pool frequency has been identified as the key feature in meeting the life history requirements of fish communities inhabiting a watershed. Pools are the least common stream habitat component in a watershed. They are also sensitive to non-point land use effects. Most fish species use pools at some stage in their lifecycle, and pools are particularly important as extreme low-flow refuge habitat. Pools are bowl shaped depressions in the stream channel where the stream surface is nearly flat. The desired pool frequency varies by channel width with larger stream channels having fewer pools.

 # pieces large woody debris - large woody debris (LWD) in forested streams is critical to habitat composition and cover for fish populations. It is important in pool formation, channel bank stability, fine sediment and gravel storage, and organic nutrient storage (USDA Forest Service, 1994b). A decrease in LWD can have major effects on these physical habitat parameters. Channel and bank instability resulting from decreases in LWD can have a direct effect on survival of some juvenile salmonids during peak flow events (Reimer and McIntyre 1993). Loss of habitat formed by LWD reduces overwinter survival of fish. LWD also creates structure for storing spawning gravel. Reduction in LWD could result in less spawning

area and decreased natural production. In addition, nutrient stored in the fine sediment trapped by the LWD and the wood itself is used by macroinvetebrates which are a food source for fish (USDA Forest Service, 1994b).

LWD is the tree stems that are (or will be) part of the stream channel structure. Woody debris comes in four varieties, fine particulate matter being transported by the streamflow, coarse particulate matter that is temporarily stored on the stream bottom (leaves and stem fragments), small woody debris (stems) that are larger than 4" at its largest end and large woody debris that is larger than 6" at its largest end. The desired situation and that which was used to measure large woody debris would be 1 piece, >12" in diameter, and greater than 35' long, every 250 feet of stream length.

Bank (channel) stability - bank stability looks at the stability of streambanks rather than the whole channel. This is different than the Pfankuch channel stability procedure used for many years in determining water yield increases on the Kootenai, although the relative condition of the stream channel would be considered similar with either measurement. Fisheries research has found that the channel stability survey has enough bias and variability in it that fish abundance is not related to that estimate. A variety of species use streambanks as cover at some time of the year. By measuring this habitat element, we directly measure hiding cover availability and indirectly approximate the availability of other types of cover that disappear as streambanks erode and send sediment downstream. Stream channel stability is determined from observation of a series of channel parameters and given a numerical rating based on those observations. Channel stability for a given stream reach for that particular set of parameters is then determined as fair, good or poor. By using both bank and channel stability measurements we are able to identify weak links in the stream system. The percent stable banks has a desired level of 80 percent.

Stream temperature - temperature is a major factor affecting fish survival, distribution, production, and community composition in forest streams of the Pacific Northwest (Beschta et al. 1987). Elevated temperatures from exposed riparian areas are expected to increase summer daily temperatures. What we want to know is whether a stream is near or above the thermal maximum for coldwater biological communities or whether there is an extreme range in temperatures over the course of several days. INFS recommends no measurable increase in maximum water temperature (7 day moving average of daily maximum temperature measured as the average of the maximum daily temperature of the warmest consecutive 7 day period). Maximum water temperatures below 59 degrees within adult holding habitat and below 48 degrees within spawning and rearing habitats.

Width/depth ratio - There are two Rosgen channel types that naturally meet the standards identified in INFS for this parameter. Types B and C have a width/depth ratio greater than 12. These RMO standards need to be adjusted to match geomorphic stream types and not attempt to make all streams fall into a single category this will better match conditions on the Kootenai National Forest.

Riparian Habitat Conservation Areas (RHCAs)

RHCAs are portions of watersheds where riparian dependent resources receive primary emphasis and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams and other areas that help maintain the integrity of aquatic ecosystems by (1) influencing the delivery of coarse sediment, aquatic matter, and woody debris to streams, (2) providing root strength for channel stability, (3) shading the stream and (4) protecting water quality (Naiman et al, 1992). In order to reach the goals of INFS, standards and guidelines are outlined which apply to RHCAs and to projects and activities in areas outside RHCAs that would degrade them.

Appendix 2: Kootenai National Forest BMP Process

In 1990, the Montana Department of State Lands began the Forestry - Best Management Practices Implementation Monitoring Program. The thrust of this program has been to conduct IDT audits on all ownerships that are actively involved in timber harvest. Since that date, field audits have been completed state- wide in 1992, 1994, 1996, 1998, 2000, and 2002. Also beginning in 1990, the Kootenai National Forest began completing forestwide BMP implementation and effectiveness reviews and field audits. Results of these on-forest audits by KNF personnel are shown below. Table 1 identifies the success of the BMP Program from 1990-2003. Table 2 expands on Table 1, adding years 1990 through 1993, and documents the specific scores on the 1-5 point scale:

Table 1 - BMP Monitoring by Kootenai Forest Personnel, 1990 – 2003

YEAR	# OF FORMS	RATING TYPE	% BMPS MEETING	% BMPS NOT MEETING
1990	255	Implementation	96	4
		Effectiveness	91	9
1991	328	Implementation	96	4
		Effectiveness	88	12
1992	401	Implementation	93	7
		Effectiveness	86	14
1993	491	Implementation	98	2
		Effectiveness	96	4
1994	461	Implementation	99	1
		Effectiveness	99	1
1995	198	Implementation	92	8
		Effectiveness	92	8
1996	409	Implementation	98	2
		Effectiveness	100	0
1997	594	Implementation	98	2
		Effectiveness	99	1
1998	169	Implementation	98	2
		Effectiveness	97	3
1999	95	Implementation	98	2
		Effectiveness	95	5
2000	60	Implementation	99	1
		Effectiveness	94	6
2001	77	Implementation	96	4
		Effectiveness	92	8
2002	141	Implementation	99	1
		Effectiveness	99	1
2003	62	Implementation	99	1
		Effectiveness	99	1

Table 2 - KNF BMP Monitoring Ratings, 1990 – 2003

YEAR	TYPE OF MONITORING	PERCENT RATING			
		ACCEPTABLE OR BETTER	UNACCEPTABLE	VERY UNACCEPTABLE	GROSSLY UNACCEPTABLE
1990	**Implementation**	**96**	**3.6**	**0.4**	**0**
	Effectiveness	**91**	**8**	**1**	**0**
1991	**Implementation**	**96**	**3**	**1**	**0**
	Effectiveness	**88**	**12**	**0**	**0**
1992	**Implementation**	**93**	**6**	**0**	**0**
	Effectiveness	**86**	**13**	**2**	**0**
1993	**Implementation**	**98**	**1.8**	**0.2**	**0**

YEAR	TYPE OF MONITORING	PERCENT RATING			
		ACCEPTABLE OR BETTER	UNACCEPTABLE	VERY UNACCEPTABLE	GROSSLY UNACCEPTABLE
	Effectiveness	**96**	**3**	**1**	**0**
1994	**Implementation**	**99**	**0.98**	**0.02**	**0**
	Effectiveness	**99**	**1**	**0**	**0**
1995	**Implementation**	**92**	**8**	**0**	**0**
	Effectiveness	**92**	**8**	**0**	**0**
1996	**Implementation**	**98**	**1.98**	**0.02**	**0**
	Effectiveness	**100**	**0**	**0**	**0**
1997	**Implementation**	**98**	**1.9**	**0.1**	**0**
	Effectiveness	**98.7**	**1.2**	**0.1**	**0**
1998	**Implementation**	**98**	**2**	**0**	**0**
	Effectiveness	**96.7**	**3.2**	**0.1**	**0**
1999	**Implementation**	**98**	**1.6**	**0.4**	**0**
	Effectiveness	**95**	**4.6**	**0.4**	**0**
2000	**Implementation**	**99**	**0.9**	**0.1**	**0**
	Effectiveness	**94**	**4.0**	**2.0**	**0**
2001	**Implementation**	**96**	**3.5**	**0.5**	**0**
	Effectiveness	**92**	**5.7**	**2.3**	**0**
2002	**Implementation**	**99**	**0.6**	**0.4**	**0**
	Effectiveness	**99**	**0.6**	**0.4**	**0**
2003	**Implementation**	**99**	**1.0**	**0**	**0**
	Effectiveness	**99**	**0.5**	**0.5**	**0**

The State audits identified that there are some specific practices that have the potential to create the greatest adverse effects to the soil and water resource. These specific "high risk" BMPs have been tracked on the Kootenai National Forest and are displayed below in Table 3.

Table 3 - High Risk BMP Evaluations, KNF, 1994 – 2003

-- = Practice not Applied

YEAR	TYPE OF MONITORING	PERCENT OF BMPs MEETING INTENT OF PRACTICE									
		14.06	14.08	14.15	KNF 14.18	BMP 15.05	NUMBER* 15.06	15.08	15.12	15.16	18.03
1994	**Implementation**	**95**	**100**	**100**	**100**	**88**	**95**	**91**	**100**	**90**	**--**
	Effectiveness	**95**	**100**	**100**	**100**	**--**	**--**	**100**	**100**	**100**	**--**
1995	**Implementation**	**81**	**86**	**70**	**87**	**100**	**91**	**100**	**100**	**100**	**100**
	Effectiveness	**78**	**91**	**78**	**84**	**100**	**86**	**100**	**100**	**100**	**100**
1996	**Implementation**	**96**	**98**	**98**	**100**	**100**	**100**	**100**	**100**	**100**	**--**
	Effectiveness	**97**	**100**	**95**	**98**	**100**	**100**	**100**	**100**	**100**	**--**
1997	**Implementation**	**96**	**96**	**97**	**100**	**98**	**92**	**100**	**100**	**100**	**100**
	Effectiveness	**91**	**100**	**95**	**100**	**100**	**97**	**100**	**100**	**100**	**--**
1998	**Implementation**	**100**	**99**	**97**	**100**	**100**	**99**	**100**	**100**	**100**	**--**
	Effectiveness	**100**	**99**	**99**	**100**	**100**	**88**	**100**	**100**	**100**	**100**
1999	**Implementation**	**100**	**100**	**100**	**100**	**100**	**100**	**--**	**100**	**--**	**100**
	Effectiveness	**--**	**100**	**100**	**100**	**100**	**99**	**--**	**100**	**--**	**100**
2000	**Implementation**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**--**
	Effectiveness	**100**	**100**	**100**	**83**	**100**	**100**	**--**	**100**	**100**	**--**
2001	**Implementation**	**91**	**98**	**96**	**95**	**100**	**100**	**100**	**75**	**33**	**100**
	Effectiveness	**100**	**100**	**80**	**100**	**100**	**100**	**100**	**67**	**67**	**100**
2002	**Implementation**	**100**	**100**	**99**	**98**	**100**	**98**	**--**	**100**	**97**	**100**
	Effectiveness	**100**	**100**	**99**	**89**	**100**	**96**	**--**	**100**	**97**	**100**
2003	**Implementation**	**100**	**100**	**97**	**100**	**100**	**100**	**--**	**--**	**100**	**--**
	Effectiveness	**100**	**100**	**95**	**100**	**100**	**100**	**--**	**--**	**100**	**--**

*KNF BMP	State BMP	Practice Description
14.06	**II.B.1**	**Riparian Area Designation (RHCA)**
14.08	**II.A.5**	**Tractor Skidding Design**
14.15	**II.C.2a**	**Erosion Control on Skid Trails**
14.18	**I.E.2**	**Erosion Control Structure Maintenance**
15.05	**I.D.2**	**Slope Stabilization and Prevention of Mass Failures**
15.06	**I.C.1**	**Mitigation of Surface Erosion and Stabilization of Slopes**
15.08	**II.C.2a**	**Pioneer Road Construction**
15.12	**I.C.6**	**Control of Construction in Riparian Areas**
15.16	**III.C.3**	**Bridge and Culvert Installation**
18.03	**II.D.9**	**Protection of Soil and Water From Prescribed Burning Effects**

From these tables, we can conclude that beginning in 1993, except for 1995 and two practices in 2001, the Forest has generally done a good job in implementing and evaluating BMPs, including these "high risk" BMPs. Table 4 is a Forest summary of all the BMPs combined to give an idea of the overall quality of the implementation and effectiveness of the BMPs.

Table 4 - Forest Summary Information for All BMPs Combined

	IMPLEMENTATION SCORES								EFFECTIVENESS SCORES							
Forest Summary	1	2	3	4	5	Total	%4 or 5	%3 or less	1	2	3	4	5	Total	%4 or 5	%3 or less
Totals by Score	16	141	938	30,414	358	31,867	97%	3%	21	119	702	16,876	160	17,878	95%	5%
Scores as % of Total Implementation	0.05%	0.44%	2.94%	95.44%	1.12%						**Total Sum of Implementation and Effectiveness scores**					**49,745**
Scores as % of Total Effectiveness	0.12%	0.67%	3.93%	94.40%	0.89%											

Libby Ranger District BMP Process

In 1998, the Forest began to implement a Revised KNF BMP Process (2/98). Projects being initiated from that date should utilize this process, with the level of documentation commensurate with resource risks.

The following process is being implemented on the Libby Ranger District as part of the Forest BMP program. Project specific forms have been completed and the District BMP Monitoring Team is responsible for reviewing a wide range of activity types to document the implementation and effectiveness of numerous BMPs, including the "high risk" BMPs.

1) **Project Scoping Form** This form is very similar to completing a NFMA analysis on the district level. This form needs to completed by the entire IDT to ensure that all concerns are being met through the BMP process. This form should be completed by the end of the first IDT meeting for the project in question. This form should be kept in the NEPA Project File.

2) **BMP Tracking Form** This form will be almost entirely created by taking the information from number 11 of the Project Scoping Form. This form is used to create a list of any "watchout" areas that either need extra protection or strict adherence of our normal BMPs to maintain or improve watershed conditions. This form is to be completed by the IDT or the Watershed/Soils specialist by the end of the scoping process. This form should be kept in the NEPA Project File

3) **BMP Form 1** This form should be tailored to meet the needs determined by the IDT by either adding or deleting from the "base" form of listed BMPs. This form should be completed by the IDT after all public scoping has been completed and the activities have been decided upon. This form should be kept in the NEPA project file and a copy should also go to the District BMP Coordinator.

4) **BMP Form 2** This form can be broken into the specific section that needs to be reviewed (i.e. , planning, timber, engineering or fuels). This form should be created by reviewing **BMP Form 1** and all the listed BMPs should be transferred to **BMP Form 2** for the specific section being reviewed. This form is for the field person responsible for the implementation of the listed BMPs. A copy of this completed form should go the District BMP Coordinator.

5) **BMP Form 3** This form can also be broken into the specific section that is being field reviewed but the reviewing team will usually be looking at all the BMPs that were applied for the activity or sale. This form is completed after the activity has been accomplished. This form will be completed by the IDT or the District BMP Review Team. A copy of this completed form should go the District BMP Coordinator.

6) **BMP Feedback Loop-** Information from analysis of the BMP Program will be fed back into the system so that problem practices can be improved or replaced; and activities needing additional protection practices can have them developed.

Appendix 3: Kootenai NF Landtype Information

(Keunnen and Gerhardt, 1995)

Landtypes 101, 102, 105, 106, 108, and 112 occur on 17% of the area. These riparian areas contain flat to gently undulating lacustrine terraces at low elevations. The surface layer is a yellowish-brown silt loam, 7-12 inches thick. The subsoil is a light gray silt loam, 15-30 inches thick. These landtypes are well suited to timber management and poorly suited to road construction. The material exposed by road construction is erosive and can plug culverts. Cutslopes slump readily. Management concerns in landtype 101 are protection of stream channels and banks and limiting unnatural sediment additions. Channel changes within this landtype can produce high amounts of sediment. The major watershed concerns for the rest of the landtypes include controlling sediment resulting from the highly erodible soils. Practices that disturb soil on or adjacent to streambanks have a high potential for increasing stream sediment.

Landtypes 201, 251, and 252 occur on 4% of the area, and consist of steep breaklands. The drainage patterns are parallel. The soils are not easily identified by unique landscape features. They are either 4 to 20 inches deep over bedrock or 20 to 40 inches deep over bedrock. The content in their angular rock fragments in their subsoils ranges from 50 to 70 percent. All the landtypes have a high sediment delivery efficiency due to the steepness of the landforms. Because of this steepness, timber harvest is usually limited to cable systems.

Landtypes 301, 302, and 303 occur on 10% of the area, and consist of convex ridge tops and ridge noses that occur on south and southwest aspects on mid-elevation drainage divides. The landforms are rounded due to glacial scouring. There is no surface drainage system. The soils were formed in glacial till and residuum. These landtypes are poorly suited for timber production. Revegetation is limited by moisture stress and solar insulations on southerly slopes. Landtype 303 is moderately suited to road construction, but the exposed material is difficult to revegetate. Soil erodibility is moderate, landform sediment delivery efficiency is low, and the feasibility of controlling sediment is moderate.

Landtypes 322, 323, 324, 325, and 328 occur on 18% of the area, and consist of low relief rolling foothills. The drainage pattern is random. The soils were formed in volcanic ash-influenced loess overlying dense glacial till. Surface soils are composed of a dark reddish brown silt loam, 7-12" deep and have a high erodibility rating. Sub-surface soils are composed of a gravelly, silty clay loam, 10-20" deep and are highly erodible. These landtypes have a low sediment delivery efficiency. These landtypes are moderately suited to road construction, although the material exposed by road construction tends to slump on cutbanks. Road surfaces are dusty when dry and become rutted when wet. Road surface treatments help control dust and prevent rutting. Bearing strength is low. The feasibility of controlling sediment from timber harvest and road construction is high. Major watershed management concerns are; sediment hazards due to cutbank slumping and highly erodible soils.

Landtype 351 occurs on less than 1% of the area, and consists of dissected glaciated mountain slopes that occur on north aspects on mid-elevation drainage divides. This landform has a mantle of glacial till and closely spaced, deeply incised, V-shaped drainages. Landslides can occur in the drainages. The soils contain 20 to 50 % course rock fragments. Soil erodibility is moderate, landform sediment delivery efficiency is high, and the feasibility of controlling sediment is low. There are no activities planned in this landtype with this proposal.

Landtypes 352, 353, 355 and 357 occur on 42% of the analysis area. These landtypes generally contain convex mountain slopes. The landform has been glacially rounded. The drainage pattern is dendritic. The landtypes contain soils formed in volcanic ash-influenced loess overlying dense glacial till. Over 25% of the

surface is rock outcrop exposed by glacial scouring. These landtypes are well suited to timber management, and moderately suited for road construction. Surface erodibility is high and sediment delivery efficiency is moderate except in landtype 357 which is high. No special watershed protection measures are required for management practices commonly applied to these landtypes.

Landtype 360 occurs on 3% of the analysis area. This landtype contains glaciated mountain ridges. The landform has gradients between 15 and 35%, with almost no surface drainages. The landtype contains soils formed in volcanic ash-influenced loess overlying bedrock. The content of angular rock fragments ranges from 45 to 70 percent. No special watershed protection measures are required for management practices commonly applied to these landtypes.

Landtype 381 occurs on less than 1% of the analysis area. This landtype contains steep mountain slopes that are structurally controlled. Sediment delivery efficiency is high, and there is a potential for debris slides in the drainages. There are no activities planned in this landtype with this proposal.

Landtype 406 occurs on less than 1% of the analysis area. This landtype contains glaciated mountain ridges. The landform has gradients between 15 and 50%, with dendritic first order surface drainages. The landtype contains soils formed in volcanic ash-influenced loess overlying bedrock. The content of angular rock fragments ranges from 45 to 60 percent. Materials exposed in cutbanks tends to ravel and is difficult to revegetate because of the harsh subalpine climate.

Landtype 510 occurs on 4% of the analysis area. This landtype occurs on steep mountain slopes. Thin deposits of glacial till overlie the bedrock in places. Over 50% of the sub-surface is angular rock overlain by a foot of silt loam. The hazard of erosion is severe along skid trails and firelines and in areas where soil material has been exposed by road construction. Sediment delivery efficiency is moderate.

Appendix 5: Road Project Information

The IDT has identified road restoration projects, which are expected to improve channel stability and water quality in streams within the analysis area as well as improving big game habitat effectiveness and security. The team looked at the following criteria in identifying roads for restoration:

- Roads that were originally built as temporary roads but were left in place.
- Roads with known erosion and sedimentation problems (i.e. sediment from roads is directly entering streams).
- Multiple roads access the same area (high road density).
- Roads with numerous stream crossing in short stretches.
- Roads with high maintenance costs and undersized culverts at stream crossings.
- Roads with no management entries planned for the next 20 to 30 years.

Figure 1. Typical culvert failure caused by an undersized culvert.

Almost all roads chosen for some level of restoration will have one thing in common. All live stream culverts will be removed in the process of the activity. This is needed for two reasons; 1) the roads were originally built to lower standards than required today and all culverts are undersized.
2) because the roads will be left in an undriveable state, access will not be possible for maintenance in the future. Figure 1 displays a typical culvert failure caused by an undersized culvert. Figure 2 displays the typical amount of work required for this activity.

Figure 2. Typical view of a culvert removal with reconstruction of channel and stream banks.

Road restoration proposals have been grouped into 2 categories depending upon the level of work needed to make the road neutral in its effects to the landscape.

"Temporary Stored Service" would include surface ripping, seeding, and/or cross ditching and some sections of partial road recontouring will also be required in areas where there is high precipitation. These areas often have an established road ditch to collect the intercepted water from the road. Roads would be undriveable (except for isolated segments) following restoration activities; however, snowmobile use may continue to occur on these roads until they are reclaimed by the development of trees and shrubs. These road prisms are expected to be needed for access in the future so they will not be considered as permanently removed from the transportation network. When the work is completed these road segments are considered "stored". Figures 3 and 4 display the typical amount of work required for this activity. This level of restoration typically costs between $2,000 to $2,500 per mile to complete.

Figure 3. Typical view of surface ripping and waterbar installation.

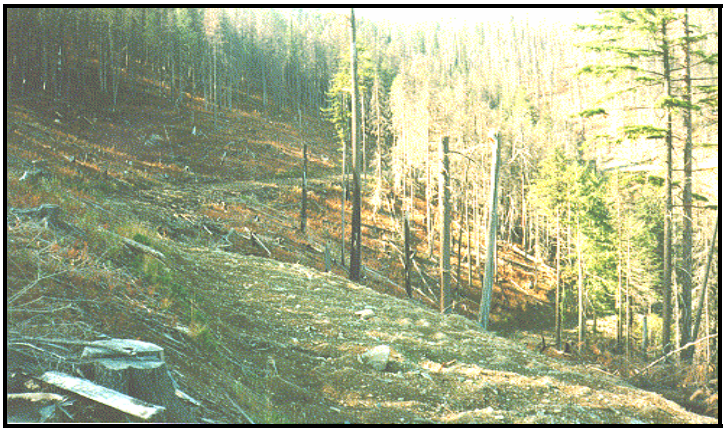


Figure 4. Typical view of a partial recontouring after the work is complete.

"Road Decommissioning" would include roads that are no longer needed in the transportation network, or have been chronic problem roads. These roads would be partially recontoured to the extent needed to re-establish overland flow processes through the road prism. Only short sections of the roads next to stream channels would require complete recontouring. Figure 5 displays the typical amount of work required for this activity. This level of restoration typically costs approximately $4,000 per mile to complete.

Figure 5. Typical view of a decommissioned road after the work is completed.

Appendix 6: References

WILDLIFE

Askins, R. A. 2000. Restoring North America's Birds: Lessons from Landscape Ecology. Yale Univeristy Press.

Bate, Lisa J. and Michael J. Wisdom. 2004. DRAFT – Snag, large Tree and Log Resources In Relation To Roads and Other Indices of Human Access on the Flathead National Forest. Progress Report July 2002. 31 pp.

Bull, E. L. 1975. Habitat Utilization of the Pileated Woodpecker, Blue Mountains, Oregon. MS thesis, Oregon Sate University, Corvallis, Oregon.

Bull, E. L. 1980. Resource Partitioning Among Woodpeckers in Northeastern Oregon. PhD Dissertation, Univ. of Idaho, Moscow, ID.

Bull, E. L. 1987. Ecology of the Pileated Woodpecker in Northeastern Oregon. Journal of Wildlife Management, 51 (2): 472-481.

Bull, E. L., and R. S. Holthausen. 1993. Habitat Use and Management of Pileated Woodpeckers In Northeastern Oregon. Journal of Wildlife Management, 57: 335-345.

Bull, E. L., and Jackson 1995

Bull, E. L., and E. C. Meslow. 1977. Habitat requirements Of the Pileated Woodpecker in Northeastern Oregon. Journal of Forestry, 75 (6): 335-337.

Bull, E. L., et al. 1997

Bull, E. L., R. C. Beckwith, and R. S. Holthausen. 1992a. Arthropod diet of pileated woodpeckers in northeastern Oregon. Northwestern Naturalist 73 (2): 42-45.

Bull, E. L., R. S. Holthausen, and M. G. Henjum. 1992b. Roost Trees Used By Pileated Woodpeckers in Northeastern Oregon. Journal of Wildlife Management 56 (4): 786-793.

Bull, E. L., et al. 1980

Buterbaugh, G.L. 1991. Biological Opinion on the effects to Grizzly Bears and Grey Wolf from the Implementation of Proposed Timber Harvest in the Grouse-Keeler Timber Sale (Compartment 40), Kootenai National Forest. USFWS, Denver, CO. July 22, 1991.

Castaneda, Bob. 2004. Old Growth Management. 1900/2600 letter, April 26, 2004. USDA Forest Service, Kootenai National Forest, Libby, MT. 1 pg. + 61 pp attachment: "Kootenai National Forest Considerations for the Management of Old-Growth"

Chen, Jiquan, J.F. Franklin and T.A. Spies. 1995. Growing-Season Microclimatic Gradients from Clearcut Edges into Old-Growth Douglas-fir Forests. Ecological Applications, Vol. 5, No. 1 (Feb. 1995) 74-86.

Christy, R.E., and S.D. West. 1993. Biology of Bats in Douglas-fir Forests. USDA, FS. Pacific Northwest Research Station. General Technical Report. PNW-GTR 308, 28 pp.

Cook, John, G., L. L. Irwin, L. D. Bryant, R. A. Riggs, and J. W. Thomas. 1998. Relations of Forest Cover and Condition of Elk: A Test of the Thermal Cover Hypothesis in Summer and Winter. Wildlife Monographs 141.

Frederick, Glenn P. 1991. Effects of Forest Roads on Grizzly Bears, Elk and Gray Wolves: A Literature Review. USDA Forest Service, Kootenai NF. Libby, MT. 53 pp.

Graham, et al. 1994

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992 (errata corrected 02/2005). Old Growth Forest Types of the Northern Region. USDA Forest Service, Northern Region, Missoula, MT.

Grindal, S. D. 1995. Habitat Use by Bats in Fragmented Forest. Pp. 260-272 in: Bats and Forests Symposium. R. Barclay and R. Brigham Eds. British Columbia Min. of For, Victoria, B.C. 291 pp.

Harestad, A. S., and D. G. Keisker. 1989. Nest tree Use by Primary Cavity-Nesting Birds in South Central British Columbia. Canadian Journal of Zoology 67 (4): 1067-1073.

Harms, Dale R. 1990. Summary of the Interagency Biologist Meeting of Feb. 22, 1990, Grizzly Bear Standards and Guidelines. USFWS, Helena, MT. 14p.

Harris, L.D. 1984. The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity. 211 pp.

Hayward, G.D, and J. Verner, tech. editors. 1994. Flammulated, Western, and Great Gray Owls in the United States: A technical Conservation Assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 214 p. 3 maps.

Hendricks, P., K. A. Jurist, D. L. Genter, and J. D. Reichel. 1995. Bat Survey of the Kootenai National Forest, Montana 1994. Report to USDA, Forest Service, Kootenai National Forest, Libby, MT. Montana Natural Heritage Program, Helena MT 59620.

Hendricks, P., K. A. Jurist, D. L. Genter, and J. D. Reichel. 1996. Bats of the Kootenai National Forest, Montana. Montana Natural Heritage Program, Helena, MT. 99pp.

Hillis, J. Michael, M. J. Thompson, J. E. Canfield, L. J. Lyon, C. L. Marcum, P. M. Dolan, and D. W. McCleery. 1991. Defining Elk Security: The Hillis Paradigm. Pages 38-43 in A. G. Christensen, L. J. Lyon and T. N. Lonner, comps., Proc. Elk Vulnerability Symp., Montana State Univ., Bozeman. 330pp.

Holt, D. W. And J. M. Hillis. 1987. Current Status and Habitat Associations of Forest Owls in Western Montana.
Pp 281-288 In: Biology And Conservation Of Northern Forest Owls: Symposium Proceedings, Feb. 3-7, Winnepeg, Manitoba. Gen. Tech. Rep. RM-142. Fo

Hutto, R. L. And J. S. Young. 1999. Habitat Relationships of Landbirds in the Northern Region, USDA Forest Service. General Technical Report. RMRS-GTR-32. Ogden, UT: U.S. Department Of Agriculture, Forest Service, Rocky Mountain Research Station. 72p.

Illg, C., And G. Illg. 1994. The Ponderosa and the Flammulated. Pp. 36-37, 58. American Forests, March/April:Vol. 100:3 And 4.

Interagency Grizzly Bear Committee (IGBC) 1986. Interagency Grizzly Bear Guidelines. USDA Forest Service, US Fish & Wildlife Service, BLM, Idaho Fish and Game, Montana Fish Wildlife and Parks, Wyoming Fish And Game, National Park Service, Washington Department of Wildlife. Missoula, MT. 105 Pp.

Jackman, S. M. 1974. Woodpeckers of the Pacific Northwest: Their Characteristics and Their Role in the Forests. MS Thesis, Oregon Sate University, Corvallis, Oregon.

Johnson, Wayne (Tech. Ed.). 2007 (Unpublished).

Johnson, Wayne (Tech. Ed.). 2005 (Unpublished). Snag Level Crosswalk and Optional Snag Management Retention Levels on the Kootenai National Forest. USDA Forest Service, Kootenai National Forest, Libby, MT. 5p.

Johnson, Wayne J. (Editor). 2004 (Unpublished). A Conservation Plan Based on the 1987 Kootenai National Forest Land Management Plan as Amended. KNF WFB Steering Group Kootenai National Forest, Libby, MT. 17 Pp Plus Appendices.

Johnson, Wayne J. 2003 (Unpublished). Incidental Take Analysis for Grizzly Bears that Occur Outside Recovery Zones on the Kootenai and Idaho Panhandle National Forests and a Portion of the Lolo National Forest. USDA Forest Service, Kootenai NF, Libby, MT. 32 Pp.

Johnson, Wayne J. 2003 (Unpublished). Old Growth and Pileated Woodpecker Analysis: Update. USDA Forest Service, Kootenai NF, Libby, MT. 4pp.

Johnson, Wayne (Tech. Ed.). 2002 (Unpublished).

Johnson, Wayne J. 1999 (Unpublished). Sensitive Species Status Summary: Kootenai National Forest. USDA Forest Service, Libby, MT. 36 Pp.

Johnson, Wayne and Frank Lamb. 1998 (Unpublished). Forest Plan Monitoring: Snags. USDA Forest Service, Kootenai National Forest, Libby, MT. 4 Pp.

Kasworm, W.F., H. Carriles, T.G. Radant, and C. Servheen. 2006. Cabinet-Yaak Grizzly Bear Recovery Area 2005 Research and Monitoring Progress Report. USFWS, Missoula, MT. 60 Pp

Kasworm, W.F., H. Carriles, T.G. Radant, and C. Servheen. 2005. Cabinet-Yaak Grizzly Bear Recovery Area 2004 Research and

Monitoring Progress Report. USFWS, Missoula, MT. 60 Pp

Kasworm, Wayne F., H. Carriles and T.G. Radant. 2004. Cabinet-Yaak Grizzly Bear Recovery Area 2003 Research and Monitoring Progress Report. USFWS, Univ. Of MT, Missoula, MT. 62 Pp

Kasworm, W.F., H. Carriles, T.G. Radant, and C. Servheen. 2003. Cabinet-Yaak Grizzly Bear Recovery Area 2002 Research and Monitoring Progress Report. USFWS, Missoula, MT. 60 Pp

Kasworm, Wayne and Timothy Manley. 1988. Grizzly Bear and Black Bear Ecology in the Cabinet Mountains of Northwest Montana. MDFWP, Helena, MT. 122 Pp.

KNF. 2001. Plan of Operations And Special Use Permit, Draft Kootenai Special Order. Kootenai National Forest, Libby, MT.

KNF and MFWP Elk Task Force. 1997 (Unpublished). Integrating Kootenai National Forest Plan and Fish, Wildlife and Parks Elk Management Plan: Final Task Force Report. Libby, MT. 8pp. IN: Appendix H of - Johnson, Wayne J. (Editor). 2004 (Unpublished).

Kimbell, Abigail R. 2004. Northern Region Revised Sensitive Species List. 2670 Letter, R-1 USFS, Missoula, MT 10 Pp.

Kimbell, Abigail R. 2005. Addition of the Goshawk and Black-Backed Woodpecker to the R1 Sensitive Species List. 2670 Letter March 31, 2005. USDA Forest Service Region 1, Missoula, MT. 1p.

Kunz, T.H., and R.A. Martin. 1982. Plecotis Townsendii. Mammalian Species. No. 175. Pp. 1-6.

Leirfallom, J. 1970. Wolf Management in Minnesota. IN: Jorgensen, S.E., L.E.Faulkner and L.D. Mech (Eds). Proceeding Symposium on Wolf Management in Selected Areas of North America. USDI Fish and Wildlife Service. 50 Pp. IN: Frederick, Glenn P. 1991. Effects of Forest Roads On Grizzly Bears, Elk, and Gray Wolves: A Literature Review. USDA Forest Service, Kootenai National Forest, 506 U.S. Highway 2 West, Libby, MT 53 Pp.

Linkhart, B. D. 2001. Life History Characteristics and Habitat Quality of Flammulated Owls (*Otus Flammeolus*) In Colorado. Ph. D. Dissertation. University Of Colorado, Boulder, CO. 221 Pages.

Linkhart, B. D., R. T. Reynolds, R. A. Ryder. 1998. Home Range and Habitat of Breeding Flammulated Owls in Colorado. Wilson Bull., 110(3): 342-351.

Linkhart, B. D., and R. T. Reynolds. 1997. Territories Of Flammulated Owls (*Otus Flammeolus*): Is Occupancy a Measure of Habitat Quality? Pages 250-254 In J. R. Duncan, D. H. Johnson, And T. H. Nicholls, Editors. Biology and Conservation of Owls in the Northern Hemisphere. U.S.D.A. Forest Service General Technical Report NC-190.

Lyon, L. J. 1984. Field Tests of Elk/Timber Coordination Guidelines. Research Paper INT – 325. U.S.D.A. Forest Service, Intermountain Research Station, Ogden, UT. 10pp.

Mannan, R. W. 1977. Use of Snags by Birds, Douglas-Fir Region, Western Oregon. MS Thesis, Oregon Sate University, Corvallis, Oregon.

Maser and Trappe 1984 The Seen and Unseen World of the Fallen Tree General Technical Report PNW-104

Maser Et Al. 1988mcclelland, B. R. 1977. Relationship between Hole-Nesting Birds, Forest Snags, and Decay in Western Larch-Douglas-Fir Forests of the Northern Rocky Mountains. Phd Dissertation, Univ. Of Montana, Missoula, MT.

Mcclelland, B. R. 1979. The Pileated Woodpecker In Forests of the Northern Rocky Mountains, Pp. 283-299 In *The Role of Insectivorous Birds in Forest Ecosystems,* Dickson, James G., Richard N. Conner, R. R. Fleet, J. C. Kroll, And Jerome A. Jackson, [Editors]. Academic Press, New York.

Mcclelland, B. R., S. S. Frissell, W. C. Fisher, and C. H. Halvorson. 1979. Habitat Management for Hole-Nesting Birds in Forests of Western Larch and Douglas-Fir. Journal of Forestry 77 (8): 480-483.

Mcclelland, B. R., And P. T. Mcclelland. 1999. Pileated Woodpecker Nest and Roost Trees in Montana: Links with Old-Growth and Forest "Health". Wildlife Society Bulletin 27 (3): 846-857.

Mcgrath, Michael T., S. Destefano, R.A. Riggs, L.L. Irwin, and G.J. Roloff. 2003. Spatially Explicit Influences on Northern Goshawk Nesting Habitat in the Interior Pacific Northwest. Wildlife Monographs No. 154, 63 Pp.

Mcmaster, Kemper M. 1995. Letter of Amendment to the USFWS 1985 Biological Opinion on the 1987 Kootenai National Forest Plan

to Include an Incidental Take Statement. USFWS, Helena, MT. 15pp.

Mellen, T. K. 1987. Home Range and Habitat Use of Pileated Woodpeckers, Western Oregon. MS Thesis, Oregon Sate University, Corvallis, Oregon.

Mellen, T. K., E. C. Meslow, and R. W. Mannan. 1992. Summertime Home Range and Habitat Use of Pileated Woodpeckers in Western Oregon. Journal of Wildlife Management 56 (1): 96-103.

Montana Bald Eagle Working Group (MBEWG). 1994. Montana Bald Eagle Management Plan. Dept. Of The Interior, Bureau of Land Management, Billings, MT. 61 Pp.

Montana Bald Eagle Working Group (MBEWG). 1991. Habitat Management Guide for Bald Eagles in Northwestern Montana. USDA, Forest Service, Missoula MT. 29 Pp.

Montana Fish, Wildlife & Parks. 1985. Coordinating Elk and Timber Management. Final Report of the Montana Cooperative Elk-Logging Study 1970-1985 by a Research Committee. Helena, MT. 53pp.

Montana Fish, Wildlife & Parks. 2004. Statewide Elk Management Plan for Montana. Wildlife Div. Helena, MT. 394pp.

Montana Natural Heritage Program. 1993. Plecotus Townsendii, Townsend's Big-Eared Bat. MNHP, Vertebrate Characterization Abstract. 5pp.

Montana Natural Heritage Program: Western Toad; Great Plains Toad. 1995.

Morrison, Michael L., B.G. Marcot, R.W. Mannan. 1992. Wildlife-Habitat Relationships Concepts and Applications. The University Of Wisconsin Press. Madison, Wisconsin 337 Pp.

Murie, Olaus J. 1979. The Elk of North America. Teton Bookshop, Jackson, WY. 376pp.

Perkins, J. M., And T. Schommer. 1991. Survey Protocol and an Interim Species Conservation Strategy for Plecotus Townsendii in the Blue Mountains of Oregon and Washington. Wallowa-Whitman National Forest, P.O. Box 907, Baker City, OR. 23 Pp.

Pfister, R.D., W.L. Baker, C.E. Fiedler, and J. W. Thomas. 2000. Contract Review of Old Growth Management on School Trust Lands: Supplemental Bio-Diversity Guidance 8/02/00. DNRC, State Of MT, Helena, MT. 31 Pp.

Pierson, E. D., M. C. Wachenhut, J. S. Altenbach, P. Bradley, P. Call, D. L. Genter, C. E. Harris, B. L. Keller, B. Lengus, L. Lewis, B. Luce, K. W. Navo, J. M. Perkins, S. Smith, and L. Welch. 1999. Species Conservation Assessment and Strategy for Townsend's Big-Eared Bat (*Corynorhinus Townsendii Townsendii* and *Corynorhinus Townsendii Pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho.

Powers, L. R. , A. Danle, P. A. Gaede, C. Rodes, L. Nelson, J. J. Dean, And J. D. May. 1996. Nesting and Food Habits of the Flammulated Owl (*Otus Flammeolus*) In South-Central Idaho. Journal of Raptor Research 30:15-20.

Province Of British Columbia. 1995 Forest Practices Code Guidebook: Biodiversity. Government publication Services, Ministry of Forests, Forest Practice Branch, Victoria, B.C.

Reel, S., Schassberger, W., W. Ruediger. 1989. Caring for our Natural Community. Region 1. Threatened, Endangered, and Sensitive Species Program. USDA, Forest Service, Northern Region, Wildlife and Fisheries. 309 Pp.

Ripple, W.J., G.A. Bradshaw, T.A. Spies. 1991. Measuring Forest Landscape Patterns in the Cascade Range of Oregon, USA. Biological Conservation 57 (1991): 73-88

Ross, A. 1967. Ecological Aspects of the Food Habits of Insectivorous Bats. Proc. Western Foundation of Vertebrate Zool. 1:205-264.

Ruggerio, Leonard F., G.D. Hayward, J.R. Squires. 1994. Viability Analysis in Biological Evaluations: Concepts of Population Viability Analysis, Biological Population, and Ecological Scale. Conservation Biology Vol. 8 No. 2: 364-372

Russell, William H., and Cristina Jones. 2001. The Effects of Timber Harvesting on the Structure and Composition of Adjacent Old-Growth Coast Redwood Forest, California, USA. Landscape Ecology 16: 731-741, 2001.

Russell, William H., J.R. Mcbride, K. Carnell. 2000. Edge Effects and the Effective Size of Old-Growth Coast Redwood Preserves. USDA Forest Service Proceedings RMRS-P-15 Vol. 3. Pp. 128-136

Russell, K. R., D. H. Van Lear, and D. C. Guynn, Jr. 1999. Prescribed Fire Effects on Herpetofauna: Review and Management Implications. Wildlife Society Bulletin, 27 (2):374-384.

Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, M. Atkinson, L. Handegard, And J. Steuber. 2007. Montana Gray Wolf Conservation and Management 2006 Annual Report. Montana Fish, Wildlife & Parks. Helena, Montana. 119 Pp.

Sime, C. 2002. Montana Wolf Conservation and Management Planning Document. (Draft), Prepared in Response to the Wolf Management Advisory Council Recommendations. Department Of Fish, Wildlife And Parks, Helena, MT.

Summerfield, R. L. 2004.

Summerfield, R. L. 1991. Coordinating Big Game and Grizzly Bear Standards. Internal 2600 Memo, December 2, 1991. USDA Forest Service, Kootenai NF, Libby, MT. 4pp.

Thiel, R.P. 1978. The Status of the Timber Wolf in Wisconsin, 1975. Wisconsin Academy Of Sciences, Arts and Letters. 66:186-194

Thomas, D. W., and S. D. West. 1991. Forage Age Associations of Bats in the Washington Cascade and Oregon Coast Ranges. In: Wildlife and Vegetation of Unmanaged Douglas-Fir Forests. Gen. Tech. Rep. PNW-285. Portland, OR. Pp 295-303.

Thomas, Jack W. Tech. Ed. 1979. Wildlife Habitats in Managed Forests, the Blue Mountains of Oregon and Washington. USDA. Forest Service, Ag. Handbook No. 553. Wildl. Manag. Instit. Wash. D.C.

Tincher, Don. 1998 (Unpublished). Estimating Snag Levels within 200 Feet of Open Roads on the Fortine Ranger District. USDA Forest Service, Kootenai National Forest, Libby, MT. 1 P.

Toweill, Dale E. and J. W. Thomas. Eds. 2002. North American Elk: Ecology and Management. Smithsonian Institution Press. Wash. D.C. 962pp.

USDA Forest Service. 2006. Forest Plan Monitoring and Evaluation Report Fiscal Year 2005. Kootenai National Forest, Libby, MT. 23pp.

USDA Forest Service. 2005. Forest Plan Monitoring Aand Evaluation Report Fiscal Year 2004 Kootenai National Forest. Libby, MT. (Monitoring Item C-7) Pp.7 - 19.

USDA Forest Service. 2003. Forest Plan Monitoring and Evaluation Report Fiscal Year 2002. Kootenai National Forest, Libby, MT. 60 Pp.

USDA Forest Service. 2003b. Technical Report: Analysis of the Management Situation for Revision of the Kootenai and Idaho Panhandle Forest Plans March 2003. 149 Pp.

USDA, Forest Service, Kootenai National Forest. 2002. Hazard Trees and Reserve Tree Management. Northern Region, Missoula, MT. 1 P.

USDA Forest Service. 2001.

USDA Forest Service. 2000. Northern Region Snag Management Protocol. Northern Region. Missoula, MT. 35 Pp.

USDA Forest Service. 1998. Forest Plan Monitoring and Evaluation Report Fiscal Year 1997. Kootenai National Forest. Libby, MT. 121 Pp.

USDA Forest Service. 1997. *Herbicide Weed Control Environmental Assessment*. U.S. Department Of Agriculture, Forest Service. Kootenai National Forest. Libby, MT. P. 30.

USDA Forest Service. 1995. Inland Native Fish Strategy Environmental Assessment Decision Notice and Finding of No Significant Impact. Intermountain, Northern and Pacific Northwest Regions, Bureau of Land Management. 17 Pp Plus Attachments

USDA Forest Service. 1991. Kootenai Supplement No. 85. to FSM 2432.22. Kootenai National Forest. Northern Region. Missoula, MT.

USDA Forest Service. 1987a. Kootenai National Forest Plan, Volume I & II. USDA Forest Service. Kootenai National Forest. Northern Region Missoula, MT.

USDI U.S. Fish & Wildlife Service. 2006. Bioloical Opinion on the Effects to Grizzly Bears, Bull Trout, and Bull Trout Critical

Habitat from the Implementation of Proposed Actions Associated with Plan of Operation for the Revett RC Resources Incorporated Rock Creek Copper/Silver Mine. USFWS Montana Ecological Services Field Office, Helena, MT. Oct 11, 2006.

USDI U.S. Fish & Wildlife Service, Nez Perce Tribe, National Park Service, Montana Fish Wildlife and Parks, Idaho Fish and Game, and USDA Wildlife Services. 2006. Rocky Mountain Wolf Recovery 2005 Annual Report. C.A. Sime and E.E. Bangs, Eds. USFWS, Ecological Services, 585 Shepard Way, Helena MT. 59601 130 Pp.

USDI U.S. Fish & Wildlife Service. 2003. U.S. Fish & Wildlife Service USFWS Montana Field Office, Helena, MT.

USDI U.S. Fish &Wildlife Service. 2001. U.S. Fish & Wildlife Service March 6, 2001 Concurrence Letter from Mark R. Wilson, on Maps of Threatened and Endangered Species Potential Distribution on the Kootenai National Forest. 2 Pp. (Plus Attachments). USFWS Montana Field Office, Helena, MT.

USDI U.S. Fish & Wildlife Service. 1998. U.S. Fish & Wildlife Service USFWS Montana Field Office, Helena, MT.

USDI U.S. Fish &Wildlife Service. 1995. U.S. Fish &Wildlife Service USFWS Montana Field Office, Helena, MT.

USDI US Fish & Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, MT. 181 Pp.

USDI U.S. Fish & Wildlife Service, 1987. Northern Rocky Mountain Wolf Recovery Plan. U.S. Fish & Wildlife Service, Denver, Colorado. 119pp.

Wakkinen, Wayne L.; Wayne F. Kasworm. 2004. Demographics and Population Trends of Grizzly Bears in the Cabinet-Yaak and Selkirk Ecosystems of British Columbia, Idaho, Montana and Washington. Ursus 15(1) Workshop Supplement: 65-752004.

Warren, N., Technical Editor. 1990. Old-Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USDA, Forest Service, Missoula, MT.

Weydemeyer, W., D. Weydemeyer. 1928. The Woodpeckers of Lincoln County, Montana. The Condor, Vol. XXX, 339-346.

Whitaker, J. O., C. E. Maser, L. E. Keller. 1977. Food Habits of Bats of Western Oregon. Northwest Sci. 51:46-55.

Wittinger, Tom, Et.Al. 2002 (Unpublished). Grizzly Bear Distribution Outside of Recovery Zones. USDA Forest Service, Northern Region, Missoula, MT 2 Pp.

Wright, V. 1996. Multi-Scale Analysis of Flammulated Owl Habitat Use: Owl Distribution, Habitat Management, and Conservation. M.S. Thesis. University Of Montana, Missoula, MT. 91 Pages

Wright, V., S. J. Hejl, R. L. Hutto. 1997. Conservation Implications of a Multi-Scale Study of Flammulated Owls (*Otus Flammeolus*) Habitat Use in the Northern Rocky Mountains, USA. Pgs. 506-516 In J. R. Duncan, D. H. Johnson, and T. H. Nicholls, Editors. Biology and Conservation of Owls of the Northern Hemisphere. U.S.D. A. Forest Service General Technical Report NC-190.

WATERSHED and SOILS

Alden, W.C., 1953. Physiography and Glacial Geology of Western Montana and Adjacent Areas. Geological Survey Professional Paper 231. 200p.

Bethlahmy, N. 1975. A Colorado Episode: Beetle Epidemic, Ghost Forests, More Streamflow. Northwest Science, Vol. 49, No. 2, 1975.

Burroughs, E.R, Jr., M.A. Marsden, and H.F. Haupt, 1972. Volume of Snowmelt Intercepted by Logging Roads. Journal of the Irrigation and Drainage Division, Proceedings of the AMSCE.

Carlston, C.W., 1963. Drainage Density and Streamflow. US Geological Survey Professional Paper 422-C, Physiographic and Hydraulic Studies of Rivers.

Chamberlin, T.W. 1982. Timber Harvest. In: Meehan, W.R., tech, ed., Influence of Forest and Rangeland Management on Anadromous Fish Habitat in Western North America. USDA, Forest Service, PNFRES, General Technical Report- 136, April 1982.

Christner, J., and R.D. Harr. 1982. Peak Streamflows from the Transient Snow Zone, Western Cascades, Oregon. In: Proceedings of the Western Snow Conference, Reno, Nevada, April 19-23, 1982. Colorado State University, Fort Collins, Colorado.

Harr, R.D 1981. Some characteristics and consequences of snowmelt during rainfall in western Oregon. J. Hydrol.,53:pp.277-304

Harr, R.D. 1982. Fog Drip in the Bull Run Municipal Watershed, Oregon. Water Res. Bull., Vol 18, No. 5., October, 1982.

Harr, R.D. 1986. Myths and Misconceptions about Forest Hydrlogic Systems and Cumulative Effects. Paper presented at California Watershed Management Conference Nov 18-20, 1986, Sacramento, California.

Helvey, J.D., and Tiedemann, A.R., 1978. Effects of Defoliation by Douglas-fir Tussock Moth on Timing and Quantity of Streamflow. USDA-Pacific Northwest Research Station, PNW-326.

INFS, 1995. Inland Native Fish Strategy-EA. USDA, Forest Service Attachment A.

Johnson, S.R. 1990. Revised Hydraulic Guide. USDA Forest Service, Kootenai National Forest.

Johnson, S. 1982. Interpretation of Kootenai National Forest Water Quality Data. Kootenai National Forest, Libby, MT.

King, J.G. 1989. Streamflow Responses to Road Building and Harvesting: a Comparison with the Equivalent Clearcut Area Procedure. USDA, FS Research Paper INT-401.

King, J.G., and L.C.Tennison. 1984. Alteration of Streamflow Characteristics Following Road Construction in North Central Idaho. Water Resources Research, Vol 20, No. 8, pages 1159-1163.

Kuennen, L.J., Gerhardt, M.L., 1995. Soil Survey of Kootenai National Forest Area, Montana and Idaho. USDA – Forest Service, and Natural Resources Conservation Service. Pp 122 plus maps.

Kuennen, L.J., 2003. Soil Survey Monitoring Data of Kootenai National Forest Montana USDA – Forest Service, White Paper.

Mangum, F., 1992- 1997. Aquatic Ecosystem Inventory. National Aquatic Ecosystem Monitoring Center, BYU, Provo, UT.

Megahan, W.F. 1972. Subsurface Flow Interception by a Logging Road in Mountains of Central Idaho. AWRA, National Symposium on Watersheds in Transition, pages 350-356.

Newcombe, C.P., and MacDonald, D.D. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management 11:72-82, AFS Publication.

Pfankuch, D.J. 1978. Stream Reach Inventory and Channel Stability Evaluation. USDA - Forest Service, Northern Region.

Potts, D.F., 1984. Hydrologic Impacts of a Large-Scale Mountain Pine Beetle (Dendroctonus Ponderosae Hopkins) Epidemic. Water Resources Bulletin, AWRA, Vol. 20, No. 3, PP 373-377.

Powers, R.,F. et al., 2005. The North American long-term soil productivity experiment: Findings from the first decade of research. Forest Ecology and Management 220 (2005) 31-50.

Rieman, B. E., and McIntyre, J. D., 1993. Gemographic and Habitat Requirements for Conservation of Bull Trout. USDA. IRS - INT-302.

Rosgen,D. 1996. Applied Fluvial Geomorphology. Wildland Hydrology Consultants, Pagosa Springs, CO.

Story, M. 1996. Phase 3 Lake Water Chemistry Monitoring in the Cabinet Mountains and Selway Bitterroot Wilderness Areas. USFS - Region 1. Missoula, MT.

Tiedemann, A.R., C.E. Conrad, J.H. Dieterich, J.W. Hornbeck, W.F. Megahan, L.A. Viereck, and D.D. Wade. 1979. Effects of Fire on Water. Prepared for the Forest Service National Fire Effects Workshop, April 10-14, 1978. Denver, Colorado. USDA, Forest Service. General Technical Report WO-10.

Troendle, C.A., 1987. The Potential Effect of Partial Cutting and Thinning on Streamflow from the Subalpine Forest. USDA-FS, Rocky Mountain Experiment Station, Research Paper, RM-274.

USDA - KNF, 1984. Kootenai National Forest Area Land System Inventory. USDA Forest Service, Kootenai National Forest.

USDA - FS. 1991. R1-WATSED Water Yield and Sediment Yield Model. USDA Forest Service, Northern Region.

USDA – FS. 2002. Upper Kootenai Subbasin Review. USDA Forest Service, Kootenai National Forest.

Vinson, M. 1998 - 2002. Aquatic Macroinvetebrate Monitoring Report. National Aquatic Monitoring Center, USU, Logan, UT.

Weaver, T. and Fraley, J. 1991. Fisheries Habitat and Fish Populations, - Flathead Basin Forest Practices Water Quality and Fisheries Cooperative Program. Flathead Basin Commission, Kalispell, MT.

Wegner, S.J., 1999. Monitoring Results of Watershed Restoration Activities. AWRA Symposium Proceedings for Wildland Hydrology., Bozeman MT. Pp 317-324.

Wegner, S. J., 1997. West Fisher Stream Reconstruction Project (and Update). KNF, Libby, MT.

Wegner, S. J., 1998. Middle Kootenai Restoration - Combining Watershed Restoration Activities and Bull Trout Restoration. Monitoring Results of Restoration Activities - 1998. KNF, Libby, MT.

Wemple, B.C., 1994. Hydrologic Integration of Forest Roads with Stream Networks in Two Basins, Western Cascades, Oregon. Oregon State University, MS Thesis. Corvallis OR.

FISH POPULATIONS and HABITATS

Apperson, K.A., and P.J. Anders. 1991. Kootenai River white sturgeon investigations and experimental culture. Annual Progress Report FY1990. Idaho Department of Fish and Game and Bonneville Power Administration, Contract DE-A179-88BP93497.

Behnke, R. J. 1992. Native trout of western North America. Am. Fish. Soc. Monograph No. 6. 275 pp.

Furniss, M.D., T.D. Roelofs, and C.S. Yee. 1991. Road Construction and Maintenance. American Fisheries Society Special Publication 19:297-323.

Graham, P.J. 1981. Status of white sturgeon in the Kootenai River. Montana Fish, Wildlife, and Parks, Kalispell, Montana. 26pp.

Griffith, J. S. 1988. Review of competition between cutthroat trout and other salmonids. American Fisheries Society Symposium 4:134-140.

Holton, G.S. 1980. The riddle of existence: fishes of special concern. Montana Outdoors 11: 2-6.

Huston, J.E., 1999. A Review of Historical Fish Planting in Kootenai River Drainage, Montana. Montana Fish Wildlife and Parks Report. 1-53 pp

Paragamian, V.L., G. Kruse, and V. Wakkinen. 1997. Kootenai River White Sturgeon investigations, chapter 1: Kootenai River White Sturgeon spawning and recruitment evaluation, annual report 1996. Idaho Department of Fish and Game, Boise, Idaho.

Reichel, J., D Flath 1995. Identification of Montana's Amphibians and Reptiles. Montana Outdoors May/June.

Rieman, B. E., and K. A. Apperson. 1989. Status and analysis of salmonids fisheries: westslope cutthroat trout synopsis and analysis of fishery information, Idaho Department of Fish and Game, Boise, ID. Job Performance Report, Project F-73-R-11, Subproject II, Job 1.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. General Technical Report INT-302, U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Ogden, Utah.

Rosgen,D. 1996. Applied Fluvial Geomorphology. Wildland Hydrology Consultants, Pagosa Springs, CO.

Scott, W. B. and E. J. Crossman. 1973. Freshwater Fishes of Canada. Fisheries Research Board of Canada.

Shepard, B. B., B. E. May, and W. Urie. 2003. Status of Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*) in the United States: 2002. Montana Cooperative Fishery Research Unit, Bozeman, MT. pp. 94.

U.S. Department of Agriculture Forest Service (USFS). 1987. Kootenai National Forest Plan, Vol. 1. USDA Forest Service, Libby, Montana, pp. III26-III31.

1995. Environmental Assessment: Decision Notice and Finding of No Significant Impact. Interim Strategies for Managing Fish-Producing Watersheds In Eastern Oregon and Washington, Idaho, western Montana and portions of Nevada. USDA, Forest Service, Intermountain, Northern, and Pacific Northwest Regions.

1998e. Middle Kootenai Restoration - Combining Watershed Restoration Activities and Bull Trout Restoration. Monitoring Results of Restoration Activities - 1998. Kootenai National Forest, Libby, MT.

2000a. Section 7 Consultation Watershed Baseline: Lower Clark Fork River, Montana. Kootenai National Forest, Libby, MT.

2000b. Section 7 Consultation Watershed Baseline: Upper Kootenai River, Montana. Kootenai National Forest, Libby, MT.

2000c. Section 7 Consultation Watershed Baseline: Middle Kootenai River, Montana. Kootenai National Forest, Libby, MT.

2000d Section 7 Consultation Watershed Baseline: Lower Kootenai River, Montana. Kootenai National Forest, Libby, MT.

USDA Forest Service and Natural Resources Conservation Service. 1995. Soil Survey of Kootenai National Forest Area, Montana and Idaho, U.S. Government Printing Office: 1995-387-974/2050/SCS, pp. 16-18, Map 65.

Weaver, T. and Fraley, J. 1991. Fisheries Habitat and Fish Populations, - Flathead Basin Forest Practices Water Quality and Fisheries Cooperative Program. Flathead Basin Commission, Kalispell, MT.

Weaver T. M. and R. G. White. 1985. Coal Creek Fisheries Monitoring Study Number III. Final Report. Montana Cooperative Fisheries Research Unit, Bozeman, Mt.

PTES PLANTS LITERATURE CITED:

Ferriel, Roger. 1999 Revised Sensitive Species Habitat Descriptions. 1999. On File Kootenai National Forest. Libby, MT. 1999

Leavell, D.M. and F.J. Triepke. *Sensitive Plant Program for the Kootenai National Forest.* Report on file. Kootenai National Forest, Libby, MT. 1995.

Morgan, P., G.H. Aplet, J.B. Haufler, G.C. Humpheries, M.M. Moore, and W.D. Wilson. "Historical Range of Variability: a Useful Tool for Understanding Ecological Change. *In Journal of Sustainable Forestry ("Assessing Forest Ecosystem Health in the Inland West")* 2:1-2. (1994), PP. 87-111.

USDA Forest Service.. *Kootenai National Forest -- Forest Plan Volume* 1. Forest Service Forest Plan. Kootenai NF, Libby, Mt. Vol. I. 1987. II-1.

U. S. Forest Service. *Kootenai National Forest Sensitive Plant Field Guide*, Fourth Edition. 1995.

U. S. Forest Service. Updated Northern Region Sensitive Species List. 2004.

USDA Forest Service. *Kootenai National Forest Sensitive Plant Manual*. Kootenai National Forest, Libby, MT. 2000.

Vanderhorst, J. *Status report on Sensitive Lady's Slipper Orchids (Cypripedium calceolus var. parviflorum and Cypripedium passerinum) on the Kootenai National Forest*. Unpublished report, Montana Natural Heritage Program, 1996.

Vanderhorst, J. Status Review of *Clarkia rhomboidea* in Montana. Unpublished report to the Kootenai National Forest. Montana Natural Heritage Program, Helena, MT. 1997.

Vanderhorst, J. *Conservation Assessment of Sensitive Moonworts (Botrychium subg. Botrychium) on the Kootenai National Forest*. Montana Natural Heritage Program, Helena, MT. 1997.

WEEDS

Dow AgroSciences 2000. Picloram and the Environment

Lacey, John R., Clayton B. Marlow, and John R. Lane. 1989. Influence of Spotted Knapweed (*Centaurea maculosa*) on Surface Runoff and Sediment Yield. In Weed Technology. Vol. 3:627-631.

Losensky, B. John. 1987. An Evaluation of Noxious Weeds on the Lolo, Bitterroot, and Flathead Forests. USDA F.S., Missoula, MT.

Flaherty, Carol. 2005. It's What You Don't See That Counts: Knapweed Crashes in 2004. Montana State University News.

LeCain, Ron., and Roger Sheley. 2002. Common Tansy. MSU Extension MT 199911AG

Pimentel, David, Rodolfo Zuniga, and Doug Morrison, 2004. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics, ECOLEC-02042.

Trammel, Michael A. and Jack L. Bulter. 1995. Effects of Exotic Plants on Native Ungulate Use of Habitat. In Journal of Wildlife Management. Vol.59 (4):808-816.

Sheley, Roger, L. and Petroff, Janet K. 1999. Biology and Management of Noxious Rangeland Weeds. Oregon State University Press.

Stalling, David. 1999. WEEDS An Exotic Invasion of Elk Country. Rocky Mountain Elk Foundation, Missoula, MT. 031-0199-001.

USDA Forest Service, KNF. 1987. Kootenai National Forest Plan, (Table IV-1, pg IV-10)

USDA Forest Service, KNF. 1997. Herbicide Weed Control Environmental Assessment. p. 2.

USDA Forest Service, KNF. 2000. Kootenai National Forest Noxious Weed Handbook

USDA Forest Service, KNF. 2003 Fisher Landscape Assessment.

USDA Forest Service. 1991. Sustaining Ecological Systems. USDA F.S., Northern Region, Missoula, MT.

USDA Forest Service, 2004. National Strategy and Implementation Plan for Invasive Species Management.

Whisenant, Steven 1994. Invasions on Public Lands. Ecology, www.agci.org/publications/eco94/EOC3/EOC3-24.html

CULTURAL

Quartz Locations, Lincoln County, Montana, Transcribed Book 2, Pages 195-196; On June 13, 1891, the Nelly Bly Quartz Lode mining claim and the Iron Clad Quartz Lode mining claim were located on Prospect Hill by Jesse J. Norgaard, George A. Chilson, and Olaf Ohlgren.

General Land Office Plat for Township 30 North, Range 31 West, surveyed August 2-20, 1893 by Daniel P. Mumbrue.

Western News, March 31, 1932, Volume XXI, No. 43, page 1: Ore Vein in D.&W. Mine Grows Wider: This property was promoted in 1932 by the D. & W. Mining and Concentrating company which had 18 claims on Prospect Creek. This property was owned by Mr. Clark, Wakefield and others.

Department of the Interior, U.S. Geological Survey, Montana, Libby Quadrangle, Edition of 1932. Topographic map of the Libby Quadrangle.

Quartz Locations, Lincoln County, Montana, pages 323-326: 12 September 1933, Ira C. Tester, Claud Tester, and William Herbert located the Flower Gold Quartz location and the Double T. On October 2, 1933 they located the Flower No. 2, and Prospect #1 Quartz Claims.

Permanent Files #911, Lincoln County, Montana, Articles of Incorporation of Herbert Gold Mines, Incorporated, filed October 20th, 1933 and Articles of Amendment of Articles of Incorporation of Herbert Gold Mines Incorporated, July 3, 1950: The Herbert Gold Mines Incorporation May 6, 1933. On June 26, 1950 a meeting of stockholders changed the name to Libby Gold Corporation. Included in the original articles of incorporation is a hand drawn map of the Herbert properties and mill site.

Western News, December 18, 1934, Volume XXXIV, No. 29, page 1,'Building a Road to the Mine'; This articles is about the construction of the new road to the Herbert properties on the north side of Prospect Creek.

Map of Mining claims of the D. and W. Mining and Concentrating Company, Libby, Lincoln County, Montana, 1935

Western News, September 12, 1935, Volume XXXV, No. 15, page 1; 'Will Build Ore Mill at Gold Mine'; This article was the attempt by the stockholders of the Herbert Gold Mines to increase capitol stock to raise money to construct a 50 to 100 ton a day mill for processing silver and gold ore.

Spokane Review, October 15, 1935, 'Herbert Gold to Build Mill'; This article concerns the same as the preceding article.

Western News, December 17, 1936, Volume XXXVI, No. 29, page 1, 'Planning Activity at Herbert Gold Mines'; This called for a resumption of activity at the mine including work in following mineral veins in the lower tunnel.

Spokane Review, October 26, 1937; 'Silver Threads Among the Gold': This article was about the first carload of silver shipped from the Herbert Gold Mines.

Western News, February 15, 1938, 'Herbert Gold Seeks Capital for New Mill': The Herbert Gold Mines were having problem proceeding with work and buying new equipment.

Spokesman Review, Spokane, Washington, March 17, 1938, 'Roads Restrain Herbert Gold'; Eager to resume development is the Herbert Gold Mines Inc., eight miles south of Libby, Montana. It hopes to reenter April 1 or as much earlier as the road conditions improve.

Book 110, Lincoln County, Montana, page 765: The Libby Gold Corporation received the patent for the Double T Lode mining claim in the S ½ of section 29, Township 30 North, Range 31 West on August 29, 1961. The claim of 20.659 acres was the only claim of Survey No. 10906 to be patented.

Geology and Mineral Deposits of the Libby Quadrangle, Montana by Russell Gibson, United States Printing Office, Washington D.C., 1948, pages 90-91; This publication describes the Herbert group of 10 claims in section 29, T 30 N, R31 W. on the north side of Prospect Creek.

Page 117: The D. and W. group, owned by Mr. Clark, Wakefield and others, includes the Last Turn, Wakefield and 12 other claims on Prospect Creek. the mine can be reached by a secondary road leading from the country road to the Glacier mine and Granite Creek.

Report on Mining Claim of the Libby Gold Corporation, U.S. Forest Service, Kootenai-Libby Gold Group, R1-416: by Gary G. Morrison, Valuation Engineer, March 6, 1964: This document is an investigation of the value of claims of the Libby Gold Corporation and the properties of Mineral Survey 10906. The examination of the mines and prospects was conducted from June 4 through June 6, 1963. The Libby Mining Corporation had claims, totaling 205.553 acres but on the Double T became the only patented mining property on Prospect Hill.

Appendix 7: FORM (KNF-BMP-3)

LIBBY DISTRICT - BMP IMPLEMENTATION AND EFFECTIVENESS DOCUMENTATION

SECTION: ____PLANNING ____TIMBER ____ENGINEERING ____FUELS ____MINERALS ____RANGE

Activity Name: **Prospect Hill Access**
Type of Activity: Road construction
Sale unit/road numbers evaluated: _____
Named Stream Below Activity: _Prospect Creek_____
Preparer(s): _____

Date of Review: ___/ ___ / ___
Legal Description: T ____ R ____ S
EIS/EA unit/road numbers:
Stage of Sale Completion: _____Complete __ Incomplete
Decision Document:

Is this an activity with special watershed concerns? (see decision document): **X** yes* ____ no
* (review should probably include a soils, hydrology, or fish specialist)

Implementation Evaluation
5-BMP implementation exceeds requirements of contract
4-BMP implementation meets requirements of contract. Satisfactory implementation on all specified areas.
3-Minor deviation in BMP implementation from intent of contract. Implementation ok on 2/3 or more of specified areas.
2-Major deviation in BMP implementation from intent of contract. Implementation incorrect or correct on < 2/3 of specified areas.
1-Non-implementation of BMP

Effectiveness Evaluation
5-BMP exceeds intent of SWCP objective.
4-BMP meets SWCP objective over entire specified area.
*3-BMP meets SWCP objective on 2/3 of specified area. BMP over remaining 1/3 of area does not meet SWCP objective.
*2-BMP meets SWCP objective on less than 1/3 of specified area. BMP over remaining 2/3 area does not meet SWCP objective.
*1-BMP does not meet SWCP objective on any of the specified area. A BMP was either not implemented or was completly ineffective.

* - Add explanation of likely effects of SWCP objective not being met (e.g. soil is eroding onto flat area w/o risk to water quality etc.). Also describe what could have been done differently to meet SWCP objective.

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
14.01	**TIMBER SALE PLANNING - To incorporate soil and water resource considerations intoTimber Sale Planning**			**All**	**Water and soil resource protection will be accompolished by the IDT during the NEPA process.**	
14.02	**TIMBER HARVEST UNIT DESIGN- To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.**			**All**	**Timber harvest design will include a cummulative effects analysis to determine effects to water yield and stream habitat features. RHCA's will be designated as a part of this process.**	
14.03	**USE OF SALE AREA MAPS (SAM's) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS -To delineate the location of protected areas and available water sources and to insure their recognition, proper consideration, and protection on the ground**			**All**	**The IDT will identify water courses to be protected, unit boundaries and other features required by other means such as "C" provisions. Ground verification, and preparation of SAMs to be included in TSC will be done by pre-sale forester. TSA reviews areas of concern with purchaser before operations.**	
14.04	**LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES - To minimize soil erosion and sedimentation and loss in soil productivity by insuring that the purchaser conducts his/her operations in a timely manner.**			**All**	**If limited operating periods are identified and recommended during the analysis by the IDT, the pre-sale forester will prepare a contract that that includes provision C6.31.**	
14.05	**PROTECTION OF UNSTABLE AREAS - To protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.**			**All**	**If at all possible all known unstable areas that occur within the Sale Area Boundary will be avoided. Soil resource specialist should also be consulted in the planning process.**	
14.06	**RIPARIAN AREA DESIGNATION - To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities**			**New road**	**All streams and wetlands in the decision area will comply with KNF Riparian Area Guidelines (Appendix 26) and KNF Forest Plan as amended by INFS/UCRB. The width of the riparian areas will be decided upon by the IDT.**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
					These widths will be included on the sale area map and marked on the ground. This information will be included in the timber sale contract.	
14.07	**DETERMINING TRACTOR LOGGABLE GROUND - To protect water quality from degradation caused by tractor logging ground disturbance.**				**IDT has identified tractor loggable ground (in conjunction with personnel from timber operations) during transportation and timber sale planning process. The results have been used to determine intensity of and restrictions for land disturbance activities. PSF will prepare a TSC that includes provisions stating areas and conditions that tractors can operate.**	
14.08	**TRACTOR SKIDDING DESIGN - To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.**				**IDT has identified sensitive areas during the planning process. The TSA will execute the plan on the ground by locating the skid trails with the timber purchaser or by agreeing to the purchaser's proposed locations prior to operation.**	
	TIMBER OPERATIONS					
14.09	**SUSPENDED LOG YARDING IN TIMBER HARVESTING - To protect the soil from excessive disturbance and accelerated erosion and to maintain the integrity of the riparian areas and other sensitive area.**				**Sensitive areas have been designated and equipment limitations have been placed on specific units.**	
14.10	**LOG LANDING LOCATION AND DESIGN - To locate in such a way as to avoid soil erosion and water quality degradation.**			**New road**	**Approved landing locations will meet the criteria of: minimal size, least excavation needed, minimum skid roads necessary, no side-cast material into sensitive areas, and have proper drainage.**	
14.11	**LOG LANDING EROSION PREVENTION AND CONTROL- To reduce erosion and subsequent sedimentation**			**All**	**Approved landing locations will meet the criteria of: minimal size, least excavation needed, minimum skid roads necessary, no side-cast**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
	from log landing through the use of mitigating measures.				**material into sensitive areas, and have proper drainage.**	
14.12	**EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION - To ensure that the purchaser's operations shall be conducted reasonably to minimize soil erosion.**			**All**	**Erosion control is kept current on all areas disturbed during the harvest activity. This prevents operation when excessive impacts are possible due to high soil moisture .**	
14.13	**SPECIAL EROSION PREVENTION MEASURES ON AREAS DISTURBED BY HARVEST ACTIVITIES - To prevent erosion and sedimentation on disturbed areas.**			**All**	**If there is an erosion problem the IDT will recommend specific BMPs based on site surveys. BMPs may be adjusted by the TSA to meet operational requirements**	
14.14	**REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES - To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation and weeds.**			**All**	**IDT has established vegetation and fertilizer mix to be used in the project area with outlines on the extent to which it should be used. TSA is responsible to see that revegetation work required by purchaser is done correctly and in a timely manner. For this project, the purchaser will be responsible for revegetation immediately after the completion of harvest. Funds will be collected for the District to do follow-up seeding/fertilizing in years two and five after harvest.**	
14.15	**EROSION CONTROL ON SKID TRAILS - To protect water quality by minimizing erosion and sedimentation derived from skid trails.**			**All**	**IDT will identifiy areas where special concerns need to be addressed, such as harvesting in fire salvage situations. Eoriosion control measures may be recommended by the IDT, but site-specifically adjusted by the TSA. TSA will ensure erosion control measures are applied prior to expected hydrologic events (spring runoff, high-intensity storms, etc.). Maintenance of erosion control structures by the purchaser may be necessary and requested by the TSA.**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
14.16	**MEADOW PROTECTION DURING TIMBER HARVESTING - To avoid damage to the ground cover, soil, and water in meadows**			**All**	**IDT has identified areas needing special protection. PSF will verify the areas needing protection and prepares the contract to prevent damage to meadows. The TSA will be responsible for on the ground protection of meadows. If meadows are found by the TSA during operations, it is their responsibility to either afford them the proper protection or to pursue a contract modification.**	
14.17	**STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT) - To protect natural streamflows; to provide unobstructed passage of flows; reduce sediment input; and to restore flow if diverted by timber sale activity.**			**All**	**IDT had identified the location of channels in the decision area. PSF will prepare a SAM locating the channels needing protection. Lay-out crew marks boundaries and trees according to HB-731 and FP guidelines. TSA will see that TSC items are carried out on the ground. Technical assistance will be consulted as needed.**	
14.18	**EROSION CONTROL STRUCTURE MAINTENANCE - To insure that constructed erosion control structures are stabilized and working effectively.**			**All**	**During the period of the TSC the purchaser is responsible for maintaining their erosion control features. If work is needed beyond this time, the district will pursue other sources of funding.**	
14.19	**ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE - To assure the adequacy of required erosion control work on timber sales.**			**All**	**A careful review of erosion prevention work will be made by the TSA before each harvest unit is considered complete. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature. A feature is considered not acceptable if it does not meet standards, or not expected to protect soil/water values. Technical assistance will be used as necessary.**	
14.20	**SLASH TREATMENT IN SENSITIVE AREAS - To protect water quality by protecting sensitive tributary areas from degradation which would result from using**			**All**	**All activities will comply with the KNF Riparian Area Guidelines (FP Appendix 26). Where harvest within riparian areas is proposed, either the slash would be removed with the tree or the slash would be**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
	mechanized equipment for slash disposal.				**scattered and not treated.**	
	ENGINEERING					
15.02	**GENERAL GUIDELINES FOR THE LOCATION AND DESIGN OF ROADS AND TRAILS - To locate and design roads and trails with minimal soil and water impact while considering all design criteria.**			**New Road**	**Consult KNF Land type inventory to determine if project is located in a area of unstable soils.**	
15.02E	**Stream crossings of proper size and conform to natural streambed and slope**			**All**	**Culverts were sized for the 100 year event, following INFS standards.**	
15.02C	**Roads avoid high hazard sites**			**new road**	**KNF landtypes were consulted to avoid high hazard sites.**	
15.02F	**Road drainage routed through adequate filte**			**All**	**Drainage from road surface is routed to a filteration area before it is allowed to enter a stream.**	
15.02F	**Ditch relief culverts installed to remove drainage before it enters stream and routed to a filteration location.**			**All**	**Ditch relief culverts are installed to allow ditch water to be deposited into a filtering device before it enters a stream. Ditch relief culverts are skewed to allow proper functioning.**	
15.03	**ROAD AND TRAIL EROSION CONTROL PLAN - To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction by timely implementation of erosion control practices.**			**New Road**	**Consult KNF Land type inventory to determine if project is located in a area of unstable soils.**	
15.04	**TIMING OF CONSTRUCTION ACTIVITIES - To minimize erosion by conducting operations during minimal runoff periods.**			**New Road**	**Timing of repair work needs to be coordinated with the District Fisheries Biologist in watersheds with high aquatic values.**	
15.05	**SLOPE STABILIZATION AND PREVENTION OF MASS FAILURES - To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.**			**new Road**	**Consult KNF Land type inventory to determine if project is located in a area of unstable soils.**	
15.06	**MITIGATION OF SURFACE**			**New Road**	**Consult KNF Land type inventory to**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
	EROSION AND STABILIZATION OF SLOPES - To minimize soil erosion from road cutslopes, fill slopes, and travelways.				**determine if project is located in a area of unstable soils.**	
15.07	**CONTROL OF PERMANENT ROAD DRAINAGE - 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.**			**new Road**	**Measures that can be implemented include but are not limited to: drive through dips, rubber surface deflectors, gravel placement, seeding and fertilizing.**	
15.08	**PIONEER ROAD CONSTRUCTION - To minimize sediment production and mass wasting associated with pioneer road construction.**			**new Road**	**Consult KNF Land type inventory to determine if project is located in a area of unstable soils. Road locations should be on as gentle slopes as can be achieved in the project area.**	
15.09	**TIMELY EROSION CONTROL MEASURES ON INCOMPLETE ROADS AND STREAM CROSSING PROJECTS - To minimize erosion of and sedimentation from disturbed ground on incomplete projects.**			**new Road**	**Erosion control measures can include but are not limited to: straw bale detention dams, slashfilter windrows, fabric mats, seeding and fertilizing, and rip-rap placement**	
15.10	**CONTROL OF ROAD CONSTRUCTION, EXCAVATION, AND SIDE-CAST MATERIAL - To reduce sedimentation from unconsolidated excavated and side-cast material caused by road construction, reconstruction, or maintenance.**			**new Road**	**Consult KNF Land type inventory to determine if project is located in a area of unstable soils. Erosion control measures can include but are not limited to: straw bale detention dams, slashfilter windrows, fabric mats, seeding and fertilizing, and rip-rap placement.**	
15.11	**SERVICING AND REFUELING EQUIPMENT - To prevent contamination of waters from accidental spills of fuels, lubricants, bituments, and other harmful materials.**			**new road**	**No servicing or refueling of equipment is allowed within the designated RHCA's or within 300 feet of any stream channel.**	
15.12	**CONTROL OF CONSTRUCTION IN RIPARIAN AREAS - To minimize the adverse effects on riparian areas form roads.**			**New road**	**IDT shall determine if road construction is allowable. For construction projects, 15.09, 15.08, 15.07, and 15.13 objectives must be enforced.**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
15.13	**CONTROLLING IN-CHANNEL EXCAVATION - To minimize stream channel disturbances and related sediment production.**			**n/a**	**Any in-channel excavation needs to be ok'd by either district fisheries biologist or hydrologist to ensure water resources are being protected.**	
15.14	**DIVERSION OF FLOWS AROUND CONSTRUCTION SITES - To minimize downstream sedimentation by insuring that all stream diversions are carefully planned.**			**n/a**	**Any projects that require the diversion of flows must be ok'd by district hydrologist and must have the required permits completed.**	
15.15	**STREAM CROSSINGS ON TEMPORARY ROADS - To keep temporary roads from unduly damaging streams, disturbing channels or obstructing fish passage.**			**N/A**	**All temporary stream crossings should be completed with the least amount of damage to the channel and must have the required permits returned from the Montana Dept. of Fish, Wildlife and Parks. A 3A permit mus also be obtained for the construction and use period of the structure.**	
15.16	**BRIDGE AND CULVERT INSTALLATION - To minimize sedimentation and turbidity resulting from excavation from in-channel structures.**			**Where needed**	**All stream crossings should be completed with the least amount of damage to the channel and must have the required permits returned from the Montana Dept. of Fish, Wildlife and Parks. A 3A permit must also be obtained for the construction and use period of the structure.**	
15.17	**REGULATION OF BORROW PITS, GRAVEL SOURCES, AND QUARRIES - To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbance in those gravel sources suitable fro development in floodplains.**			**All**	**An approved operating plan must include input form fisheries and watershed resources to ensure water resources are being protected. Sediment production needs to be stabilized and contained on the project location.**	
15.18	**DISPOSAL OF RIGHT-OF-WAY AND ROADSIDE DEBRIS - To insure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels.**			**All**	**Sidecasting of road materials is not allowed within RHCA's or within 300 feet of stream channels. Material cannot be placed in a manor that will restrict the effectiveness of the road drainage structures.**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
15.19	**STREAMBANK PROTECTION - To minimize sediment production from streambanks and structural abutments in natural waterways.**			**All**	**The only activity that allows equipment activity in the RHCA are 15.13- 15.16. Any such activity must meet the requirements set forth in those descriptions.**	
15.20	**WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION - To supply water fro road construction and maintenance and fire protection while maintaining water quality**			**All**	**Development of water sources for road construction or fire supression activities will not include any permanent diversion or blockage of natural stream channels or wet areas**	
15.21	**MAINTENANCE OF ROADS - To maintain all roads in a manner which provides for soil and water protection by minimizing rutting, failures, side-cast, and blockage of drainage facilities.**			**All**	**Road maintenance associated with a timber sale is the responsibility of purchaser. The ER/SA will ensure that the purchaser maintains roads according to the appropriate maintenance level.**	
15.22	**ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS - To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.**			**All**	**Sidecasting of road materials is not allowed within RHCA's or within 300 feet of stream channels. Material cannot be placed in a manor that will restrict the effectiveness of the road drainage structures.**	
15.23	**TRAFFIC CONTROL DURING WET PERIODS - To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation.**			**All**	**Road restrictions, and traffic control measures will be implemented on all roads when damage would occur during spring breakup. The decision to restrict a road is made by the ER. Hauling restrictions would be controlled by the TSA.**	
15.24	**SNOW REMOVAL CONTROLS - 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.**			**All**	**Snow removal will be kept current on all roads associated with winter logging operations. The TSA ensures compliance with contract provisions.**	
15.25	**OBLITERATION OF TEMPORARY ROADS To reduce sediment generated**			**any new temp roads**	**This work will be done on all new temporary roads in the decision area. The work will be done by the**	

SWCP Objective		Implementation (1-5)	Effectiveness (1-5)	Unit or Road Number	BMP or alternative method used to meet the SWCP objective.	Comments (How did BMP meet obj.? If SWCP objective was not met, was it due to BMP selection, implementation design,? What are the likely effects?)
	from temporary roads by obliterating them at the completion of their intended use.				**purchaser with compliance by the TSA.**	
	FUELS TREATMENT					
18.02	**FORMULATION OF FIRE PRESCRIPTIONS - To provide for the protection of soil and water resources while achieving the management objective through the use of prescribed burning.**			**n/a**	**The prefered burning conditions should be used as the optium requirement used to achieve the desired effects from the project.**	
18.03	**PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS - To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering surface water.**			**n/a**	**The prefered burning conditions should be used as the optium requirement used to achieve the desired effects from the project.**	
18.03A (KNF)	**PROTECTION OF RHCA'S DURING FUELS TREATMENT - To maintain the integrety of the RHCA's during broadcast burning and machine fuels treatment.**			**n/a**	**The prefered burning conditions should be used as the optium requirement used to achieve the desired effects from the project. For RHCA's that require additional protection, firelines may need to be constructed at the boundary of the units.**	
18.04	**MINIMIZING WATERSHED IMPACTS FROM FIRE SUPRESSION EFFORTS - To avoid watershed impacts in excess of that which is caused by the fire itself.**			**n/a**	**The resource advisor should be consulted before fireline work is completed in sensitive areas to determine of the work will result in an overall benefit to the area.**	

Appendix 8: KNF Equivalent Clearcut Acres (ECA) Calculator

Lynn Cain, user interface design & development (ArcMap, Visual Basic)
Don Tincher, Oracle development, scoping & project design

ECAC Model Capabilities and Limitations:
The KNF beta version of the Equivalent Clearcut Acres Calculator (ECAC) is a GIS interface with management activity databases (Oracle and TSMRS), that allows watershed specialists to model the current equivalent clearcut acres (ECA) within a watershed of interest. The ECAC model calculates ECA for a specified watershed based on the most recent and most impactive (greatest crown removal) management activities associated with roads, timber harvest, prescribed fire, and wildfire. The ECAC model does not model peak flows or sediment production and transport. Watershed specialists must use additional models, indices, measures, monitoring, site specific data, and experience to model these watershed variables and analyze cumulative watershed effects.

The most current model for reviewing the effects of forest management activities has been the R1-WATSED model (USDA, 1991). Watershed modeling is used to predict and evaluate the cumulative watershed effects of the existing harvest, roading and proposed alternatives within the subject watershed. The Kootenai National Forest uses the R1 - WATSED model which is considered to be "state-of-the-art". The values produced are estimates, and are used to compare effects between the existing conditions and alternatives. The R1 - WATSED model predicts the highest 30-day-average water yield increase and the annual sediment yield increase using naturally caused and human activities in the watershed as input. Water yield and sediment yield recovery is also predicted by the model. The model calculates disturbances based on the "ECA" (Equivalent Clearcut Acre) procedure, for example a 100 acre harvest area with 50 percent canopy removal would equate to a 50 acre clearcut. Information on how the model functions and the data it requires to complete an analysis is located at the end of this discussion. Included in the model discussion are the values the Kootenai National Forest has input into the various data bases required to run the model. The values for these data bases have been adjusted for site specific conditions found on the Kootenai National Forest. The predicted values generated by the model do not reflect rare or episodic weather events (such as the rain-on-snow events that have occurred in this area in the past), or the effects the predicted increases will have on fish or aquatic habitat.

R1 -WATSED also requires the input of local adjustments for variables like delayed recovery for different disturbances, and canopy removal due to natural causes, like fire. The most recent local research and field data were used to generate these adjustments. The following adjustments have been used during the completion of the R1 - WATSED model runs on the forest.

Canopy Removal From Fire:

Fire Intensity	Percent Canopy Removed
High	80
Moderate	55
Low	25

Delayed Recovery (in years) by Habitat and Disturbance Type:

	Disturbance Types			
Habitat Type	Harvest and Site Prep.	Fire (low)	Fire(mod.)	Fire(high)
Fast Growing	5	0	5	8
Moderately Growing	7	0	7	11
Slow Growing	9	9	9	14

The Kootenai National Forest (Libby Ranger District) is currently reviewing and compiling data to begin the validation process for the R1 - WATSED model for the forest. The initial efforts at validation have showed that the water yield portion of the model displays good correlation between collected data and the model predictions (see below). Additional intense sediment data collection is needed to get a better idea on the sediment volume predicting possibilities of the model. One data set has been used thus far for validation of the sediment prediction capabilities of the model. That analysis showed the model under predicted actual measurements by 300%. The values for sediment prediction should only be used for comparison purposes between different alternatives. The volumes predicted for sediment generation reflect only increases of suspended sediment in the stream, at the analysis point. Predicted sediment is delivered to the stream from upslope activities only and does not include any in-channel generated sediment. The sediment values predicted are not exact amounts.

Water and Suspended Sediment Yield Validation Example for R1 WATSED

Assumptions: 95% of suspended sediment occurs in a one month period.
Streamflow is divided equally per day in the high month period.
Routed sediment from R1WATSED is equivalent to suspended sediment.
Sediment (tons/ day) = mg/L TSS x cfs x .0027

Example Calculations: Quartz Creek (34.07 mi.^{2})
R1WATSED - Natural Conditions; Average 30 day Peakflow = 161.7 cfs, Routed Sediment = 8.1 tons/mi^2

8.1 tons/mi^2 x 34.07 mi^2 = 276 tons/year
276 tons/year x .95 (high month) = 262 tons
262 tons / 30 days = 8.74 tons/ day
High 30 day average mg/L TSS = 8.74/ 161.7 x .0027 = 20 mg/L TSS

R1WATSED - 1995 Estimates; Peakflow Increase = 7%, Annual Sediment Increase = 123%

Average 30 day peakflow = 173 cfs, Routed Sediment = 18.06 tons/mi^2

18.06 tons/mi^2 x 34.07 mi^2 = 615 tons/year
615 tons/year x .95 (high month) = 584 tons
584 tons / 30 days = 19.5 tons/ day
High 30 day average mg/L TSS = 19.5/ 173 x .0027 = 42 mg/L TSS

Collected Data -1995; Avg. 30 day peakflow = 212 cfs, 7 day peakflow = 261 cfs, One day peakflow = 292 cfs

1,864 tons TSS in high 30 day period, 1,864 tons/ 30 days = 62.1 tons/day
1,176 tons TSS in high 7 day period, 1176 tons/ 7 days = 168 tons/day
562 tons on high day
High 30 day average mg/L TSS = 62.1/ 212 x .0027 = 108 mg/L TSS
High 7 day average mg/L TSS = 168/ 261 x .0027 = 301 mg/L TSS
High day mg/L TSS = 562/ 210 x .0027 = 991 mg/L TSS

Water Year 95 = 22 inches ppt., 80 year average = 17.6 inches ppt. Water Year 95 is

130% of average
1995 collected high 30-day flow data is 122% above what R1WATSED predicted for the 30 day peakflow.

On Libby Ranger District during the mid-1990's numerous watersheds were run to obtain existing conditions. Because of computer system changes, personnel changes, and problems with interfacing various evolving data bases and the model, a process was completed that allowed an easier path to the data that WATSED provided. This process included separating watersheds by size class and precipitation regime that had already been run through the model and comparing their results with the above mentioned ECAC process to look at water yield estimates. This procedure has allowed us to use a more simplified analysis path based on ECA's to generate water yield estimates that have been validated by comparison with the WATSED model output. A new version of WATSED is in the process of been completed and beta tested for use. The process on Libby Ranger District uses regression lines created from WATSED outputs to determine the number of ECA's required to generate a 1% increase in peakflows and also the number of ECA's that recover each year in a watershed based on its drainage size and precipitation regime. Copies of the regression graphs are included in the project file.

Because the sediment validation of the model needs extensive data collection and a secure amount of long-term funding, sediment validation of the model has been lagging. Suspended sediment data collection has been ongoing on the District for a few years but the time need to complete the validation process does not allow both project work and validation work to proceed. Validation work is completed on a "free-time" basis and thus far has not been completed. For this reason the effects analysis for sediment concerns is based on actual data such as stage/discharge relationships, suspended sediment sampling (daily and grab), streamcore sediment sampling, and macroinvertebrate sampling.

The values generated from the ECAC process are related to actual project area streamflow monitoring or streamflow monitoring from a representative watershed near the project area with similar attributes (precipitation, geology, development history, etc). The values are compared to the actual data and based on the stream geomorphology and professional judgment is used to determine the potential effects to the watershed resource.

USDA - FS. 1991. R1-WATSED Water Yield and Sediment Yield Model. USDA Forest Service, Northern Region.

Appendix 9

	FOREST SERVICE MANUAL **NORTHERN REGION (REGION 1)** **MISSOULA, MT.**

FSM 2000 – NATIONAL FOREST RESOURCE MANAGEMENT

ZERO CODE 2080 – NOXIOUS WEED MANAGEMENT

Supplement No.: R1 2000-2001-1

Effective Date: May 14, 2001

Duration: Effective until superseded or removed

Approved: KATHY A. MCALLISTER
Acting Regional Forester

Date Approved: 04/27/2001

Posting Instructions: Supplements are numbered consecutively by Title and calendar year. Post by document name. Remove entire document and replace with this supplement. Retain this transmittal as the first page of this document.

New Document(s):	2080	16 Pages
Superseded Document(s):	None. (This is the first supplement to this Manual.)	0 Pages

Digest:

	This supplement implements an Integrated Weed Management approach for management of noxious weeds on National Forest System lands in Region 1.

2080.4 - Responsibility.

Encourage weed awareness and education in employee development and training plans and orientation for both field and administrative work.

2080.43 - Forest Supervisor.

Forest Supervisors are responsible for:

1. Emphasizing weed awareness and weed prevention in all fire training, especially resource advisors, fire management teams, guard school, and district orientation.
2. Adding weed awareness and prevention education to Fire Effects and Prescribed Fire training.
3. Giving helicopter managers training in weed prevention and mitigation measures.
4. Resource Advisors should provide briefings to identify operational practices to reduce weed spread.
5. Providing Field Observers with weed identification aids and striving to avoid weed infestations in fire line location.

2080.44 - District Rangers.

District Rangers are responsible for:

1. Providing weed prevention briefings for helibase staff.
2. Ensuring at least one permanent staff member per District is trained and proficient in weed management.
3. Applying weed treatment and prevention on all Forest Service administrative sites including Ranger Stations, trailheads, campgrounds, pastures, interpretive and historic sites.

2081 – MANAGEMENT OF NOXIOUS WEEDS.

2081.2 - Prevention and Control Measures.

1. Roads.

a. Required Objectives and Associated Practices.

(1) Incorporate weed prevention into road layout, design, and alternative evaluation. Environmental analysis for road construction and reconstruction will include weed risk assessment.

(2) Remove the seed source that could be picked up by passing vehicles and limit seed transport in new and reconstruction areas.

(a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.

(b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.

(3) Re-establish vegetation on bare ground due to construction and reconstruction activity to minimize weed spread.

(a) Revegetate all disturbed soil, except the travel way on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent weed establishment. Use native material where appropriate and available. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. To

avoid weed contaminated seed, each lot must be tested by a certified seed laboratory against the all State noxious weed lists and documentation of the seed inspection test provided.
(b) Use local seeding guidelines for detailed procedures and appropriate mixes. Use native material where appropriate and available. Revegetation may include planting, seeding, fertilization, and weed-free mulching as indicated by local prescriptions.
(c) Monitor and evaluate success of revegetation in relation to project plan. Repeat as indicated by local prescriptions.
(4) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. The borrow pit will not be used if new invaders, defined by the Forest Weed Specialist, are found on site.
(5) Minimize sources of weed seed in areas not yet revegetated. If straw is used for road stabilization and erosion control, it must be certified weed-free or weed-seed free.
(6) Minimize roadside sources of weed seed that could be transported to other areas during maintenance.
(a) Look for priority weed species during road maintenance and report back to District Weed Specialist.
(b) Do not blade roads or pull ditches where new invaders are found.
(c) Maintain desirable roadside vegetation. If desirable vegetation is removed during blading or other ground disturbing activities, area must be revegetated according to section (3) (a), (b), (c) above.
(d) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(e) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders, as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.
(f) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
(7) Reduce weed establishment in road obliteration/reclamation projects. Revegetate according to section (3) (a), (b), (c) above.
b. <u>Recommended Objectives and Associated Practices.</u>
(1) Retain shade to suppress weeds. Consider minimizing the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance, particularly on southerly aspects.
(2) Consider re-establishing vegetation on bare ground due to construction and reconstruction activity to minimize weed spread. Road maintenance programs should include scheduled fertilization to maintain vigor of competitive vegetation (3-year period suggested).
(3) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.
(4) Minimize roadside sources of weed seed that could be transported to other areas. Weed infestations should be inventoried and scheduled for treatment.
(5) Ensure that weed prevention and related resource protection are considered in travel management. Consider weed risk and spread factors in travel plan (road closure) decisions.
(6) Reduce weed establishment in road obliteration/reclamation projects. Consider treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local analysis and prescription.

(7) Evaluate and prioritize noxious weeds along existing Forest Service access roads leading to project area and treat as indicated by local analysis and prescriptions, before construction equipment moves into project area. New road construction must be revegetated as described in Weed Prevention measure, see Roads Required Objectives and Associated Practices section (3) (a), (b), (c) above.

2. Recreation, Wilderness, Roadless Areas.

a. Required Objectives and Associated Practices.

(1) Minimize transport and establishment of weeds on National Forest Service lands.

(a) Include environmental analysis for recreation and trail projects in weed risk assessment.

(b) Post and enforce statewide weed-free feed orders.

(c) Seed only when necessary at backcountry sites to minimize introduction of nonnative species and weeds. Reseed according to Roads (3) (a), (b), (c) above.

(2) Reduce weed establishment and spread from activities covered by Recreation Special Use Permits.

(a) Include Clause R1-D4, (or subsequent approved direction), in all new and reissued recreation special use permits, authorizations, or other grants involving ground-disturbing activities. Include this provision in existing ground-disturbing authorizations, which are being amended for other reasons.

(b) Revegetate bare soil resulting from special use activity according to Roads (3) (a), (b), (c) above.

(3) Prevent weed establishment resulting from land and float trail use, construction, reconstruction and maintenance activities.

(a) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

b. Recommended Objectives and Associated Practices.

(1) Minimize transport and establishment of weeds on National Forest System (NFS) lands.

(a) Encourage backcountry pack and saddle stock users to feed only weed-free feed for several days prior to traveling off roads in the Forest. Before entering NFS land, animals should be brushed to remove any weed seed.

(b) Stock should be tied and/or held in the backcountry in such a way as to minimize soil disturbance and avoid loss of native/desirable vegetation.

(c) Maintain trailheads, boat launches, outfitter and public camps, airstrips, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition.

(d) Motorized and/or mechanized (such as mountain bikes) trail users should inspect and clean their vehicles prior to using NFS lands.

(2) Consider reducing weed establishment and spread from activities covered by recreation, special use permits. Consider including Clause R1-D4, (or subsequent approved direction), by amending existing ground-disturbing authorizations as indicated by local prescriptions.

(3) Prevent weed establishment resulting from land and float trail use, construction, reconstruction, and maintenance activities.

(a) All trail crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.

(b) Inspect and approve all gravel and borrow sources before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.

3. Cultural Resources.

Required Objectives and Associated Practices. Reduce weed establishment and spread at archeological excavations.

Revegetate bare soil resulting from cultural resource excavation activity according to the Roads (3) (a), (b), (c) section above.

4. Wildlife, Fisheries, and Botany.

Required Objectives and Associated Practices. Incorporate weed prevention into wildlife, fisheries, and botany project design.

a. Include weed risk assessment in environmental analysis for wildlife, fish and botany projects with ground disturbing actions.

b. Revegetate bare soil resulting from wildlife and fish project activity according to the Roads (3) (a), (b), (c) section above.

c. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

d. Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

5. Range.

a. Required Objectives and Associated Practices.

(1) Ensure weed prevention and control are considered in management of all grazing allotments.

(a) Include weed risk assessment in environmental analysis for rangeland projects.

(b) When other plans do not already address noxious weeds, include practices and control measures in Annual Operating Plans.

(2) Minimize ground disturbance and bare soil.

(a) Revegetate, where applicable, bare soil from grazing activities according to the Roads (3) (a), (b), (c) section above.

(b) Check areas of concentrated livestock use for weed establishment and treat new infestations.

(3) Minimize transport of weed seed into and within allotments.

(a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

(c) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

b. Recommended Objectives and Associated Practices.

(1) Transport of weed seed into and within allotments should be minimized.

(a) Avoid driving vehicles through off-road weed infestations.

(b) Feed certified weed-free feed to livestock for several days prior to moving them onto the allotment to reduce the introduction of new invaders and spread of existing weed species. Consider using transitional pastures when moving animals from weed infested areas to the National Forest. (Transitional pastures are designated fenced areas that can be logistically and economically maintained.)

(c) Consider excluding livestock from sites with new invaders or treat new invaders in these areas before entry by livestock.

(2) Maintain healthy desirable vegetation that is resistant to noxious weed establishment.

(a) Consider managing forage utilization to maintain the vigor of desirable plant species as described in the Allotment Management Plan.

(b) Minimize or exclude grazing on restoration areas until vegetation is well established.

6. Timber.

a. Required Objectives and Associated Practices.

(1) Ensure that weed prevention is considered in all pre-harvest timber projects.

(a) Include weed risk assessment in environmental analysis for timber harvest projects.

(b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service

vehicles that will stay on the roadway, traveling frequently in and out of the project area.) Reference Contract Provision C/CT6.26

(c) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as designated by the Forest Weed Specialist). Reference Contract Provision C/CT6.261

(2) Minimize the creation of sites suitable for weed establishment. Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.

b. Recommended Objectives and Associated Practices.

(1) Ensure that weed prevention is considered in all timber projects.

(a) Consider treating weeds on roads used by timber sale purchasers. Reference Contract Provision C/CT6.26.

(b) Treat weeds on landings, skid trails and helibases that are weed infested before logging activities, where practical.

(2) Minimize the creation of sites suitable for weed establishment. Soil disturbance should be minimized to meet harvest project objectives.

(3) Consider monitoring for weeds after sale activity and treat weeds as indicated by local prescriptions.

(a) Consider trust, stewardship, or other funds to treat soil disturbance or weeds as needed after timber harvest and regeneration activities.

(b) Consider monitoring and treating weed infestations at landings and on skid trails after harvest.

7. Minerals.

a. Required Objectives and Associated Practices.

(1) Minimize weed establishment in mining, oil and gas operations, and reclamation.

(a) Include weed risk assessment in environmental analysis for minerals and oil and gas projects.

(b) Include weed prevention measures in operation and/or reclamation plans.

(c) Retain bonds until reclamation requirements are completed.

(d) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.

(2) Remove seed source and limit seed transport into new or existing mining and oil and gas operations. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(3) Minimize weed spread caused by moving infested gravel and fill material.

(a) The borrow pit will not be used if new invaders (as defined by the Forest Weed Specialist) are found on the site.

(b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(c) Do not establish new gravel and fill material sources in areas where new invaders are present on National Forest Service lands. Where widespread weeds occur at new pit sites strip at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.

b. Recommended Objectives and Associated Practices.

(1) Consider removing seed source and limiting seed transport into new or existing mining and oil and gas operations. Where applicable, treat weeds on project access routes. Reference Contract Provision C/CT6.27.

(2) Minimize weed spread caused by moving infested gravel and fill material.

(a) Inspect and approve all gravel and borrow sources before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.
(b) Consider maintaining stockpiled material in a weed-free condition.
(c) Check the area where pit material is used to ensure that no weed seeds are transported to the use site.

8. Soil and Water.

a. Required Objectives and Associated Practices.
(1) It is required that integrated weed prevention and management be used in all soil, watershed, and stream restoration projects.
(a) Include weed risk assessment in environmental analysis for soil, watershed, and stream restoration projects with ground disturbing actions.
(b) Revegetate bare soil resulting from excavation activity according to the Roads (3) (a), (b), (c) section above.
(c) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
(d) Clean all equipment prior to leaving the project site, if operation in areas infested with new invaders (as designated by the Forest Weed Specialist).
(e) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

b. Recommended Objectives and Associated Practices.
Integrate weed prevention and management in all soil, watershed, and stream restoration projects by considering treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local prescriptions.

9. Lands and Special Uses.

a. Required Objectives and Associated Practices.
(1) Incorporate weed prevention provisons in all special use permits, road use permits, and easements.
(a) Include weed risk assessment in environmental analysis for land projects with ground disturbing actions.
(b) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above, as a condition of the authorization.
(c) Include approved special use provision R1-D4, see FSH 2709.11, chapter 50, (or subsequent approved direction) in all new and reissued special use permits, authorizations, or other grants involving ground disturbing activities. Include this provision in existing ground disturbing authorizations, which are being amended for other reasons .
(d) Include noxious weed prevention and control measures as indicated by local prescriptions in new or reissued road permits or easements granted pursuant to FLPMA (P.L. 94579 0/2/76), FRTA (P.L. 88657 0/3/64) or subsequent authorities. This includes FLPMA Private and Forest Road Permits and Easements; FRTA Private and Forest Road Easements; Cost Share Easements; and Road Use (commercial haul) Permits (7730). (While the approved terms and conditions of certain permits or easements may not provide for modification, the necessary weed prevention and control provisions may be included in written plans, specifications, stipulations and /or operation and maintenance plans attached to and made a part of the authorization.)
(e) Clean all equipment prior to leaving the project site, if operating in areas infested with New Invaders (as designated by the Forest Weed Specialist).
(2) Minimize weed spread caused by moving infested gravel and fill material.
(a) Do not establish new gravel and fill material sources on National Forest Service lands in areas where new invaders are present. Where widespread weeds occur at new pit sites strip

at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.
(b) Remove all mud, dirt, and plant parts from all off-road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
b. Recommended Objectives and Associated Practices.
(1) Incorporate weed prevention provisions in all special use permits, road use permits and easements.
(a) Consider including special use provision R1-D4 by amending existing ground disturbing authorizations as indicated by local prescriptions.
(b) Consider including noxious weed prevention and control provisions by amending existing ground disturbing authorizations when determined to be necessary by the authorized officer. (While the approved terms and conditions of certain permits or easements may not provide for modification, the necessary weed prevention and control provisions may be included in written plans, specifications, stipulations and/or operation and maintenance plans attached to and made a part of the authorization.)
(2) Minimize weed spread caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.

10. Fire.

a. Required Objectives and Associated Practices.
(1) Increase weed awareness among all fire personnel. Include weed risk factors and weed prevention considerations in the Resource Advisor duties on all Incident Management Teams and Fire Rehabilitation Teams during pre-fire, pre-incident training.
(2) Mitigate and reduce weed spread during wild fire activities
(a) Initiate establishment of a network of helibases, camps and staging areas that will be maintained in a noxious weed-free condition.
(b) Minimize weed spread in camps by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes and washing equipment.
(c) Inspect all fire going vehicles regularly to assure that undercarriages and grill works are kept weed seed free. All vehicles sent off Forest for fire assistance will be cleaned before they leave or return to their home.
(3) Minimize weed spread during smoke jumper operations.
(a) Inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment.
(b) Coordinate with Weed Specialist(s) to locate and/or treat practice jump areas.
(4) Mitigate and reduce weed spread in Air Operations.
(a) Initiate establishment of a network of helibases that will be maintained in a noxious weed-free condition.
(b) Minimize weed spread at helibases by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes.
(c) Provide weed prevention briefings for helibase staff.
(d) Inspect, and if necessary clean, contract fuel and support vehicles before and after each incident when travelling off road or through weed infestations.
(e) Inspect and remove weed seed and plant parts from all cargo nets.
(5) Mitigate and reduce weed spread from Logistics Operations activities.
(a) Look for weed-free camps, staging, drop points and parking areas.

(b) Regularly inspect and clean fire vehicles as necessary to assure that undercarriages and grill works are kept weed seed free.
(6) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.
(a) Include weed risk assessment in environmental analysis for prescribed fire projects.
(b) Coordinate with local Noxious Weed Management Specialist to utilize helibases that are maintained in a weed-free condition, whenever possible.
(c) All crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.
(d) Add weed awareness and prevention education to Fire Effects and Prescribed Fire training.
(7) Encourage desirable vegetation during rehabilitation activities.
(a) Revegetate only erosion susceptible and high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) as described in the Roads (3) (a), (b), (c) section above.
(b) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.
b. Recommended Objectives and Associated Practices.
(1) Mitigate and reduce weed spread during fire activities.
(a) Initiate establishment of a network of helibases, camps, and staging areas on private land that will be maintained in a noxious weed-free condition.
(b) Consider checking and treating weeds that establish at cleaning sites after fire incidents, during rehabilitation.
(c) Emphasize Minimum Impact Suppression Tactics (M.I.S.T.) to reduce soil and vegetation disturbance.
(2) Minimize weed spread during smokejumper operations. Travel through weed infested areas should be avoided or minimized.
(3) Mitigate and reduced weed spread from Logistics Operations activities. Traffic should be routed through camps to avoid weed infested areas.
(4) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.
(a) Consider treating high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) with weed infestations (such as roads, disturbed ground) before burning and check and retreat after burning if necessary.
(b) Consider avoiding ignition and burning in high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) that cannot be treated before or after prescribed fire.
(5) Encourage desirable vegetation during rehabilitation activities.
(a) Check and treat weeds at cleaning sites and all disturbed staging areas.
(b) Treat weeds within the burned area as part of rehabilitation plan to reduce weed spread.
(c) Check weed spread resulting from fire and fire suppression activities.
(d) Consider applying for restoration funding for treatment of weed infestations within the fire area.

11. Administration.

a. Required Objectives and Associated Practices.
(1) Ensure all Forest Service employees are aware of and knowledgeable about noxious weeds.
(a) Train Line Officers in noxious weed management principles and practices.
(b) Each unit will have access to Weed Specialist at the Ranger District or Supervisor's Office.

(2) Ensure all Forest workers are reducing the chance of spreading noxious weeds. All Forest workers will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment including Forest Service vehicles.

b. Recommended Objectives and Associated Practices.
Consider a reward program for weed awareness, reporting, and beating new invaders.

2082 - COOPERATION.

1. Required Objectives and Associated Practices. Coordinate road maintenance activities with herbicide applications to maximize efficacy. Ensure road blading and roadside herbicide applications are coordinated chronologically to minimize herbicide use and increase effectiveness.

2. Recommended Objectives and Associated Practices. Consider providing Plans Section with weed control contact familiar with weeds in the fire area.

2082.2 - Methods of Cooperation.

6. Region 1 Required Objectives and Associated Practices.

a. Reduce weed establishment and spread at archeological excavations. Passports In Time programs and other Cultural Resource workers shall be given weed briefings and will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.

b. Promote weed awareness and prevention efforts among range permittees. Discuss weed awareness and prevention practices at annual permittee meetings.

Appendix 10: KNF Special Order – Occupancy and Use Restrictions and Food Storage in the Cabinet/Yaak Ecosystem

RECOMMENDED FOOD STORAGE GUIDELINES

1. **Human, pet and livestock food (except baled or cubed hay without additives), garbage, and other attractants should be attended or stored in a bear resistant manner.**

2. **Wildlife carcasses, birds, fish or other animal parts that are within 1/2-mile of any camp or sleeping area should be stored in a bear-resistant manner during nighttime hours.** If a wildlife carcass is within an attended camp during daytime hours it may be on the ground.

3. **Attractants (such as food leftovers or bacon grease) should not be buried, discarded, or burned in an open campfire.**
    a. Leftover food or other attractants may be burned in a contained stove fire.
    b. Leftover food or food waste products may be placed in an appropriate, sealed container and packed out with garbage.
    c. Attractants may be placed into a suitable container (i.e., tin can), to prevent leaching into ground, and burned over an open campfire. Any remaining attractants unconsumed by burning should be placed with other garbage and packed out.

4. **The responsible party should report the death and location of any livestock to a Forest Service Official within 24 hours of death.** In some very remote areas, it may not be possible to meet the 24-hour timeframe. In these special cases, the responsible party should report to a Forest Official the death of any livestock within 48 hours.

5. **Bear-resistant containers meet the following criteria:** A securable container constructed of solid material capable of withstanding 200 foot-pounds of energy applied by direct impact. A bear-resistant container developed commercially should be approved by the USDA, Forest Service, Missoula Technology and Development Center (MTDC). Bear-resistant containers developed for personal use can be inspected for approval by the local District Ranger or their designated representative(s). For commercial operations, the MTDC has an impact testing machine available to evaluate containers for strength.

DEFINITIONS

1. **Attended:** At least one adult person (attendee) is physically present within 100 feet of attractants during daytime hours. During the nighttime hours, all attractants should be within 50' of the attendee, or attractants should be stored in a bear resistant manner. During the nighttime, no physical barrier, except containers or attractant packaging material should exist between the attendee and attractants which are not stored in a bear-resistant manner.

2. **Attractant:** Food as defined below and garbage from human, livestock or pet foods.

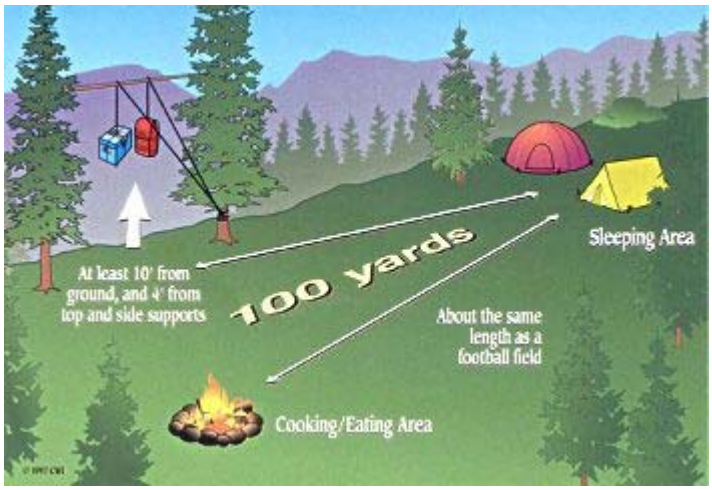
3. **Food:** Any nourishing substance, which includes human food or drink (canned, solid or liquid), livestock feed (except baled or cubed hay without additives) and pet food.

4. **Attendee:** An adult (18 years or older) in control of attractants.

5. **Bear resistant container:** A securable container constructed of solid material capable of withstanding 200 foot-pounds of energy applied by direct impact. The container when secured and under stress, should not have any openings greater than one-quarter (1/4) inch, or hinges that would allow a bear to gain entry by biting or pulling with its claws.

6. **Bear resistant manner** means any food items, including canned foods, garbage, and livestock feed, should be stored in one of the following ways if unattended:

a. secured in a hard-sided camper or vehicle trunk or cab;
b. secured in a hard-sided dwelling or storage building;
c. suspended at least 10 feet up (from the bottom of the suspended item) and 4 feet out from any upright support (i.e., tree, pole);
d. stored in an approved bear-resistant container;
e. stored within an approved and operating electric fence;
f. stored in any combination of these methods;
g. or stored by methods other than those described in Section #6, a-f, that are approved in writing by the Forest Supervisor responsible for their area of jurisdiction.



7. **Contained fire stove:** A metal stove that completely encloses the fire.

8. **Daytime:** 1/2-hour before sunrise until 1/2-hour after sunset.

9. **Nighttime:** 1/2-hour after sunset until 1/2-hour before sunrise.

10. **Livestock:** A domesticated animal, such as mule, horse, llama, or goat.

11. **Wildlife carcass:** The body, or any parts thereof, of any deceased wild animal, bird, or fish.

12. **Approved electric fence: should meet, as a minimum, the following specifications (refer to Forest Service publication 9623-2850-MTDC for more description of fence specifications and set-up):**

a. The fence should be set-up as a "tight wire" fence. The wire will be tight and under tension, not loose or sagging.

b. Minimum fence height.....4 feet.

c. Minimum post height.....5 feet.

d. Maximum spacing between posts.....8 feet.

e. Conductors (wire): Minimum of 7 wires, with 6-10 inch spacing between wires. Bottom wire should be within 2 inches of the ground. All wire should be smooth metal fence wire of at least 16 gauge or poly wire, except the top wire which may be poly tape of at least six strand stainless steel.

f. The system should be set-up to operate both as a ground wire return and a grounded system. The two top wires will be hot, with all other wires alternating hot and ground. The minimum length ground rod is 2 feet.

g. Fence charge (minimum): (1) stored energy of 0.7 joules, (2) tested peak output of 5000 volts, (3) 40 shocks per minute. User should be able to test electrical output in the field.

h. The charger should be made inaccessible to disturbance from a bear. The charger may be stored within the interior of the fence, or located a minimum of 10 feet above ground.

i. Minimum distance between fence and items enclosed by fence.....3 feet.