CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Six Hills Timber Sale
Proposed Implementation Date:	Winter 2009/2010 and Summer of 2010
Proponent:	Libby Unit, Department of Natural Resources and Conservation (DNRC)
Location:	Sec 16 T28N R30W (175 Acres); approximately 14 air miles south of Libby, MT. Sec 16 T28N R29W (187 Acres); approximately 17 air miles southeast of Libby, MT. Sec 16 T28N R28W (430 Acres); approximately 21 air miles southeast of Libby, MT. Sec 36 T28N R29W (56 Acres); approximately 21 air miles southeast of Libby, MT. Sec 16 T29N R28W (517 Acres); approximately 19 air miles east of Libby, MT. Sec 14 T29N R28W (58 Acres); approximately 20 air miles east of Libby, MT.
County:	Lincoln

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC), Libby Unit is proposing commercial timber harvests on approximately 1,423 acres over six parcels of trust land located in T29N R28W Sec. 16 (Richards Creek), T29N R28W Sec. 14 (Backus Creek), T28N R30W Sec. 16 (Poker Hill), T28N R29W Sec. 36 (Lower McKillop Creek), T28N R28W Sec. 16 (Snell Creek), and T28N R29W Sec. 16 (Harris Creek), (see Attachment A, Vicinity Map). Under the proposed Six Hills Timber Sale, DNRC would harvest and sell approximately 5 million board feet of wood products from 9 harvest units totaling 1423 acres using ground based and skyline based logging equipment. As a result of this proposed timber sale, an estimated $260,000 would be generated for the Common Schools Trust, and an estimated $10,000 would be generated for the Public Buildings Trust. Additional actions would include the reconditioning and maintenance of 62 miles of existing road (Attachment A, Road Development). Post timber harvest operations may include spot planting of Ponderosa pine, Western Larch, Douglas-fir or Western White Pine. Logging slash would be treated to meet state laws. Timber sale activities are likely to begin late in 2009 and conclude in the year 2011. Site specific objectives for the project area are: promote historic forest stand conditions and species compositions, and capture the value of the declining overstory. The proposed harvest is a follow-up treatment to stands where Ponderosa pine was harvested in the mid 1980s due to an epidemic of mountain pine beetle. The residual Douglas-fir overstory is in decline and harvest treatments are proposed to capture this value.

Lands involved in this proposed project are held by the State of Montana in trust for the Common Schools and Public Buildings trusts. The Board of Land Commissioners and the DNRC are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). The DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996), the Administrative Rules for Forest Management (ARM 36.11.401 through 456), and all other laws applicable to timber harvest activities on State lands.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project.

Public notices were placed in the *Western News* during August, 2007. Scoping letters were sent to adjacent landowners and other interested parties on the Libby Unit mailing list for scoping notices. Those involved in project development from DNRC include: Garrett Schairer, wildlife biologist; Marc Vessar, soil and hydrology specialist; Patrick Rennie, archaeologist; Jeremy Rank, project leader & forester; and John Shotzberger, Libby Unit Manager. Comments and concerns are addressed and incorporated in the Environmental Assessment.

There is ongoing involvement for this project with the US Forest Service involving rights of way cost share agreements on existing roads to gain legal access to the tracts proposed for management.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

DNRC would need to apply for three 124 permits from MT Dept. Fish, Wildlife and Parks that would allow culvert replacement at two perennial stream crossings and one intermittent stream crossing. DNRC and the USFS are involved in an ongoing right of way cost share agreement on existing roads to gain legal access to the tracts proposed for management.

3. ALTERNATIVES CONSIDERED:

No Action: Under the No Action Alternative, no activity would be undertaken. No timber would be harvested and no road improvements would occur. The No Action alternative would result in the continued decline and loss of value of the overstory trees. This alternative would not produce revenue for the trust grants. Effects of the No Action Alternative are shown in the Checklist and Attachments and can be used to compare effects of the proposed action.

Action: The Action Alternative is shown in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale are being analyzed for in the EA Checklist. Mitigations would be incorporated into the proposed action.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

The Kootenai National Forest land system inventory (LSI) identified no areas of soils at high risk for mass movements in the project area. Ground based yarding can create soil impacts through displacement and compaction. The impacts anticipated with the action alternative are below the range analyzed for in the Expected Future Conditions section of the State Forest Land Management Plan (SFLMP), and well within the 20% impacted area established as a level of concern in the SFLMP. Cumulative effects to soils may occur from repeated entries into a forest stand.

Best Management Practices would be implemented to protect soil resources and limit the magnitude or severity of adverse impacts. These include: allowing ground based equipment operations when soil moisture is dry, or ground is frozen or snow covered; retaining woody debris and green slash on site for maintaining long term site productivity; incorporating slash into skid trails and temporary roads and water-barring them; and reusing existing skid trails from past harvest activities where appropriate.

For detailed analysis, please refer to Attachment B, Soils Analysis. For a complete list of Soil Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify cumulative effects to water resources.

A DNRC hydrologist has reviewed the project area, transportation system and harvest plan. The project area is located the Fisher River and Libby Creek watersheds. There are no new stream crossings that will be developed. One existing crossing is a deteriorating log bridge and is at high risk of failure, this crossing would be replaced with a fish passage CMP. Two addition deteriorating pipes will be replaced. These activities in association with road maintenance during the sale activities would generate sediment to the streams for 1-2 years after the completion of the project because of exposure of bare soil. This risk of sediment delivery would decrease to near pre-project levels as the site revegetates, all applicable BMPs would be used to minimize sediment delivery.

For detailed analysis, please refer to Attachment C, Water Resources Analysis. For a complete list of Water Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

6. AIR QUALITY:

What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

Logging slash generated would be burned, causing temporary air quality impacts. Under the proposed action, burning within the project area would be short in duration and would be conducted when conditions favored good to excellent ventilation and smoke dispersion as determined by the Montana Department of Environmental Quality and the Montana/Idaho Airshed Group. The DNRC, as a member of the Montana/Idaho Airshed Group, would burn only on approved days. Dust may be created from log hauling on portions of native surface roads during summer and fall months. These impacts would be several miles from the nearest residence and would be short in duration. Direct, indirect, and cumulative effects to air quality due to burning and log hauling are expected to be minimal.

7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

The project area is bordered by USFS and industrial private ownerships. The project area currently is dominated by Mixed Conifer and Western larch/Douglas-fir cover types. Silvicultural prescriptions will promote the conversion to or maintenance of the serial, shade intolerant species that dominated these stands historically. This treatment would assist Libby Unit in meeting its unit wide desired future condition cover types.

Rare plants or cover types listed by the Montana Natural Heritage program have not been found within the project area. There are old-growth stands located within the project area (3.6% of treatment area). Treatments in old-growth stands would retain at least the minimum number of large live trees to be defined as old-growth for the given cover type as specified by Green et al. (1992). There would be no reduction of old growth acres on Libby Unit. An integrated weed management approach would be implemented to limit the potential for the spread and introduction of noxious weeds into the project area.

For detailed analysis, please refer to Attachment D, Vegetative Analysis. For a complete list of Vegetative Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

The project area provides habitat for a variety of wildlife species, including a host of species that require mature forests and/or use snags and coarse woody debris. Deer, elk, and moose likely use the project area most of the year, and winter range exists across portions of the project area. Under the action alternative, approximately 1,423 acres of ponderosa pine, western larch/Douglas-fir, and mixed conifers would be removed, including roughly 370 acres of mature stands with a relatively closed canopy, leading to younger, more open stands on much of that acreage. This would slightly alter habitats for wildlife species requiring mature forests, while enhancing habitats for species needing more open stands of younger forests. This also includes approximately 52 acres that meet the definition of old growth, which would further reduce available habitats for those species requiring those habitats. Present and future deadwood material would be reduced during the proposed timber harvesting; however some snags and snag recruits would be planned for retention in the units. The action alternative would reduce thermal cover on 877 acres (42%) of the 2,102 acres; however, most of those acres were harvested in the recent past and were not providing much thermal cover or snow intercept.

For detailed analysis, please refer to Attachment E, Wildlife Analysis. For a complete list of Wildlife Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

Some grizzly bear and Canada lynx habitats exist in the Poker Hill portion of the project area; the annual home ranges of the Meadow Peak and Wolf Prairie wolf packs includes much of the proposed project area. The action alternative could disturb grizzly bears, but mitigations would largely reduce the effect of disturbance on grizzly bears by avoiding activities during the spring period when grizzly bear use would be the most likely. Hiding cover for bears would be reduced across 1,423 acres, but no changes to security habitats, open road densities, total road densities, or public access would occur. Approximately

81 acres of mostly mature foraging habitats for Canada lynx would be converted to temporary non-lynx habitats in the short-term with the action alternative. Proposed activities could cause slight shifts in use by wolves and their prey, however, no key habitat components are known to exist in the project area and long-term use is not expected to appreciably change.

Potential habitat exists in the project area for fisher, flammulated owls, and pileated woodpeckers. Roughly 8.8 acres of riparian fisher habitats (10%) and an additional 223 acres of potential upland fisher habitats (15%) would be included in the proposed units that would be altered. Most of the 1,423 harvested acres within the project area would be largely too open to be considered pileated woodpecker habitat after proposed harvesting; however many of those acres are already too open to receive much use. At least 302 acres of potential pileated nesting habitats would be removed and an additional 1,005 acres of potential foraging habitats would be removed with the proposed harvesting. Additionally, roughly 1,185 of the 1,550 acres (76%) of flammulated owl habitats would be altered with the proposed harvesting.

For detailed analysis, please refer to Attachment E, Wildlife Analysis. For a complete list of Wildlife Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine effects to historical, archaeological or paleontological resources.

The DNRC staff archaeologist was consulted and concluded there should be no cultural resource concerns. No additional archaeological investigative work is recommended.

See project file, Cultural Resource Analysis, Archeologist findings (e-mail communication).

11. AESTHETICS:

Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

Active forest management is prevalent in this area on adjacent private ownerships. Within the project area, harvested stands would look more open with fewer trees per acre. The proposed project would be expected to have minimal direct, indirect, and cumulative impacts to the aesthetic quality of the area.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:

Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects to environmental resources.

No direct, indirect, or cumulative impacts are likely to occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

There are no other environmental documents that pertain to the project area.

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:

Identify any health and safety risks posed by the project.

Harvesting would result in a short term increase of flashy fuels within the project area from the resulting logging slash, thereby increasing the potential fire hazard. Slash treatments prescribed as part of the action plan would meet or exceed the standards for treating logging slash under the Fire Hazard Reduction Law and associated administrative rules.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

Commercial logging would occur on 1423 acres of state land over a 1-2 year period.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there will be no measurable direct, indirect, or cumulative impacts from this proposed action on employment.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

Due to the relatively small size of the timber sale program, there will be no measurable direct, indirect, or cumulative impacts from this proposed action on tax base or revenues.

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

There will be no measurable direct, indirect, or cumulative impacts related to demand for government services due to the relatively small size of the timber sale program.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

The DNRC operates under the State Forest Land Management Plan (SFLMP, DNRC 1996) and Administrative Rules for Forest Management (ARM 36.11.401 through 450, DNRC 2003). The SFLMP established the agency's philosophy for management of forested trust lands. The Administrative Rules provide specific guidance for implementing forest management projects.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

The area is used infrequently for hiking, hunting, cross-country skiing, snowmobiling and general recreating. Currently there are open and closed roads throughout the project area. There would be no change in road closure status and the selection of either alternative would not affect the ability of people to recreate on this parcel.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing.

There will be no measurable direct, indirect, or cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

The communities and lifestyles of this area have traditionally been and still are dependent on forest management and timber production for employment and other benefits received from this type of land use and management. The action alternative would be consistent with current and traditional lifestyles in this area.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

No direct, indirect, or cumulative impacts related to cultural uniqueness and diversity would be expected under either alternative.

See project file, Cultural Resource Analysis, Archeologist findings (e-mail communication).

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, terms of sale, or anything that could affect a buyer's willingness to pay for.

No Action: Implementing the No Action alternative would not generate revenue to the trust.

Action: The timber harvest would generate additional revenue for the Common Schools Trust. The estimated return to the trust for the proposed harvest is $270,000 based on an estimated harvest of 5,000 thousand board feet (38,770 tons) and an overall stumpage value of $6.95 per ton. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute estimates of return.

EA Checklist Prepared By:	**Name:** Jeremy Rank	**Date:** 5/08/09
	Title: Management Forester	

V. FINDING

25. ALTERNATIVE SELECTED:

Upon review of the Checklist EA and appendices I find Action Alternative as proposed meets the intent of the project objectives as stated on page 1, Type and Purpose of Action. It complies with all pertinent environmental laws, DNRC State Forest Land Management Plan, and a consensus of professional opinion on limits of acceptable environmental impact. The No Action Alternative does not meet the project objectives. For these reasons I have selected the Action Alternative for implementation on this project.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

After a thorough review of the scoping documents, Department policies, standards, guidelines, and the State Forest Land Management Plan (SFLMP), I find all the identified resource management concerns have been fully addressed in this Checklist EA and its appendices. Specific mitigation measures for each resource concern are listed in Appendix F. The action alternative provides for income to the trusts and promotes the development of a healthy, biologically diverse, and productive forest. It also provides the opportunity to improve access and road maintenance within the project area. I find there will be no significant impacts as a result of implementing the action alternative. Specific project design features and various resource management specialist recommendations have been implemented to ensure that this project will fall within the limits of acceptable environmental change and result in no significant effects.

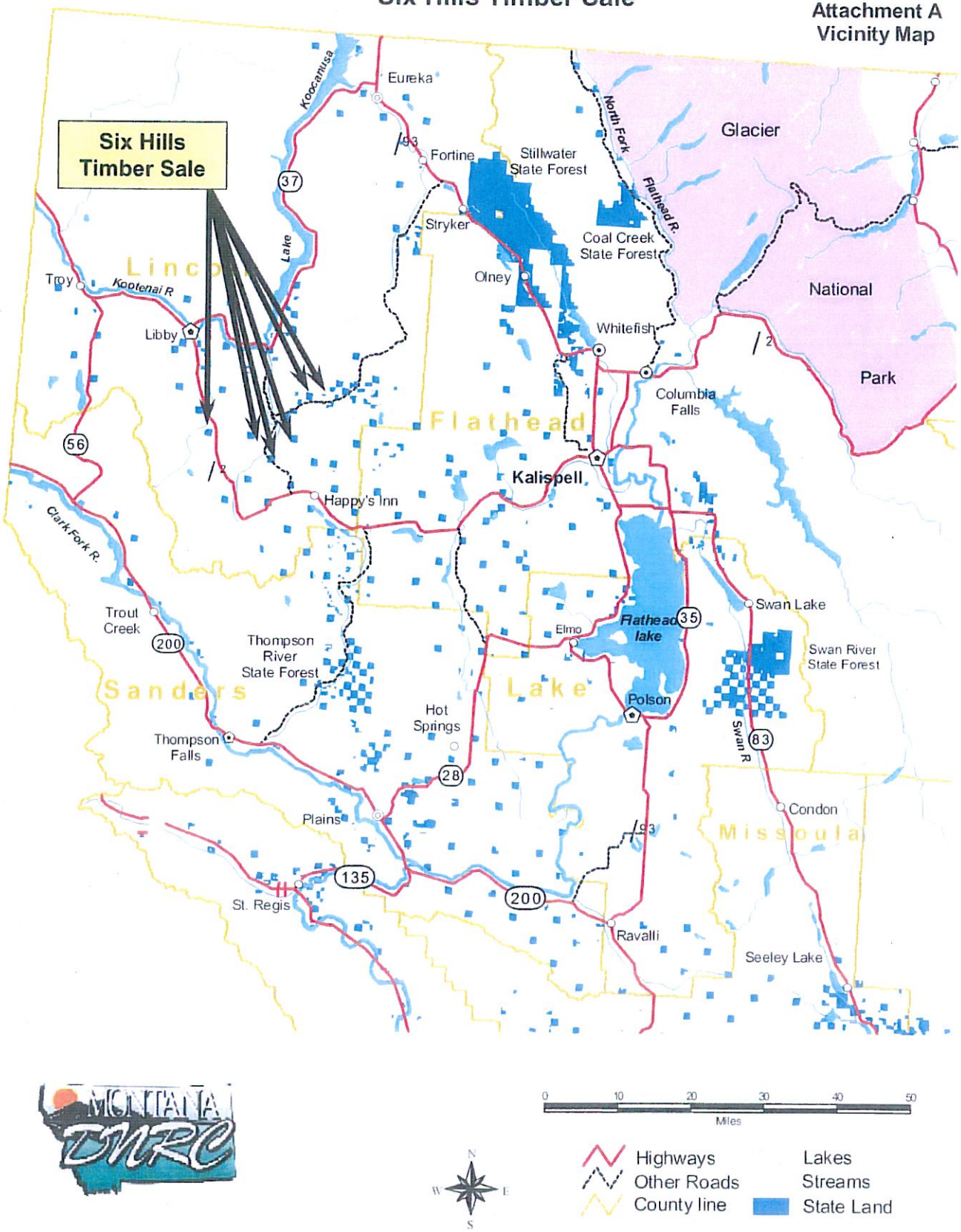
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

[ ] EIS	[ ] More Detailed EA	[X] No Further Analysis

EA Checklist Approved By:	**Name:**	John Shotzberger
	Title:	Libby Unit Manager
Signature: /s/John Shotzberger	**Date**:	5/11/09

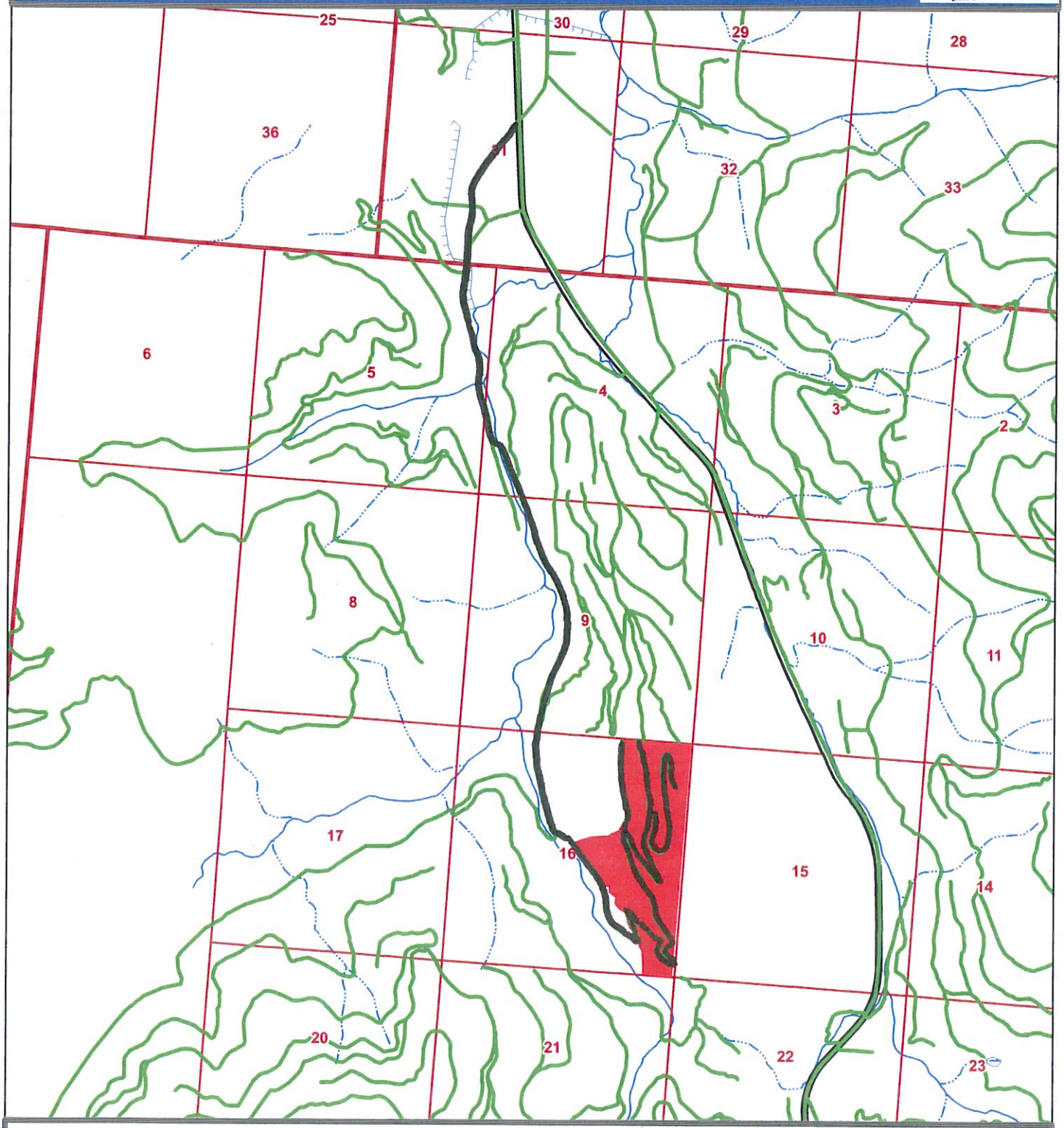
Six Hills Timber Sale

Attachment A
Vicinity Map



Six Hills Timber Sale
Harvest Plan for Poker Hill

T28N R30W sec. 16



Legend

Roads

Poker Hill harvest unit P16-1

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

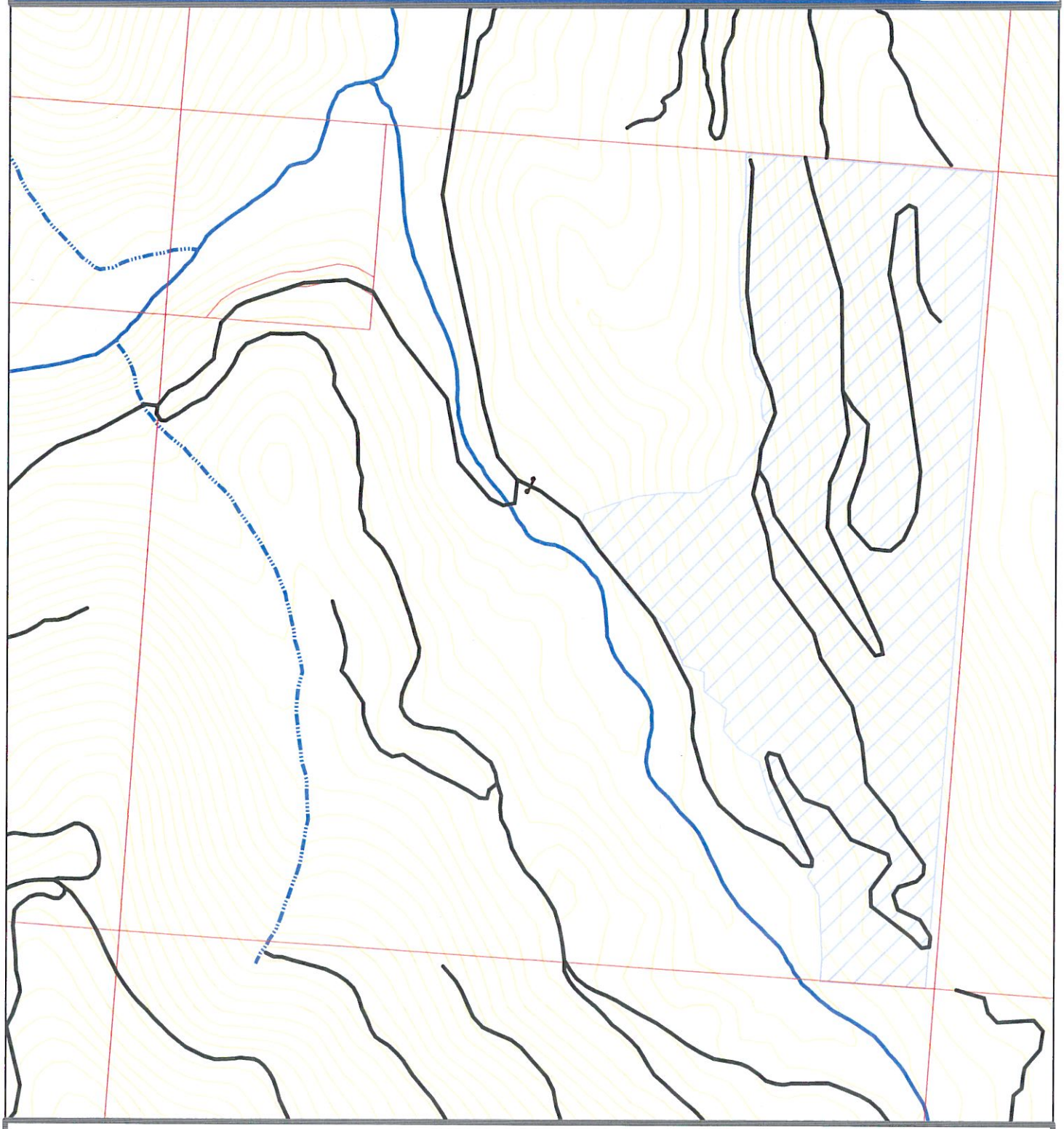
N

0 0.3 0.6 0.9 1.2 Miles

1:37,778

Six Hills Timber Sale
Harvest Plan for Poker Hill

T28N R30W sec. 16



Legend

— Roads

Poker Hill harvest unit P16-1

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

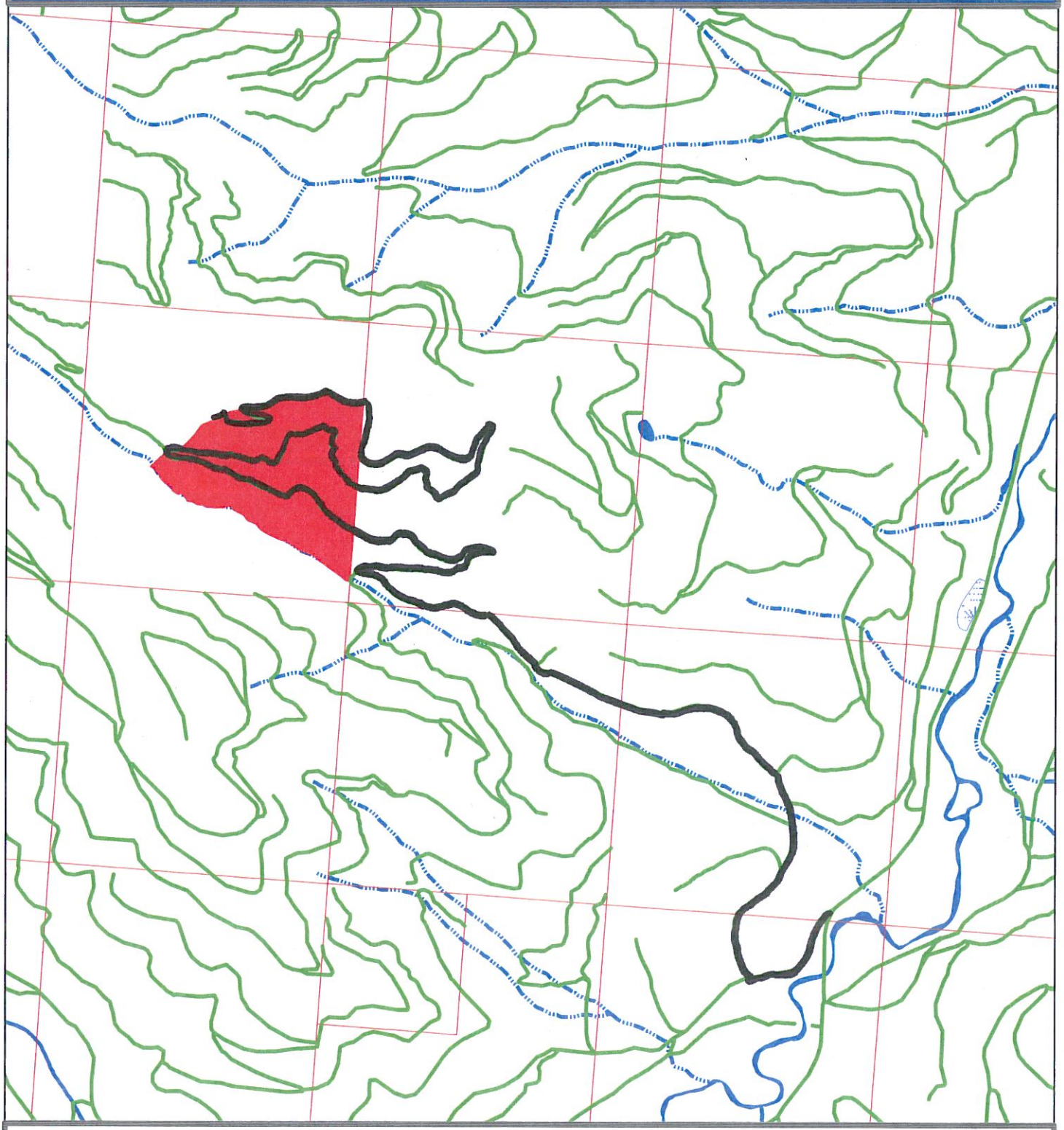
0 0.08 0.16 0.24 0.32 Miles

1:10,785

N

Six Hills Timber Sale
Harvest Plan for Harris Creek

T28N R29W sec. 16



Legend

Roads

Harris Creek harvest units

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

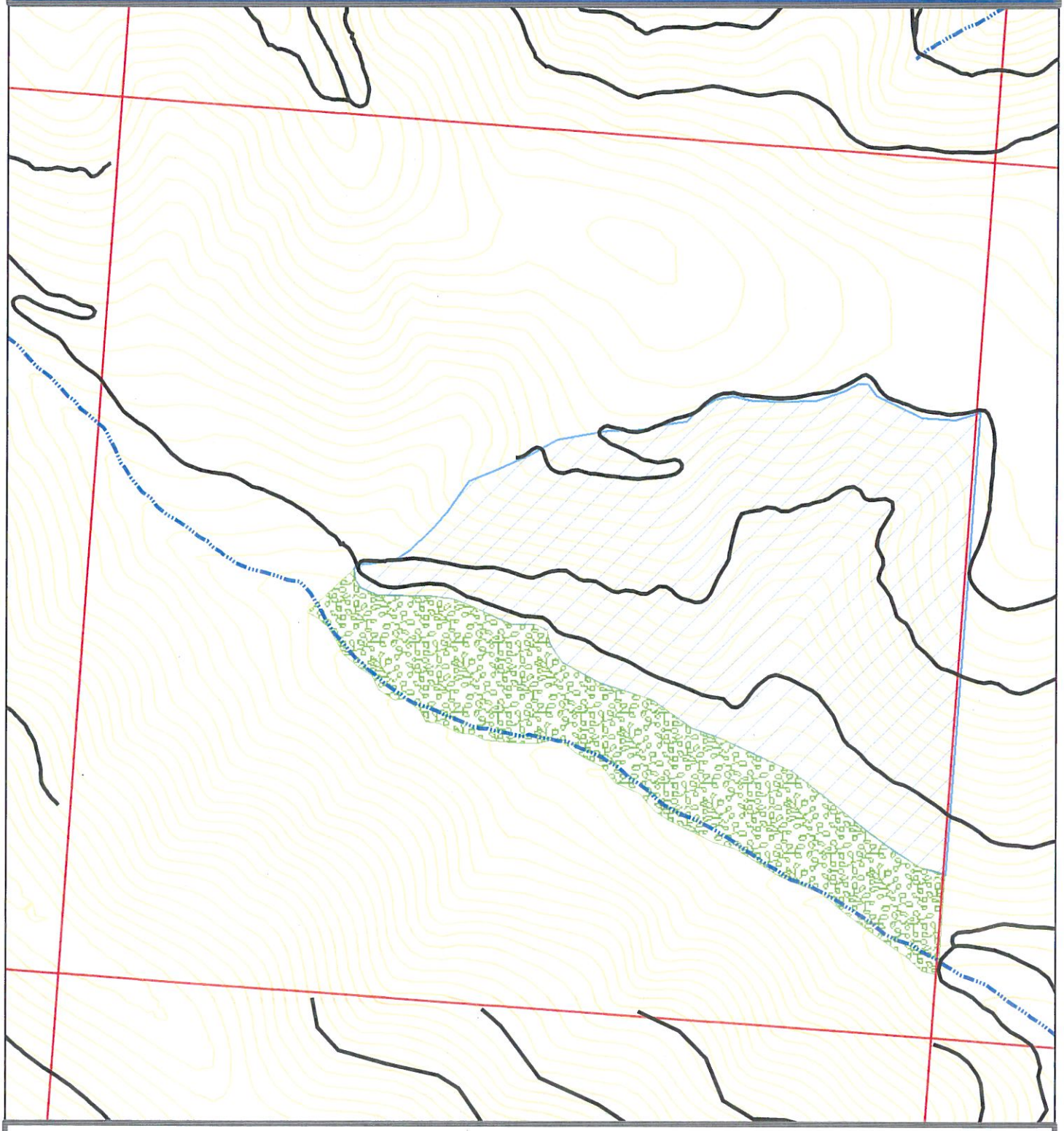
0 0.25 0.5 0.75 1 Miles

1:31,565

N

Six Hills Timber Sale
Harvest Plan for Harris Creek

T28N R29W sec. 16



Legend

- Roads
- Harris Creek Harvest: H16-1
- Harris Creek harvest: H16-2

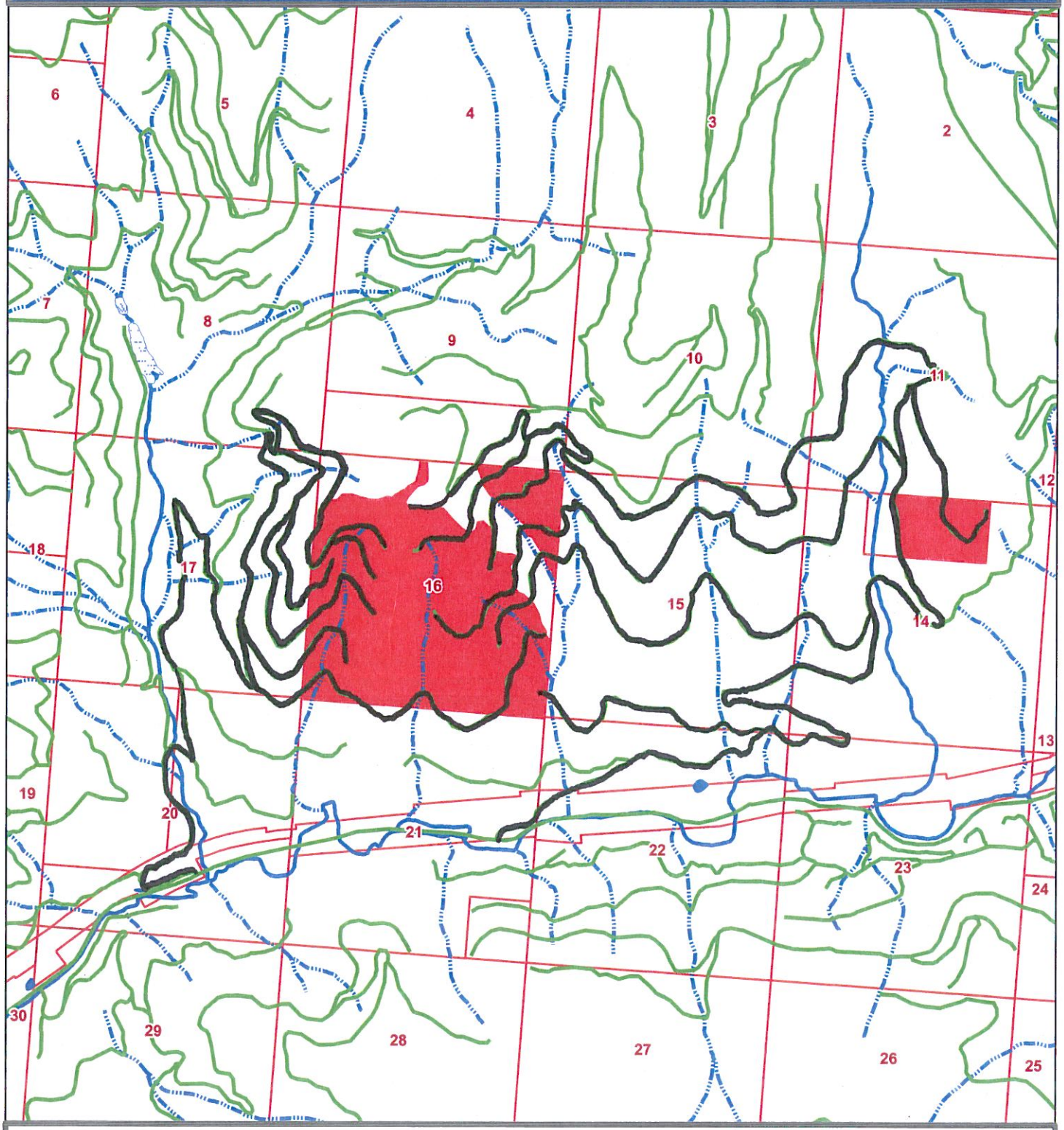
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

0 0.08 0.16 0.24 0.32 Miles
1:10,090

N

Six Hills Timber Sale
Harvest Plan for Richards and Backus

T29N R28W sec. 14 & 16



Legend

Roads

Six Hills harvest units

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

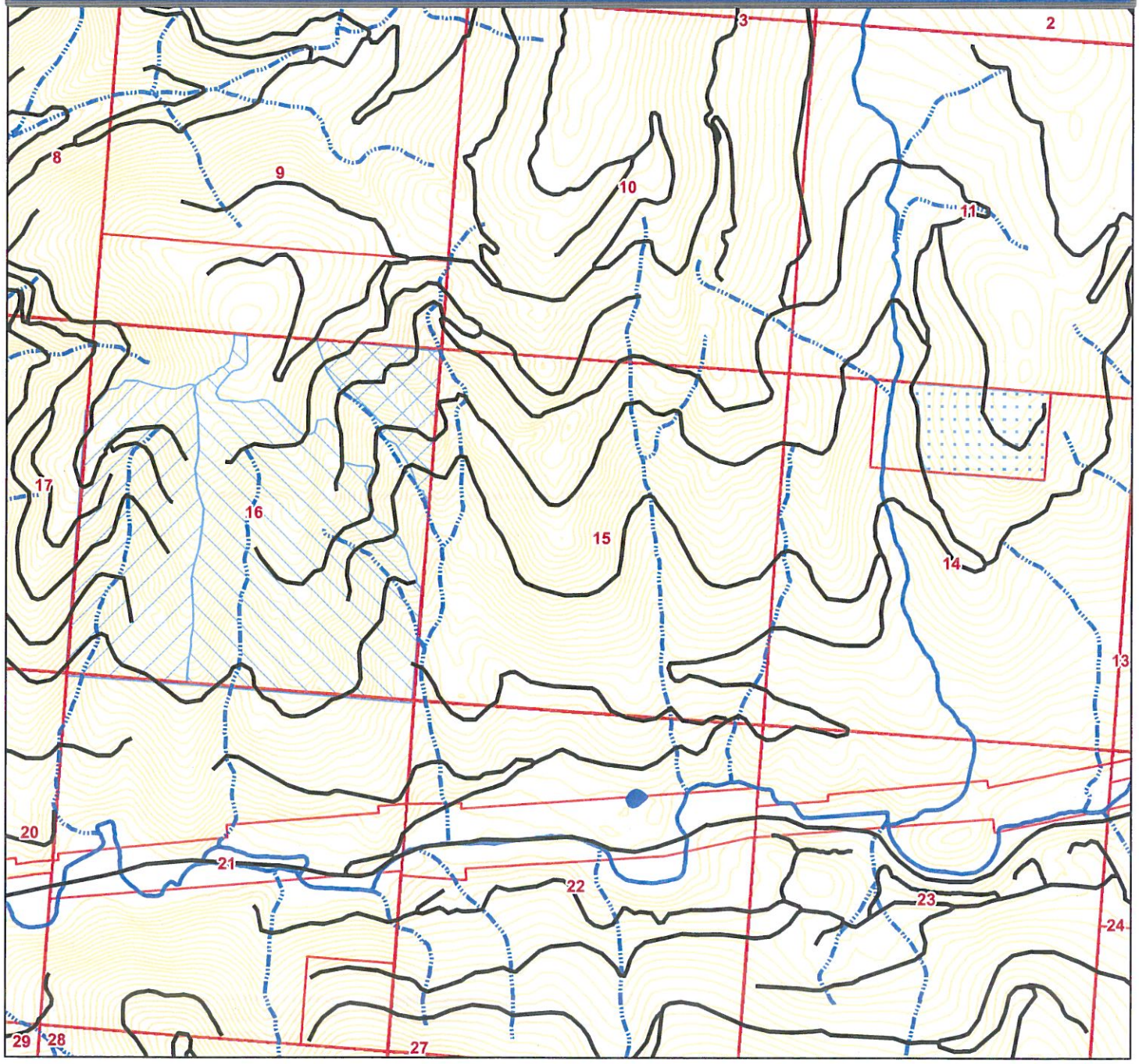
0 0.3 0.6 0.9 1.2 Miles

1:36,000

N

Six Hills Timber Sale
Harvest Plan for Richards and Backus

T29N R28W sec. 14 & 16



Legend

- Roads
- Richards harvest unit R16-1
- Richards harvest unit R16-2
- Richards harvest unit R16-3
- Backus harvest unit B14-1

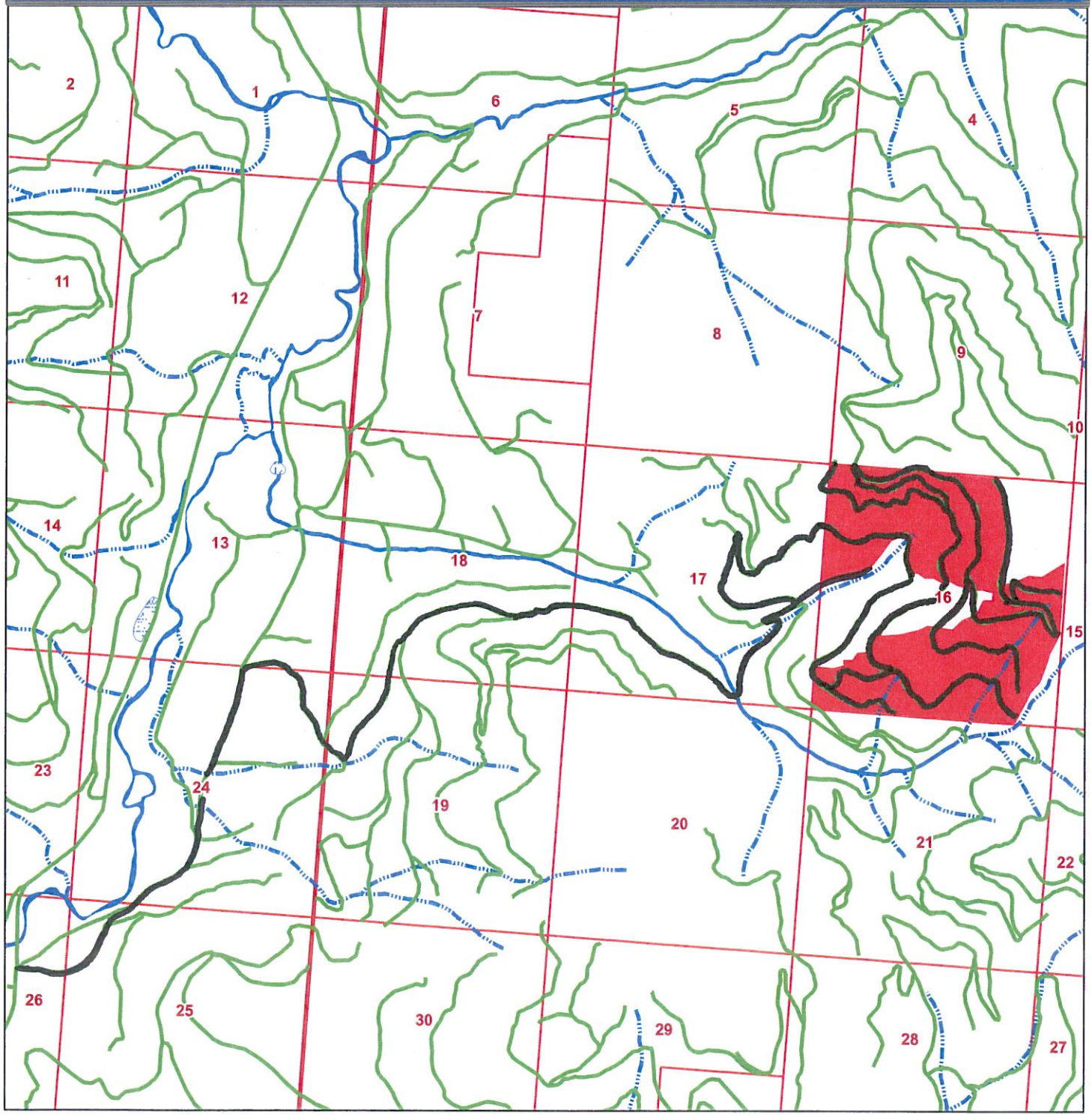
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

0 0.2 0.4 0.6 0.8 Miles
1:27,000

N

Six Hills Timber Sale
Harvest Plan for Snell

T28N R28W sec. 16



Legend

Roads

Six Hills harvest units

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

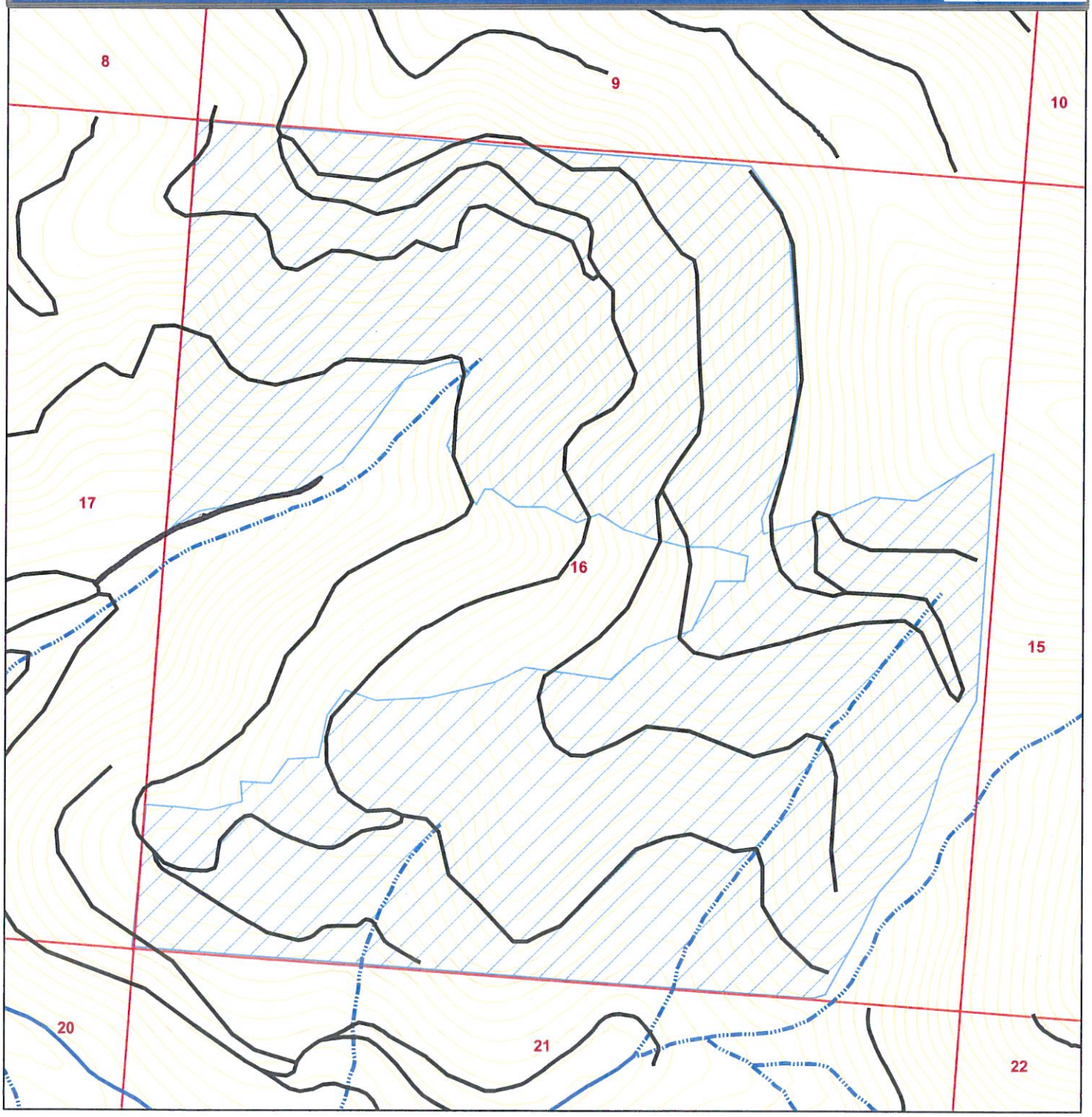
0 0.25 0.5 0.75 1 Miles

1:37,176

N

Six Hills Timber Sale
Harvest Plan for Snell

T28N R28W sec. 16



Legend

Roads

Snell harvest unit: S16-1

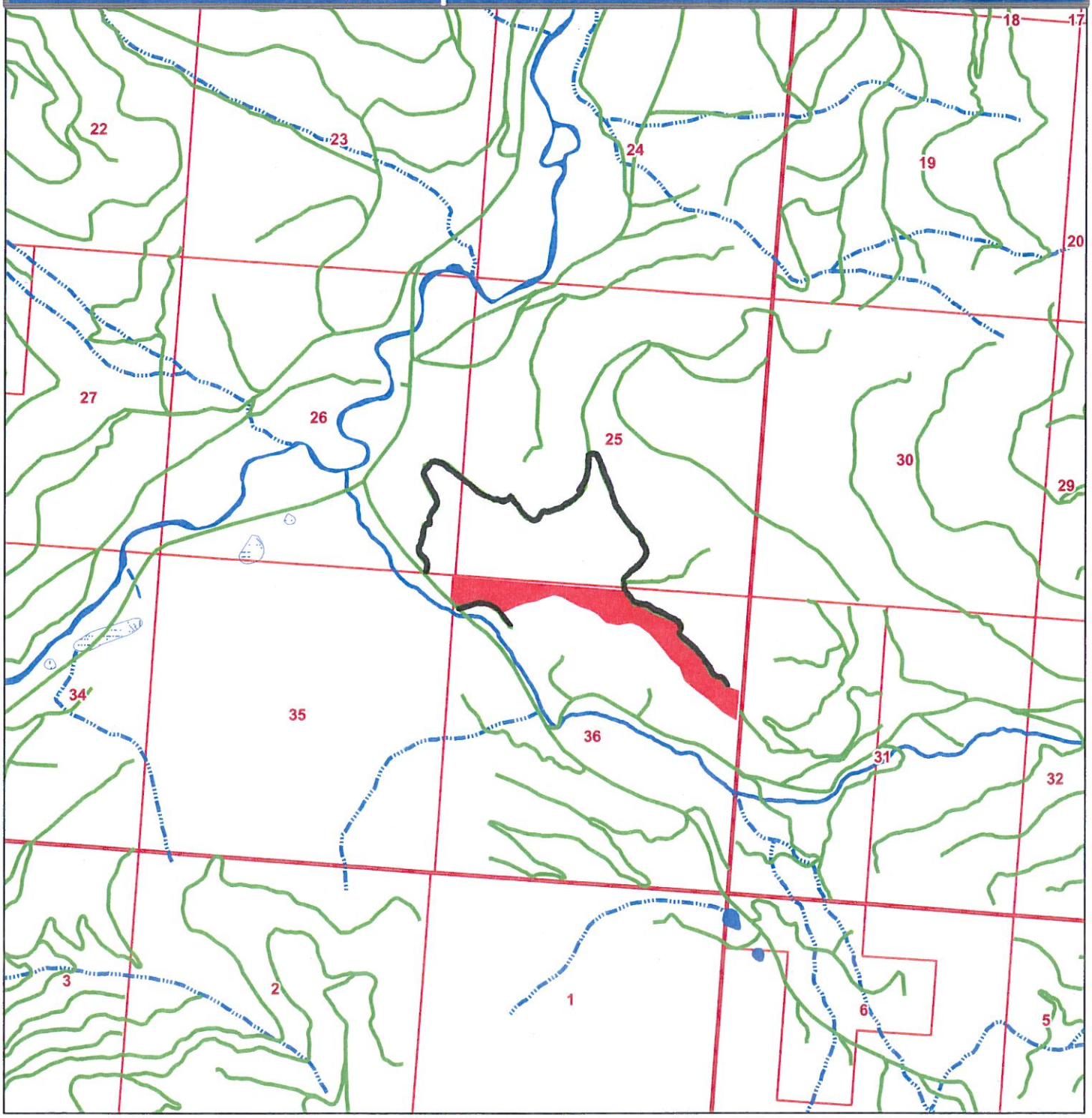
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

0 0.08 0.16 0.24 0.32 Miles
1:10,958

N

Six Hills Timber Sale
Harvest Plan for McKillop

T28N R29W sec. 36



Legend

Roads

Six Hills harvest unit

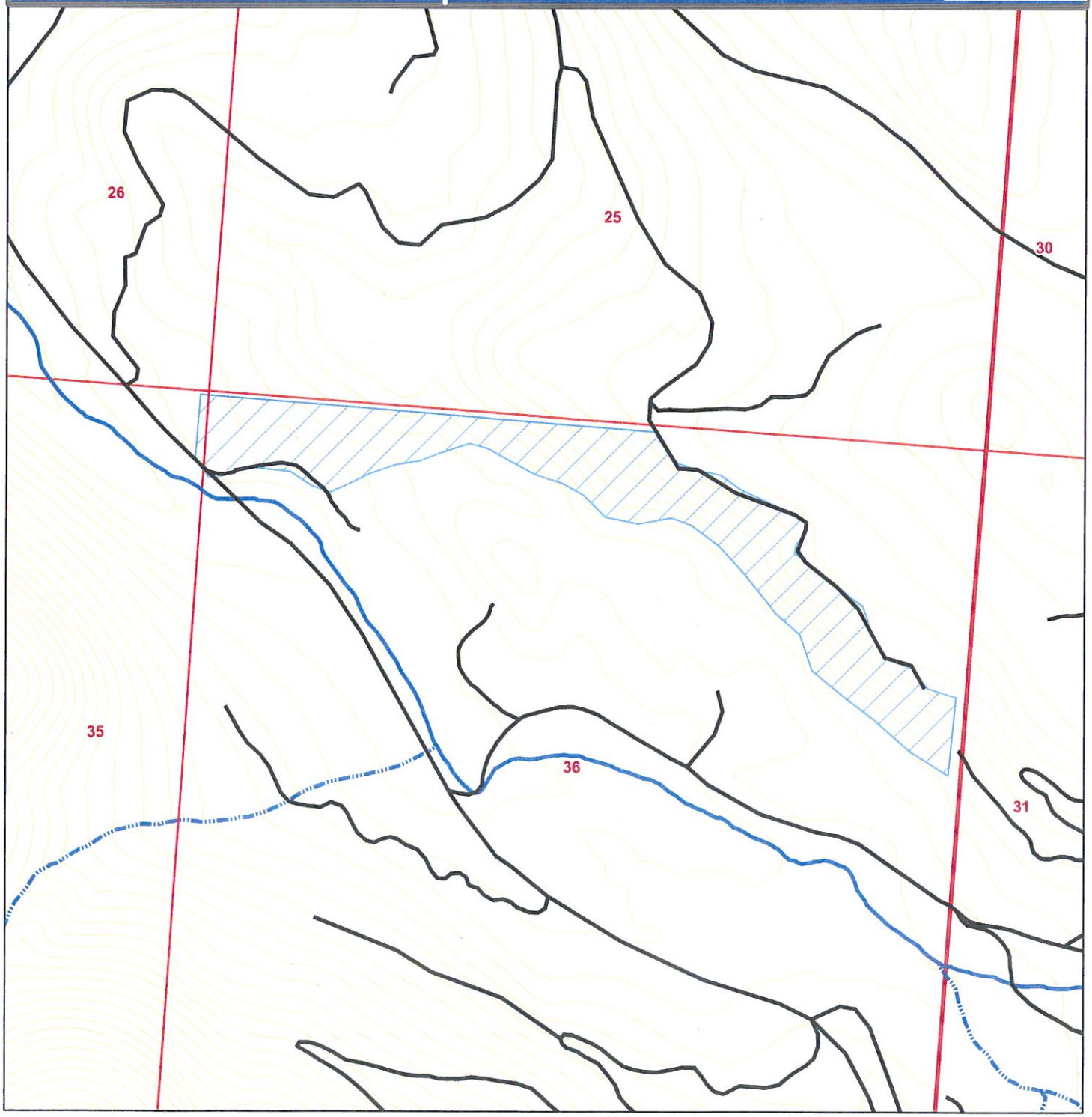
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

N

0 0.3 0.6 0.9 1.2 Miles

Six Hills Timber Sale
Harvest Plan for McKillop

T28N R29W sec. 36



Legend

Roads

McKillop harvest unit: M36-1

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Libby Unit

N

0 0.1 0.2 0.3 0.4 Miles

SIX HILLS TIMBER SALE PROPOSAL
SOILS ANALYSIS
3/25/09

INTRODUCTION

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding soil impacts. The following issue statement was developed regarding the potential effects of the proposed timber harvesting:

> *Timber harvesting activities may result in reduced soil productivity and increased erosion due to compaction and displacement.*

ANALYSIS AREA

The project area for this proposal includes approximately 3,240 acres. However, harvest units are only proposed on 1,439 of these acres. The analysis area for soil impacts will be the area within harvest units and where proposed road activities would take place. This analysis area will adequately allow for disclosure of existing conditions, direct, indirect, and cumulative impacts. This analysis also looks at cumulative effects for the entire project area.

ANALYSIS METHODS

Methods for disclosing impacts include using general soil descriptions and the management limitations for each landtype. *Landtype* refers to a unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. This analysis will qualitatively assess the risk of negative effects to soils from erosion, compaction and displacement from each alternative using insight from previously collected soils monitoring data from over 70 DNRC postharvest monitoring projects.

While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.

EXISTING CONDITIONS

GENERAL CONDITIONS

The *Soil Survey of Kootenai National Forest Area, Montana and Idaho* (USFS, 1995) combines landform and soil information with habitat types to inventory and map soils in the project area. Nine landtypes were identified in the project area; activities are proposed on seven of these landtypes, therefore only seven landtypes will be discussed. Additional information for all landtypes is available in the project file. *TABLE S-1 - PROJECT AREA LANDTYPE DESCRIPTIONS* provides a brief description of the landtypes affected within the project area while *FIGURES S1* through *S6* provides a visual depiction of the all landtype locations in the project areas.

This portion of the Libby Unit, like much of northwest Montana, is dominated by bedrock consisting of metasedimentary rocks from the Proterozoic age. Rocks in this formation are generally comprised of argillites, quartzites, and siltites. Surface deposits of glacial till, outwash, and lacustrine sediments can be found throughout the area. Overlying these sediments is a layer of loess that has been influenced by volcanic ash deposited and redeposited from Mount Mazama approximately 6,800 years ago (USFS, 1995).

The project area is predominately located glaciated mountain sideslopes and ridges although some limited areas of lacustrine and glacial outwash deposits can be found on terraces. Low-order drainageways are typically widely spaced.

Attachment B

Figures S1 through S6: Landtypes in the Six Hills Project Area

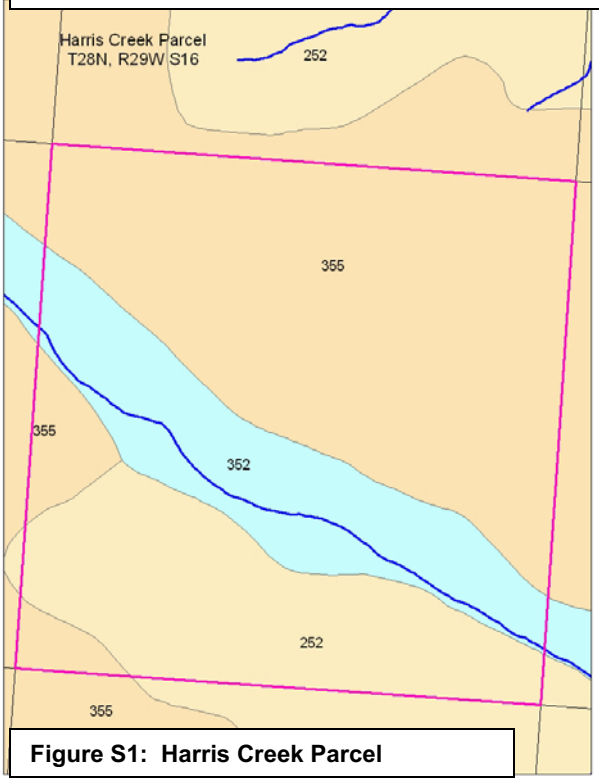


Figure S1: Harris Creek Parcel

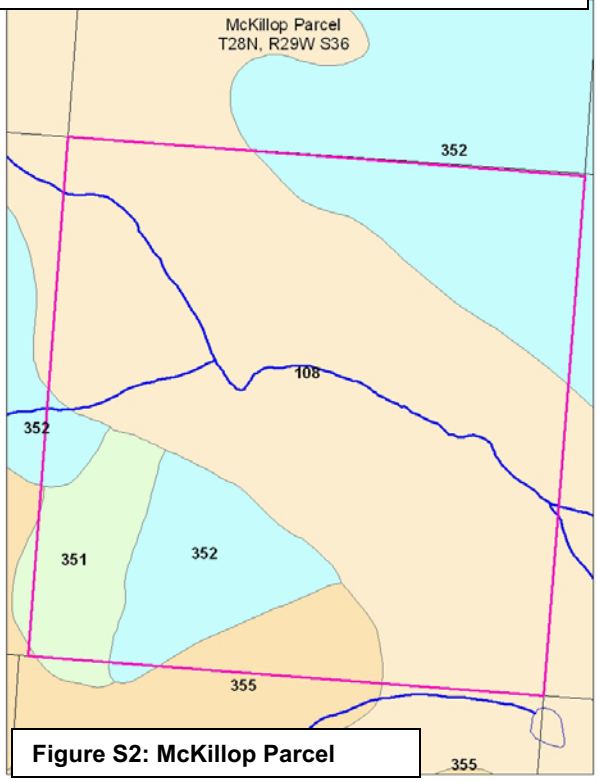


Figure S2: McKillop Parcel

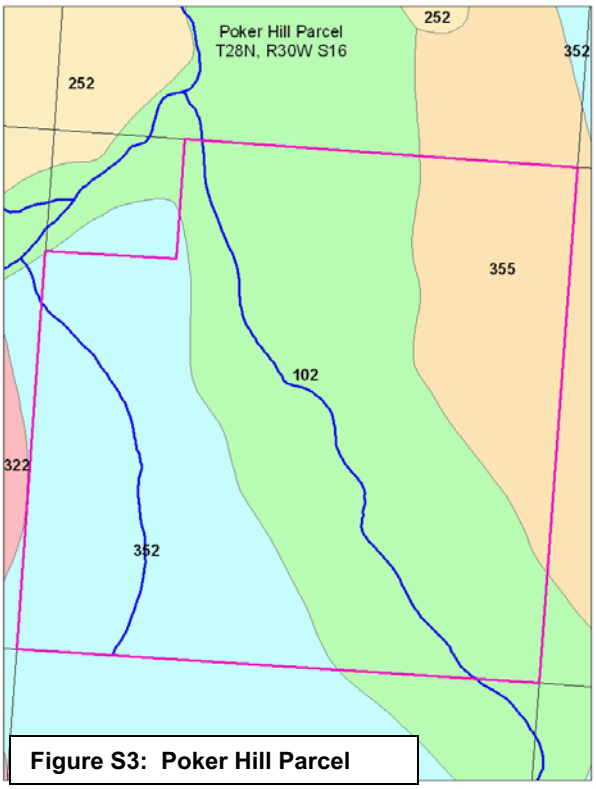


Figure S3: Poker Hill Parcel

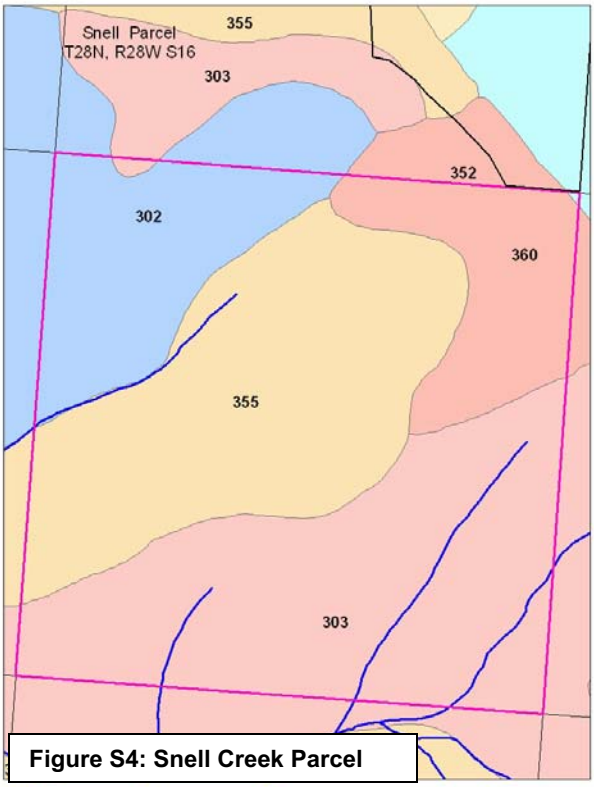


Figure S4: Snell Creek Parcel

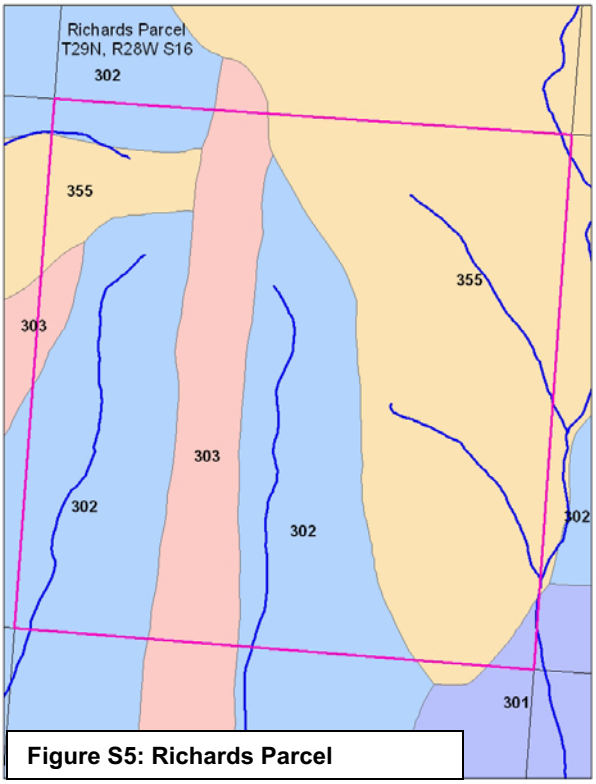


Figure S5: Richards Parcel

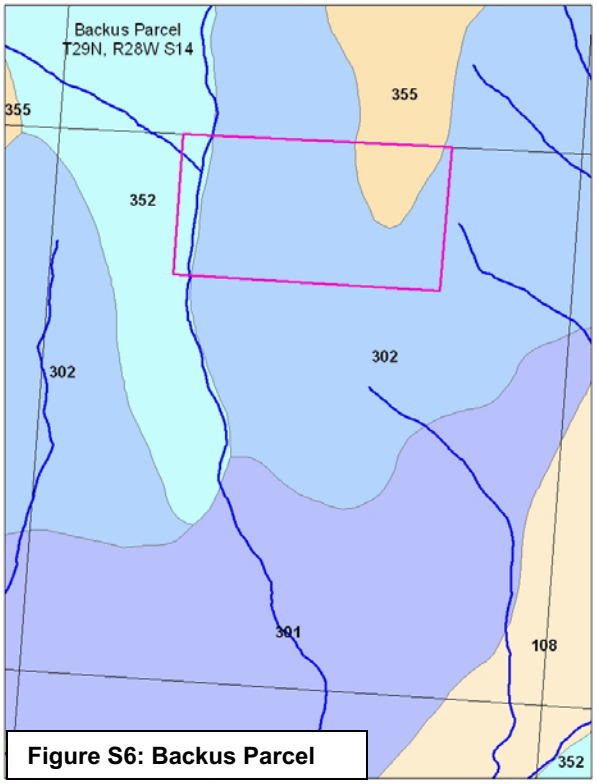


Figure S6: Backus Parcel

Existing Condition due to past Management Activities

DNRC strives to maintain soil productivity by limiting cumulative soil impacts to 15 percent or less of a harvest area, as noted in the State Forest Management Plan (*DNRC, 1996*). As a recommended goal, if existing detrimental soil effects exceed 15 percent of an area, proposed harvesting should minimize any additional impacts. Harvest proposals on areas with existing soil impacts in excess of 20 percent should avoid any additional impacts and include restoration treatments, as feasible, based on site-specific evaluation and plans.

A review of the section record cards at the Northwestern Land Office in Kalispell indicated that past harvesting operations in the *project area* includes small harvests in the 1950's and 1960's. The first large harvesting in the project area occurred in the Poker Hill parcel in 1973 when approximately 2.4 mmbf was removed. In the 1980's, all of the parcels in the project area were harvested to salvageable timber affected by the mountain pine beetle. These timber sales included the Richards-Horse Timber Sale, Poker Smoke Timber Sale, Wolf-Fisher Timber Sale and others. These salvage sales were the first large (>100 mbf) timber harvest in the Snell Creek, Richards and Harris Creek parcels. Smaller forest product removals include small salvage harvests; post-and-pole harvests; firewood gathering and individual Christmas tree harvesting throughout the last 60+ years.

While many of the skid trails and roads are still discernable, vegetation similar to the surrounding vegetation is generally present and growing. Through the freeze-thaw cycles and root mass penetrating the soil, impacts from past entries are reduced.

Past monitoring on DNRC timber sales from 1988 to 2006 has shown an average of 13.1 percent soil impacts across all parent materials. The majority of soils in the project area are comprised of gravelly silty loams from glacial till. Stratifying the results by texture similar to the majority of the proposed harvesting shows an average of approximately 11.5 percent of the harvest areas impacted by displacement and severe compaction (*DNRC, 2004*).

When winter harvesting is implemented on these areas, the impacts are typically less than summer operations due to frozen soils being more difficult to compact or displace. However, in this particular

situation, winter harvest operations on similar soils shows an average of 13.2 percent of the harvest area impacted by displacement or severe compaction (DNRC 2004).

Cumulative effects from past and current uses on the *proposed harvest units* are limited, although soils were monitored in the Poker Hill parcel in 1989. The impacts following the last harvest in there estimated 5.3 percent of the harvest area with displacement or severe compaction.

Although ground-based harvesting is a preferred method of timber harvest on feasible slopes, much of the project area is more suited to cable yarding techniques. Although data is limited on the impacts of cable yarding associated with DNRC timber sales, soil monitoring on seven harvest units that employed cable yarding systems found that ground disturbance average 7.0 percent with a range of 2.7 to 11.4%.

TABLE S-1 - PROJECT AREA LANDTYPE DESCRIPTIONS

Landtype	Parcels	Name	Soil & Vegetation Descriptions	Management Considerations			
				K factor**/ erosion potential	Timber	Roads	Comments
102	Poker Hill	Lacustrine Terraces 0-15% slopes Elev: 2,000-3,700 ft	Soils have a surface layer of loess influenced by volcanic ash 4-14 inches thick overlying silt loam and silty clay loam glacial lake deposits. Rock content is generally less than 15 percent. Vegetation is characteristic of a moist, mixed forest with western red cedar, western hemlock, grand fir and Douglas-fir over a forest understory dominated by shrubs and forbs.	0.28 for whole soil 0.28 for <2mm fraction	Potential Prod: Mod - High Equipment: Tractor unless wet areas are identified. Regen: Can be limited by frost pockets or frost heaving.	Roadcuts along terraces prone to slumping. Ruts form readily during wet weather on unsurfaced roads. Crusted surface soils may limit revegetation after construction.	Sediment delivery efficiency is low due to the gentle topography. Fine silt material can be damaging to fish spawning gravels. Drainage on the terraces consists of short, deeply incised draws or streams.
108	McKillop	Lacustrine-Glacial Outwash Terraces 0-15% slopes Elev: 2,000-4,000ft	The surface soils and vegetation is similar to Landtype 102, however the subsoils in this landtype consist of stratified glacial outwash of sand and gravels as well as the silt loam and silty clay loam from glacial lake sediment.	0.28 for whole soil 0.28 for <2mm fraction	Potential Prod: High Equipment: Tractor unless wet areas are identified. Regen: Can be limited by frost pockets or frost heaving.	Roadcuts along terraces prone to slumping. Ruts form readily during wet weather on unsurfaced roads with silty surfaces. Road with higher cobble contents tend to become rough if finer material is eroded.	Sediment delivery efficiency is low due to the gentle topography. Fine silt material can be damaging to fish spawning gravels. Terraces tend to have no drainage features due to the well-drained subsoils.
302	Snell Cr Richards Cr Backus Cr	Glaciated mountain slopes 30-60% slopes Elev: 3,000-4,200 ft	Soils in this landtype generally have a very gravelly, very fine sandy loam surface horizon overlying a compacted glacial till subsoil. Rock fragments may comprise up to 50% of the subsoil. Vegetation is typically a dry Douglas-fir habitat type with lesser amounts of ponderosa pine, western larch and lodgepole pine. The understory is dominated by shrubs.	0.05 for Whole soil 0.20 for <2mm	Potential Prod: Moderate Equipment: Tractor and cable yarding dependent upon slope. Regen: can be limited by droughtiness	Roadcuts along terraces prone to slumping. Road with higher cobble contents tend to become rough if finer material is eroded.	Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Woody debris is an important component to maintain soil fertility in this landtype. Surface drainage features are widely spaced.
303	Snell Cr Richards Cr	Glaciated mountain ridges 15-35% slopes Elev: 3,500-4,700 ft	Soils in this landtype are formed mostly in material weathered from metasedimentary rocks with some glacial till overlying bedrock in some locations. Rock outcroppings are common. Surface soils are shallow in this landtype with bedrock typically present within 24 inches of the surface. Surface soils are a very cobbly sandy loam about 6 inches thick. Vegetation is typically Douglas-fir and lodgepolse pine interspersed with grasslands. Northern aspects generally have a higher productivity.	0.05 for Whole soil 0.20 for <2mm	Potential Prod: very low Equipment: Tractor, although rock outcroppings limits operability. Regen: Can be limited by shallow soils and droughtiness.	Roads are difficult due to hard rock. Cut and fill material is extremely stony. Roads are rough due to the large stones and cobbles. Droughtiness limits revegetation.	Due to the amount of rock in this landtype, sediment delivery efficiency and erosion is limited. Surface drainage systems are very rare to non-existent.

352	Harris Cr McKillop	Glaciated mountain slopes 20-60% slopes Elev: 2,200-5,600 ft	Compacted glacial till underlies a volcanic-ash influence loess surface layer up to 14 inches thick. The lower surface soils may have rock fragments that comprise up to 50% of the content. Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine and grand fir. The understory is dominated by forbs and low-growing shrubs.	0.15 for whole soil 0.28 for <2mm	Potential Prod: High Equipment: Tractor and cable systems dependent upon slope.	Cutbanks formed during road construction can slough if too steep. Tread erosion of fine material will leave a rough cobbly surface. Crusted surface soils may limit revegetation after construction	Erosion hazard and sediment delivery efficiency is moderate. Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Surface drainage features are widely spaced
355	Poker Hill Harris Cr Snell Cr Richards Creek Backus Creek	Glaciated mountain slopes 20-50% slopes Elev: 3,000-5,500 ft	Soils in this landtype are very similar to Landtype 352, except for rock outcrops may occupy up to 20% of this landtype. Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine and grand fir. The understory is dominated by forbs and shrubs.	0.15 for whole soil 0.28 for <2mm	Potential Prod: High except in areas of rock outcrops Equipment: Tractor, although rock outcroppings limits operability	Roads are difficult due to hard rock. Cutbanks formed during road construction can slough if too steep. Tread erosion of fine material will leave a rough cobbly surface. Droughtiness limits revegetation.	Erosion hazard and sediment delivery efficiency is moderate. Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Surface drainage features are widely spaced
360	Snell Cr	Glaciated mountain ridges 15-35% slopes Elev. 4,500-6,000 ft	Soils in this landtype are generally up 4 to 20 inches thick overlying bedrock. The surface layer is influenced by volcanic ash. Soils angular rock fragments in the subsoil ranges up to 70%. Rock outcrops make up around 60% of the landtype. Vegetation is scattered subalpine fir, lodgepole with lower amounts of Englemann spruce. The understory is forbs and low-growing shrubs.	.15 for whole soil 0.28 for <2mm	Potential Prod: very low in forested areas. This is limited due to the shallow bedrock. Equipment: Tractor, although rock outcroppings limits operability	Roads are difficult due to hard rock. Unsurfaced roads are rough due to the large rock. Droughtiness severely limits regeneration on cutslopes.	Almost no surface drainageways are found on the mountain ridges.

***Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. (NRCS, 1996)*

ENVIRONMENTAL EFFECTS
DESCRIPTION OF ALTERNATIVES

- *No-Action Alternative*
  No timber harvesting or associated activities would occur under this alternative.

- *Action Alternative*
  Nine units totaling approximately 1,439 acres would be commercially harvested under this alternative. Approximately 659 acres of the proposal would be suitable for ground-based harvesting; the remaining 780 acres would require cable yarding methods. While no new road construction is proposed three stream crossing replacement would be implemented and approximately 62.3 miles of road would be maintained or have minor drainage improvements installed as necessary to protect water quality. Although no seasonal limitations would be imposed, it is assumed that all of the work would be completed during dry conditions instead of during the winter.

ALTERNATIVE EFFECTS

- *Direct and Indirect Effects of the No-Action Alternative on Soils*
  No timber harvesting or associated activities would occur under this alternative. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases.

- *Direct and Indirect Effects of the Action Alternative on Soils*
  To provide an adequate analysis of potential impacts to soils, a brief description of implementation requirements is necessary. *ARM 36.11.422 (2)* and *(2)(a)* state that appropriate BMPs shall be determined during project design and incorporated into implementation. To ensure that the incorporated BMPs are implemented, the specific requirements would be incorporated into the DNRC Timber Sale Contract. As part of this alternative design, the following BMPs are considered appropriate and, therefore, would be implemented during harvesting operations:

  1) Limit equipment operations to periods when soils are relatively dry, (less than 20 percent), frozen, or snow-covered to minimize soil compaction and rutting and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

  2) On ground-based units, the logger and sale administrator will agree to a general skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) would not be used and may be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

  3) Tractor skidding should be limited to slopes of less than 40 percent unless the operation can be completed without causing excessive erosion. Based on site review, short, steep slopes above incised draws may require a combination of mitigation measures, such as adverse skidding to a ridge or winchline skidding from more moderate slopes of less than 40 percent.

  4) Keep skid trails to 20 percent or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrently with operations.

  5) Slash disposal - Limit the combination of disturbance and scarification to 30 to 40 percent of the harvest units. No dozer piling on slopes over 35 percent; no excavator piling on slopes over 40 percent unless the operation can be completed without causing excessive erosion. Consider lopping and scattering or jackpot burning on the steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.

  6) Retain 10 to15 tons of large woody debris and a majority of all fine litter feasible following harvesting. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

  Considering data from the *DNRC SOIL MONITORING REPORT (DNRC, 2004)*, the implementation of Forestry BMPs has resulted in less risk of detrimental soil impacts from erosion, displacement, and severe compaction. While the report noted that the impacts were more likely on the fine-textured

soils and steep slopes, reduced soil productivity due to compaction and displacement may occur on coarser parent materials similar to those found in the state parcels. Also, the greatest impacts were noted where harvesting implementation departed from BMPs, such as limiting ground-based skidding to slopes of 40 percent or less.

Comparing the soil type map, field reconnaissance notes and topographic map features with the proposed harvest unit map indicates that under this alternative ground-based skidding would occur on a majority of the proposed harvest area. The extent of impacts expected would likely be similar harvest areas monitored by DNRC and reported in the monitoring report *(DNRC, 2004)*, or approximately 11.5% percent of the ground-based harvest area and 7% of the cable harvesting area. Potential impacts to soils from cable yarding would generally be displacement, although some compaction could occur. In addition, cable corridors may pose a slight risk of routing water because the corridor is generally parallel to the fall-line of the hill slope. *TABLE ST-2 – EXPECTED ACRES OF IMPACT TO SOIL FROM COMPACTION AND DISPLACEMENT* summarizes the expected impacts to soils within harvest units.

TABLE ST-2 - EXPECTED ACRES OF IMPACT TO SOIL FROM COMPACTION AND DISPLACEMENT

HARVEST METHOD	NO-ACTION ALTERNATIVE	ACTION ALTERNATIVE
Ground based-summer harvest (659) acres with up to 11.5 percent harvest area impacts)	0	75.8 acres
Cable (780 acres with up to 7 percent of the harvest area impacts)	0	54.6 acres
Total area of impacts (acres)	0	130.4
Total harvest acres	0	1439 acres
Percent of area impacted	0	9.1 percent

As vegetation begins to establish on the impacted areas and freeze-thaw cycles occur, the area of reduced productivity would decrease.

- *Cumulative Effects of the Action Alternative to Soils*

On a project area analysis, DNRC estimates that approximately 130.4 acres of land may be impacted, however, most of this area has been previously used for skid trails, line corridors and landings during past harvesting. Previous harvest was estimated to have impacts similar to monitored sites with similar parent materials. As discussed earlier, this was estimated at 11.5% of the harvest area for ground-based units and 7% for cable-yarded units. Future harvesting opportunities would likely use the same road system, skid trails, and landing sites to reduce additional cumulative impacts

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15 percent of the harvest units (as recommended by the SFLMP) through implementation of BMPs, skid trail planning on tractor units, and limiting operations to dry or frozen conditions.

After considering the existing condition due to management activities and the expected impacts from the proposed harvesting, the level of adverse impacts would be expected to remain below the recommended goal of 15 percent of the project area because the proposed harvesting operations would include skid-trail planning, soil moisture restrictions, season of use, and method of harvesting. Therefore, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low.

References:

DNRC, 2004. DNRC Compiled Soils Monitoring Report on Timber Harvest Projects. Missoula, MT.

DNRC Section Record Cards. Kept at NWLO for a record of past management activities on DNRC managed lands.

DNRC, 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation. Missoula, MT.

USFS, 1995. Soil Survey of Kootenai National Forest Area, Montana and Idaho. USDA Forest Service and Natural Resources Conservation Service. US Government Printing Office.

WATER RESOURCES ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the hydrologic and fisheries resources and display the anticipated effects that may result from each alternative of this proposal. During the initial public scoping, no issues or concerns were identified regarding water quality, water quantity or fisheries resources. DNRC developed the following issue statements regarding the potential effects of the proposed timber harvesting:

- Timber harvesting and road construction has the potential to increase water yield which in turn may affect stream channel stability.
- Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality and fisheries.
- Timber harvesting activities may adversely affect fish habitat parameters of LWD, stream shading and stream temperature.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area and by assessing the level of riparian harvest and the potential risk of changing fisheries habitat parameters.

Other comments regarding fish passage were received by the DNRC fisheries biologist. Five culverts that restrict fish passage are in the area of this project. However, because none of these crossings are proposed for use and the economic return of the proposal may not support the replacement, DNRC will defer replacement.

The Environmental Effects sections disclose the anticipated indirect, direct and cumulative effects to water resources within the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

The primary concerns relating to aquatic resources within the analysis area are potential impacts to water quality from sources outside the channel. In order to address these issues the following parameters are analyzed by alternative:

-Miles of new road construction and road improvements
-Potential for sediment delivery to streams
-Increases in ECA and annual water yield
-Increases or decreases in fish habitat parameters

Analysis Method

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect and cumulative effects include a field review to look at potential sediment sources from haul routes. Roads were qualitatively evaluated to determine existing sources of introduced sediment. Potential sediment delivery from harvest units will be evaluated from a risk assessment. This risk assessment will use the soil information provided in the Soils Analysis and the results from soil monitoring on past DNRC timber sales.

Water Yield and Cumulative effects

As described in the Forest Management Rules (ARM 36.11.423), DNRC will determine the level of analysis dependent upon (1) extent of the proposed activity; (2) level of past activities; and, (3) beneficial uses present.

Annual Water yield will be disclosed as a cumulative effect in the 'Existing Conditions' portion of this report because the existing condition is a result of all past harvesting and associated activities. In the 'Environmental Effects' portion of this report, water yield increases as a result of this project

will be disclosed as a direct effect. The cumulative water yield increase as predicted to include each alternative will be disclosed as a cumulative effect.

The annual water yield increase for watersheds in the project area was estimated using the Equivalent Clearcut Acres (ECA) method as outlined in Forest Hydrology, Part II (Haupt et. al., 1976). Data for the ECA method is derived from aerial photo interpretation, previous timber sale contracts, and local knowledge.

ECA is a function of total area roaded, harvested or burned, percent of crown removed during harvesting or wildfire, and amount of vegetative recovery that has occurred in the harvested or burned areas. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff. This method also estimates the recovery of these increases as new trees revegetate the site and move toward pre-harvest water use.

In order to evaluate the potential effects of water yield increases, a *threshold of concern* for each watershed was established per ARM 36.11.423. This level of cumulative effects is aptly named because conditions that result in annual water yields greater than the "threshold of concern" may result in unacceptable impacts such as excessive bank scour, channel degradation and adverse impacts to beneficial uses. Thresholds were established based on evaluating the acceptable risk level, resources value, and watershed sensitivity.

Fish Habitat Parameters
Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline disclosing the expected changes due to the alternatives proposed. The analysis method for woody debris recruitment and stream shading will evaluate the potential reduction in recruitable woody debris and levels of shading due to timber harvest activities. Stream temperature will be addressed by evaluating the risk of stream temperature increases due to reduced shading from vegetation.

Analysis Area
Sediment Delivery
The analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes upland sources of sediment that could result from this project. In addition, in-channel sources of sediment such as mass wasting locations or excessive scour/deposition will be discussed for streams near proposed harvest units.

Water Yield and Cumulative effects
Water yield will be discussed on a scale relevant to potential effects. Due to the wide distribution of potential harvest units, the amount of harvest in sixth code watersheds is generally inadequate to display potential effects. Therefore, this analysis will use smaller watersheds when appropriate. The smaller watersheds include Harris Creek, Snell Creek, and Hoodoo Creek. Larger 6th-code watersheds will include McKillop Creek and Wolf Creek.

Fisheries Habitat Parameters
The analysis area for fisheries habitat parameters is the proposed harvest units immediately adjacent to fish-bearing streams and lakes. This only includes proposed harvest units near Harris Creek. All other proposed harvest units are located at least 100 feet from fish-bearing streams and in most cases further.

Water Uses and Regulatory Framework
Water Quality Standards
This portion of the Kootenai River basin, is classified as B-1 by the State of Montana Department of Environmental Quality (DEQ), as stated in the Administrative Rules of Montana (ARM 17.30.609). The water quality standards for protecting beneficial uses in B-1 classified watersheds are located in ARM 17.30.623. Water in B-1 classified waterways is suitable for 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. State water quality regulations limits any increase in sediment above naturally occurring concentration in water classified B-1. Naturally occurring "means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied" [ARM 17.30.602 (19)]. Reasonable land, soil and water conservation practices include "methods, measures or practices that protect present and reasonably anticipated beneficial uses…" [ARM 17.30.602 (25)]. The State of Montana has adopted Best Management Practices (BMPs) through its non-point source management plan as the principle means of meeting the Water Quality Standards (MDEQ, 2007).

Water Quality Limited Waterbodies
Within the project area, no waterbodies are listed as a water quality limited water body in the 2006 303(d) list. However, downstream of the Harris, Snell and McKillop Creek parcels is a listed waterbody-Fisher River; downstream of the Richards and Backus parcels is the listed waterbody, Wolf Creek; and, downstream of the Poker Hill parcel is the listed waterbody Libby Creek. All of the listed waterbodies named above are listed as partially supporting aquatic life and cold water fisheries. The probable causes of impairment are different for each waterbody and may include alteration of streamside vegetative cover, sedimentation/siltation, water temperature, physical substrate habitat alteration, high flow regimes and lead. As with the probable causes, the probable source of impairments varies. Silviculture activities are listed as a probable source only for the Fisher River. A thorough list of potential impairments, sources and assessments can be found at the Department of Environmental Quality (DEQ) Clean Water Act Information Center (http://cwaic.mt.gov/).

The 303(d) list is compiled by the Montana Department of Environmental Quality as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do no fully meet water quality standards, or where beneficial uses are threatened or impaired.

Streamside Management Zone Law (SMZ)
All rules and regulations pertaining to the Streamside Management Zone (SMZ) Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater then 35%. An SMZ width of 50 feet is required when the slope is less than 35%.

Fisheries—Threatened, Endangered and Sensitive Species.

Westslope cutthroat trout are listed as a *sensitive species* by Montana DNRC (ARM 36.11.436) and are considered as a *Species of Concern* by Montana Fish, Wildlife and Parks, and the Montana Natural Heritage Program. This designation is reserved for native Montana species that are considered "at risk" due to declining population trends, threats to habitat and/or limited distribution. (MNHP 2008)

Water Rights and Beneficial Users
Surface water rights exist within three miles downstream of the project area only for irrigation uses from Libby Creek. Other water rights within three miles downstream of project area parcels are for groundwater.

EXISTING CONDITION
General Description
The 3,240-acre project area includes DNRC managed lands in four distinct 6th-code hydrologic units (HUCs): Middle Fisher River, McKillop Creek, Upper Libby Creek, and Lower Wolf Creek. Table WR-1 shows the project area acres and proposed harvest acres located in each watershed.

Table WR-1: 6th Code HUC watersheds in relation to project

6th-Code HUC Watershed Name	Acres	Approximate Acres of Project Area	Approximate Proposed Harvest Acres	Includes these parcels
Middle Fisher River	26,457	1,269*	628	Harris Creek Snell Creek
McKillop Creek	11,177	640	58	McKillop
Upper Libby Creek	42,954	600	176	Poker Hill
Lower Wolf Creek	42,880	720	577	Richards Backus
Totals	*74,451*	*3,229**	*1,439*	

** Approximately 11 acres of the Snell Creek parcel are in the Cow Creek HUC. No harvest is planned in the Cow Creek HUC.*

While this displays the distribution of project area and proposed harvest due to the distribution of the proposal, smaller watersheds within these will be used for water yield and cumulative effects analysis when appropriate.

Harris Creek Parcel—
The Harris Creek parcel is drained by Harris Creek; an approximate 2,400-acre tributary to the Fisher River. Precipitation ranges from 20 inches per year at the confluence with the Fisher River to approximately 50 inches per year at the highest elevation in the watershed.

While the stream provides habitat for westslope cutthroat trout per FWP website and Forest Service personnel (Hooper, pers comm.), the flow regime shifts from perennial to intermittent within the DNRC managed parcel. Bankfull widths were measured to be near seven feet in the lower portion of the channel. Using the protocol for channel stability evaluation on the Kootenai National Forest (USFS, 1993), stream stability appeared to be good (no large mass wasting sites or evidence of channel shifting), although some sediment from streambanks at outcurves and constrictions was observed during field reconnaissance.

Ownership in this watershed is split three ways: Plum Creek Timber Company (~69%); Kootenai National Forest (~7%); and, Montana DNRC (~24%).

Harvesting activities are proposed within the SMZ of Harris Creek.

Snell Creek Parcel—
The Snell Creek parcel is drained by intermittent and ephemeral streams that are tributary to Snell Creek. This 3,450-acre watershed is tributary to the Fisher River and the stream flows from a general east-to-west direction. Precipitation is generally low a range of 20-30 inches per year.

The tributary that flows out the west side of the section is considered a Class II stream because it flows considerably less than 6 months of the year, and due to the very short season of flow, is not expected to contain fish within the state parcel. The second tributary flows across the southeast corner of the section and has a flow regime very similar to the other tributary to Snell. Both streams are primarily fed by seasonal snowmelt, which results in a very short season of flow.

Ownership in this watershed is split three ways: Plum Creek Timber Company (~60%); Kootenai National Forest (~22%); and, Montana DNRC (~18%).

No harvesting is proposed within 400 feet of Snell Creek nor within the SMZ of the intermittent stream channels in the western half of the section or the southeast quarter of the section.

McKillop Creek Parcel—

The McKillop Creek parcel is drained by McKillop Creek; an approximately 11,177-acre tributary to the Fisher River. Precipitation ranges from 20 inches per year in the lower elevations to approximately 40 inches per year at the watershed divide.

Ownership in this watershed is split three ways: Plum Creek Timber Company (~58%); Kootenai National Forest (~36%); and, Montana DNRC (~6%).

No harvest activities are proposed within100 feet of McKillop Creek, and most of the proposed unit is greater than 500 feet from the stream.

Poker Hill Parcel—
The majority of the Poker Hill parcel is drained by Hoodoo Creek; a second order stream that flows south-to-north in the approximate 2,250-acre watershed. Hoodoo Creek is a tributary to Libby Creek. Precipitation ranges from less than 30 inches per year in the lower elevations to over 50 inches per year at the watershed divide.

Ownership in this watershed is split four ways: Kootenai National Forest (~81%); Montana DNRC (~19%); Plum Creek Timber Company (<1%); and, non-industrial private (<1%).

No harvest activities are proposed within 100 feet of Hoodoo Creek.

Richards Parcel—
The Richards Parcel is drained by first order ephemeral draws and a second order intermittent stream. None of the draws or streams is connected to downstream waterbodies via surface flow. An SMZ would be required on the intermittent stream in the southeast corner of the section. This parcel is completely surrounded by Plum Creek Timber Company Lands.

No harvesting within SMZ is proposed.

Backus Parcel—
The Backus Parcel is drained by an ephemeral draw and Backus Creek, a perennial tributary to Wolf Creek. Precipitation ranges from 18 to 30 inches per year. No data was found on the fisheries present in the stream. This parcel is completely surrounded by Plum Creek Timber Company Lands.

No harvesting is proposed within 250 feet of Backus Creek.

Sediment Delivery
No upland sources of sediment were identified during field reconnaissance in 2008. Sediment delivery from roads is limited due to existing surface drainage on roads and the limited number of stream crossings. Two stream crossings on Harris Creek currently contribute sediment due to over steepened fill material at the crossing sites and deteriorated crossing structures. While the current level of sediment delivery is low, the risk of failure for these native material crossings is considered moderate to high. . Because unnaturally sized sediment deposits were noted during field review, the current impacts to fish and fish habitat are considered low. DNRC is currently obtaining a use agreement for the lower crossing; the upper crossing is not on state land and is not considered an access need at this time

Sediment delivery from in-channel sources is limited to outcurves and constrictions. These sites are very small and are considered to be predominantly natural, although some influence from past management activities is possible. No mass wasting sites were noted. However, the Harris Creek parcel contains some very steep banks adjacent to the stream channel that could become sediment sources if damaged.

Fish Habitat Parameters
Large Woody Debris
Woody debris in Harris Creek is present at natural levels because no harvesting has occurred previously, although quantitative data is not available. Therefore, it can be reasonably assumed that no reduction in woody debris or recruitable woody debris has occurred on the DNRC managed parcel.

Stream Temperature
No temperature data has been collected on Harris Creek.

Water yield and Cumulative effects
After reviewing the beneficial uses, existing channel conditions and existing watershed condition per ARM 36.11.423, the threshold of concern for the each watershed was set. This process included reviewing general stream stability conditions, fish presence and the current level of harvest in the watershed. The recommended threshold value is compared to the expected annual water yield of a fully forested condition. This threshold values expects a low to moderate degree of risk to beneficial uses due to water yield increases as described in ARM 36.11.423(f)(iv).

Watershed	6th Code HUC Watershed	Estimated Annual Water Yield Increase	Recommended Threshold
Harris Creek	Middle Fisher River	8.4%	12%
Snell Creek	Middle Fisher River	9.9%	12%
Hoodoo Creek	Upper Libby Creek	4.9%	12%
McKillop Creek	McKillop Creek	5.3%	12%

In addition to these watersheds, harvest is planned in the Lower Wolf Creek watershed and the Upper Libby Creek watershed. However, due to the limited amount of harvest in relation to the size of these two watersheds, impacts would not be measurable. No further discussion of water yield will be included in this document regarding these two larger watersheds.

ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

No-Action Alternative
No timber harvesting or associated activities would occur under this alternative. Existing activities such as recreational use, individual Christmas tree harvest and firewood gathering would continue.

Action Alternative
Nine units totaling approximately 1,439 acres would be commercially harvested under this alternative. Approximately 659 acres of the proposal would be suitable for ground-based harvesting; the remaining 780 acres would require cable yarding methods. While no new road construction is proposed, three stream and draw crossing replacements would be implemented and approximately 62.3 miles of road would be maintained or have minor drainage improvements installed as necessary to protect water quality. Replacement stream crossings would be located on Harris Creek, and on an unnamed stream on the Backus Road. In addition, a culvert on an unnamed ephemeral draw in the Harris Creek watershed would be replaced. Although no seasonal limitations would be imposed, it is assumed that all of the work would be completed during dry conditions instead of during the winter. Existing activities such as recreational use, individual Christmas tree harvest and firewood gathering would continue.

DIRECT AND INDIRECT EFFECTS

No Action Alternative
Sediment Delivery
Under this alternative, no timber harvest or related activities would occur. The existing direct sediment delivery sources at road-stream crossings would continue until repaired by another project or funding source. In-channel sources of sediment would continue to exist and erode as natural events dictate.

Fish Habitat Parameters
Large Woody Debris Recruitment
No reduction in recruitable large woody debris would result from the implementation of this alternative.

Stream Temperature
No increases in stream temperature from a reduction in stream shading would be expected under this alternative.

Water Yield
No increase in water yield would be associated with this alternative.

Action Alternative
Sediment Delivery
Past monitoring of DNRC timber harvest has shown erosion on approximately 6% of the sites monitored, although no water quality impacts from the erosion were found (DNRC, 2004). These sites were harvested during the summer period and the erosion was attributed to inadequate skid trail drainage. By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (Clayton, 1987 In DNRC, 2004).

During a review of BMP effectiveness including stream buffer effectiveness, Raskin et al. (2006), found that 95 percent of erosion features (disturbed soil) greater than 10 meters (approximately 33 feet) from the stream did not deliver sediment. His findings indicated that the main reasons stream buffers are effective include 1) keeping active erosion sites away from the stream, and 2) stream buffers may intercept and filter runoff from upland sites as long as the runoff is not concentrated in gullies or similar features (Raskin et al, 2006)

No new road construction is proposed although three stream and draw crossings would be replaced on existing roads—two in the Harris Creek watershed and one on the Backus Creek road. During installation, some sediment would likely enter the stream but mitigation measures would be implemented to minimize sediment delivery. Short-term impacts may include increased turbidity beyond state water quality standards and displacement of resident fish. A recent study of turbidity changes during culvert removals indicated that turbidity levels can affect several hundred feet of stream below the project area, but the impacts last considerably less than 24 hours (Foltz et al., 2008). No long term impacts to fish would be expected because fish passage would be maintained or improved, seasonal timing would not impact egg incubation, and turbidity would be expected to return to pre-project levels within 24 hours. A 124 permit (Stream Protection Act) would be required as would a 318 authorization (short-term turbidity increase).

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative. Existing sources of sediment would be mitigated or repaired as part of the timber sale contract requirements. Minor drainage improvements include reshaping drain dips, cleaning ditch relief culvert catch basins as well as ditch reshaping and ditch relief culvert extensions. Current maintenance activities would continue to provide drainage to area roads.

Because DNRC would incorporate BMPs into the project design as required by ARM 36.11.422 (2), and all laws pertaining to SMZs would be followed, a low risk of sediment delivery to streams from timber harvest activities would result from the implementation of this alternative. A high risk of sedimentation into Harris Creek during culvert installation would result, however the impacts from this would be minimized with erosion mitigation. The risk of long-term adverse direct or indirect effects to water quality or beneficial uses would be low.

Fish Habitat Parameters
Large Woody Debris Recruitment

Harvest within the SMZ of Harris Creek would occur although a no-harvest buffer on steep (greater than 40%) slopes adjacent to the stream would be implemented to minimize the risk of sediment delivery. The upstream portion of the harvest unit would realize the largest SMZ harvest, however this portion of Harris Creek is intermittent and likely provides little or no habitat for fish although some intermittent stream can provide seasonal fish habitat. In the perennial reaches of Harris Creek, harvest would be limited to areas outside of steep slopes—generally 50 feet from the stream. Due to the retention of these trees, DNRC expects adequate levels of recruitable large woody debris to be available for fish habitat and to maintain stream form and function with a low degree of risk.

All other streams in the project area would not have harvest within 100 feet and therefore would have a very low risk of affecting recruitable woody debris.

Stream Temperature
Because harvesting would be limited near fish-bearing streams, there is a very low risk that a measurable increase in water temperature would result from the implementation of this alternative. Because no measurable increase would be expected, no impacts from stream temperature increases would be expected.

Water Yield
If this alternative were selected, approximately 1,439 acres would be harvested using conventional ground-based and cable yarding methods, Although undetectable annual water yield increase would result in most watersheds, two watershed would have measurable increase. Table WR-2 displays the ECA increase and percent annual water yield increase for applicable watersheds.

Table WR-2: ECA and Annual Water Yield Increase for Project Watersheds

Watershed	6th-Code HUC Watershed Name	Harvest Acres	ECA increase	AWYI
Harris Creek	Middle Fisher River	188	71	1.2%
Snell Creek	Middle Fisher River	440	0*	0.0%
Hoodoo Creek	Upper Libby Creek	138	12	0.1%
McKillop Creek	McKillop Creek	58	4	0%
*The proposed treatment (overstory removal) would not result in enough canopy removal to emulate a clearcut acre.				

Because proposed harvest levels under this alternative would not substantially increase water yield or stream flow, only a low risk of increased in-channel sediment would result from this alternative.

CUMULATIVE WATERSHED EFFECTS
No Action Alternative
Sediment Delivery
Under the no action alternative the potential for sediment contribution from the proposed haul route and would still exist as described in the *Existing Condition*. The limited number of existing sediment delivery sources would continue until repaired by another project or funding source.

Fish Habitat Parameters
Large Woody Debris Recruitment
No reduction in recruitable large woody debris would result from the implementation of this alternative.

Stream Temperature
No increases in water temperature from a reduction in shading would be expected under this alternative because no harvest would occur.

Water Yield

No increase in water yield would be associated with this alternative.

Cumulative effects summary
Because no timber harvest or associated activities would occur under this alternative, cumulative effects would be limited to the natural progression of the existing condition. Sediment sources would continue unless repaired under a separate project. Conditions would continue to support fish habitat parameters and provide adequate levels of LWD for habitat and also support a natural range of water temperatures. Under this alternative, fisheries habitat quality would be maintained at its current level with a low degree of risk of change due to management actions.

Action Alternative
Sediment Delivery
Under this alternative, the proposed timber harvest and road construction activities would occur. A cumulative increase in sediment delivery as a result of timber harvest would have a low risk of occurring because of the best management practice application, limited activities near surface water and adequate buffers to filter potential displaced soil.

Fish Habitat Parameters
Large Woody Debris Recruitment
Harvest unit H16-1 along Harris Creek would result in temporarily reduced levels of recruitable woody debris. However, because a majority of the recruitable woody debris in the proposed harvest unit would be retained and the harvest would impact only one side of the stream, a low risk of adverse affects to fish habitat or populations would result from the reduction.

Stream Temperature
Because of the limited amount of shade-producing vegetation would be removed, a low risk of adverse cumulative temperature increases above naturally occurring ranges would result from the implementation of this alternative.

Water Yield
The estimated cumulative annual water yield increases in the project watersheds would remain below the recommended thresholds if this alternative were selected. Because these levels would remain below the thresholds set in accordance with ARM 36.11.425(g), a low degree of risk to water quality would result from the implementation of this alternative. Other watersheds would have very small increases that would likely be immeasurable.

Table WR-3: ECA and Annual Water Yield Increase for Project Watersheds

Watershed	6th-Code HUC Watershed Name	Recommended Threshold	AWYI
Harris Creek	Middle Fisher River	12%	9.2%
Snell Creek	Middle Fisher River	12%	9.9%
Hoodoo Creek	Upper Libby Creek	12%	4.9%
McKillop Creek	McKillop Creek	12%	5.3%

Cumulative Effects Summary
Because all timber harvest activities would follow BMPs as required by ARM 36.11.422, and the direct and indirect effects would have a low risk of impacts, the risk of additional adverse cumulative effects would also be expected to be low under this alternative. This expectation includes the results of (1) a reduction in sediment delivery at three stream crossings (2) a slight reduction in potential recruitable LWD near Harris Creek; and (3) a slight increases in modeled water annual water yield estimates in Harris Creek and Hoodoo Creek. Conditions would continue to support fish habitat parameters provide adequate levels of LWD for fish habitat and adequately mitigate potential impacts to stream temperatures. Under this alternative, fisheries habitat quality

would be maintained at its current level with a low degree of risk of change due to management actions.

Because the annual water yield increases would remain below the thresholds of concern and BMP's would be implemented during timber harvest and road construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat would be low.

REFERENCES

Martinson, A. H. and W. J. Basko. 1998. Soil Survey of Flathead National Forest Area, Montana. USDA Forest Service, Flathead National Forest, Kalispell, Montana.

DNRC, 2004. DNRC Compiled Soils Monitoring Report on Timber Harvest Projects. Missoula, MT

DFWP MFISH Waterbody Reports. http://fwp.mt.gov/fishing/mfish/

Foltz, Randy B.; Yanosek, Kristina A.; Brown, Timothy M. 2008. Sediment concentration and turbidity changes during culvert removals. Journal of Environmental Management. 87(3): 329-340.

Haupt, H.F., et al., 1974. Forest Hydrology Part II Hydrologic Effects of Vegetation Manipulation. USDA Forest Service, Region 1. Missoula, Montana.

Edward B. Raskin, Casey J. Clishe, Andrew T. Loch, Johanna M. Bell (2006). Effectiveness of Timber harvest Practices for Controlling Sediment Related Water Quality Impacts. Journal of the American Water Resources Association 42 (5), 1307–1327.

MDEQ, 2007. Montana Nonpoint Source Management Plan. Montana Department of Environmental Quality. Helena, MT. 238 pp.

Montana Department of Environmental Quality (DEQ) Clean Water Act Information Center (http://cwaic.mt.gov/).

MNHP 2008. Montana Natural Heritage Program and Montana Fish Wildlife and Parks. 2008. Montana Animal Species of Concern. Helena MT: Montana Natural Heritage Program and Montana Department of Fish Wildlife and Parks. 17p.

Personal communication, Paul Hooper, USFS fisheries technician, Libby Ranger District. Kootenai National Forest.

USFS 1993. Kootenai National Forest Stream reach Inventory and Channel Stability Evaluation. (A Revision of the Region-1 Channel Stability Survey created by Dale Pfankuch in 1975.) Kootenai National Forest. Libby MT. 20p.

Six Hills Environmental Assessment
VEGETATIVE ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the vegetative resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following vegetative issues were identified from internal and external comments regarding the effects of proposed timber harvesting:

- Timber harvesting could rectify the imbalance of species composition, age distribution and stand health.
- Timber harvesting could affect any identified sensitive, threatened, or endangered species.
- Timber harvesting and associated activities could cause the spread of noxious weeds.

The following sections disclose the anticipated indirect, direct and cumulative effects to these vegetative resources in the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

ANALYSIS AREA

In this section the discussions will focus on 2 areas of different scale. The first will be the "project area", which consists of the state managed portion of section 16 in T28N R30W, section 16 T28N R29W, section 36 T28N R29W, section 16 T29N R28W, section 16 T28N R28W and section 14 T29N R28W. The parcels range from 2,820 to 5,680 feet elevation and encompass all aspects with slopes of varying steepness. The parcels are dominated by Douglas-fir/western larch and mixed conifer habitats. The second scale or the "analysis area" relates to the surrounding landscape for assessing cumulative effects.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse vegetation populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis.

A. Existing Forest Conditions

The State Forest Land Management Plan (SFLMP) directs DNRC to promote biodiversity by taking a coarse filter approach thereby favoring an appropriate mix of stand structures and compositions on State land. Components used to determine an appropriate mix of stand conditions at the landscape level include cover type proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands- i.e. size and location on the landscape.

1. Libby Unit (landscape level) Cover Types

Estimate of current and desired future conditions were determined at the Landscape level for the entire Libby Unit in 2008. The Libby Unit's Inventory (SLI) was used in conjunction with John Losenky's 1997 report *Historical Vegetation of Montana* to compare present (current) conditions with historical (desired) conditions for this landscape in regards to amount and distribution of cover types. Table 1 displays this information:

Table 1: Current and Desired Future Conditions for the Libby Unit

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current Type Minus (–) Desired Future Cond.
DF	1,828	260	1,568 acre surplus
HW	221	221	0
LP	1,248	182	1,066 acre surplus
MC	4,768	336	4,432 acre surplus
PP	12,458	18920	6,462 acre deficit
SUBALP	283	52	231 acre surplus
WL/DF	8,813	8678	135 acre surplus
WWP	486	1693	1,207 acre deficit
OTHER	732	495	237 acre surplus
TOTAL	30,837	30,837	

DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, Other=nonstocked. The Current Type minus Desired Future Conditions above lists the excess and deficit acres for each cover type.

The PP and WWP cover types are not as well represented within the Libby Landscape as estimated for the early 1900's. Most notable, is the conversion of over 6,400 acres from the PP cover type, over the last 100 years, to the present over abundance of the MC, LP, and DF cover types.

This cover type shift is typical for Northwest Montana and it does represent a change in stand conditions. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more

of logging practices that favored the removal of commercially valuable western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*) and Douglas-fir (*Pseudotsuga menziesii*) for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory that includes a higher percentage of more shade tolerant trees such as, grand fir (*Abies grandis*), Engelmann spruce (*Picea engelmannii*) and western hemlock (*Tsuga heterophylla*).

2. Six Hills (project area) Cover Types

The Six Hills project area comprises 3240 acres (~10%) of the Libby Unit landscape. Stand level inventory (SLI) data specific to project area is summarized below for cover types and age class distribution. Site review observations and stand measurements were used to update, confirm or refine the SLI data for this section.

Table 2 displays current and desired future cover types for the Six Hills project area. The project area reflects the forest cover type shift similar to the landscape level, as species compositions are trending towards shade tolerant species dominating the composition of theses timber stands.

Table 2: Current and Desired Future Conditions for Six Hills (Section 16, T30N, R31W)

	Cover Type	Current Cover Type (Acres)	Desired Future Condition (Acres)	Current – DFC (Acres)
T28N R28W Sec. 16 Snell Creek	DF	416	37	379 acre surplus
	MC	14	0	14 acre surplus
	PP	50	575	525 acre deficit
	WL/DF	159	26	133 acre surplus
	SUBTOTAL	*638*	*638*	
T28N R29W Sec. 16 Harris Creek	DF	36	0	36 acre surplus
	LP	19	0	19 acre surplus
	MC	337	70	267 acre surplus
	PP	45	169	124 acre deficit
	SUBALP	110	0	110 acre surplus
	WL/DF	89	396	307 acre deficit
	SUBTOTAL	*635*	*635*	
T28N R29W Sec. 36 McKillop Creek	DF	37	0	37 acre surplus
	MC	10	0	10 acre surplus
	PP	24	148	124 acre deficit
	WL/DF	561	484	77 acre surplus
	SUBTOTAL	*631*	*631*	
T28N R30W Sec. 16 Poker Hill	MC	202	8	194 acre surplus
	PP	51	234	183 acre deficit
	WL/DF	174	21	153 acre surplus
	WWP	171	334	163 acre deficit
	SUBTOTAL	*597*	*597*	
T29N R28W Sec. 14 Backus Creek	MC	18	0	18 acre surplus
	PP	51	61	10 acre deficit
	WL/DF	10	18	8 acre deficit
	SUBTOTAL	*79*	*79*	
T29N R28W Sec. 16 Richards Creek	DF	76	0	76 acre surplus
	PP	404	632	228 acre deficit
	WL/DF	152	0	152 acre surplus
	SUBTOTAL	*632*	*632*	

DF=Douglas-fir, LP=Lodgepole pine, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUBALP=Subalpine fir. The Current Type minus Desired Future Conditions above lists the excess and deficit acres for each cover type.

3. Six Hills Stand History

Records show that a large timber sale occurred during the mid 1980s where ~15 million board feet of Ponderosa pine was removed. Approximately 40% of the project area was logged. The stand cover in the early 1900's was WL/DF and PP, after the large pine sale, it has changed to largely DF and MC types. With this conversion, stand health has deteriorated significantly over the last 20 years due to insects and disease causing a high rate of mortality in the grand fir and Douglas-fir.

4. Libby Unit (landscape level) Age Class Distribution

The Libby Unit's Stand Level Inventory (SLI) 2008 version was used to summarize the estimated age class distribution for current cover types. Table 3 displays this information.

Table 3: Libby Unit Age Class Distribution by Current Cover Type

Sum of Acres in Age Class Groups (years):								
	No Age Data	Non Forested	00 - 39	40 – 99	100 – 149	150+	Old Growth	Total
DF	303			818	441	266		1828
HW				103	118			221
LP			896	295	56			1248
MC			344	938	1975	725	786	4768
NONFOR		482						482
NONSTKD			237					237
PP	283		2648	3059	3108	2850	510	12458
PP-NC						13		13
SUBALP			23	83	52	79	46	283
WL/DF	160		346	1329	3523	1466	1987	8813
WWP			231		43	112	99	486
TOTAL	746	482	4726	6626	9316	5511	3429	30837

5. Six Hills (project area) Age Classification Distribution

Table 4: Displays the estimated age class distribution for the Six Hills project area from SLI observations.

Table 4: Six Hills Project Age Class Distribution by Current Cover Type

Sum of Acres in Age Class Groups (years):							
Current Cover Type		00 - 39	40 - 99	100 – 149	150 +	Old Growth	**Total**
T28N R28W Sec. 16 Snell Creek	DF		155	224	37		416
	MC				14		14
	PP	9		41			50
	WL/DF			31	128		159
	SUBTOTAL	*9*	*155*	*295*	*178*		*638*
T28N R29W Sec. 16 Harris Creek	DF			36			36
	LP		19				19
	MC			186	14	137	337
	PP				45		45
	SUBALP				79	31	110
	WL/DF			43	46		89
	SUBTOTAL		*19*	*265*	*184*	*168*	*635*
T28N R29W Sec. 36 McKillop Creek	DF			7	30		37
	MC	10					10
	PP	24					24
	WL/DF			91		470	561
	SUBTOTAL	*33*		*98*	*30*	*470*	*631*
T28N R30W Sec. 16 Poker Hill	MC	53	16		56	76	202
	PP		13			37	51
	WL/DF				101	73	174
	WWP				78	94	171
	SUBTOTAL	*53*	*29*		*235*	*280*	*597*
T29N R28W Sec. 14 Backus Creek	MC					18	18
	PP		51				51
	WL/DF		10				10
	SUBTOTAL		*61*			*18*	*79*
T29N R28W Sec. 16 Richards Creek	DF		76				76
	PP	79	43	130	34	118	404
	WL/DF		134	18			152
	SUBTOTAL	*79*	*254*	*148*	*34*	*118*	*632*
TOTAL		***174***	***518***	***806***	***660***	***1055***	***3213***

6. Old Growth

In describing his classification of the age structure of natural stands, Losenksky (1997) notes that old stands represent "a pool of acres of old aged trees, a portion of which may be considered old growth stands. The actual acres which may be considered old growth are somewhat elusive in that our understanding of the concept of old growth is limited and not rigidly defined by nature." It is recognized that stand age is an important criteria for determining old growth but would not realistically determine old growth acreage if used as the sole parameter. The Northern Region USFS publicized their effort to characterize old growth forest communities by cover type in a 1992 Internal Report: *Old-Growth forest Types of the Northern Region* (Green et al. 1992).

As per the State Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by cover types, based on minimum number and size of large trees per acre and age of those trees as described by Gren et al. (1992). Older stands within proposed project areas would be assessed for determining actual acreage that meet DNRC's old growth definitions. Old growth will be managed to meet biodiversity and fiduciary objectives in the SFLMP, pursuant to state law and the Forest Management rules, ARM 36.11.401 through 36.11.450.

SLI indicated eighteen stands within the project area as potential old growth. Treatments were proposed for five of those 18 stands, while the remaining 13 potential old-growth stands would remain untreated. Pre-sale cruise data verified that two of the five potential old-growth stands proposed for treatment under Six Hills timber sale met the criteria for DNRC's old growth definitions. In addition to the two stands the proposed project would enter, pre-sale cruise data verified an additional stand that met the criteria for old growth that was not indicated in the SLI data, raising the total number of old-growth stands receiving treatments under the proposed project to three.

The treatments proposed under the Six Hills timber sale would not result in a reduction of the total acres of old growth on Libby Unit, as the proposed treatments would retain at least the minimum number of large live trees to be defined as old-growth according to DNRC's old-growth definitions. The stands verified as old-growth are: T28N R29W section 16 stand 8 (Harris Creek) where 52 acres of the 73 stand acres would be harvested using a shelter-wood harvest treatment, the remaining 21 acres would not be harvested. The proposed shelter-wood harvest treatment would retain all trees that contribute to this stand meeting the old growth definition. T28N R29W section 36 stand 19 (McKillop Creek) where 3 acres of the 33 stand acres would be harvested using a sanitation/salvage of unhealthy trees and retaining those trees that contribute to this stand meeting the old growth definition. The remaining 30 acres would not be harvested. T28N R30W section 16 stand 2 (Poker Hill) where 2 acres of the 29 stand acres would be harvested using a sanitation/salvage of unhealthy trees and retaining those trees that contribute to this stand meeting the old growth definition. The remaining 27 acres would not be harvested. There would be a

zero acre reduction in old growth on Libby Unit resulting from the proposed activities.

7. Six Hills Stand Characteristics

Stand characteristics helpful in describing existing stand conditions are summarized below in Table 7.

Table 7: General Stand Characteristics for Six Hills Project Area.

	Stand	ACRES	CURRENT CVR TYPE	APPROPRIATE CVR_TYPE	Habitat Type	Stocking: merch BA per acre	STRUC	Species composition
	1	57	DF	PP	PSME/PIPO	60	multi	D8, P1, L0
	2	36	DF	PP	PSME/ARUV	50	multi	D8, P1
	3	52	DF	PP	PSME/PIPO	70	multi	D9, P0
	4	22	PP	PP	PSME/CARU	100	multi	D7, YP1, P1
	5	18	PP	PP	PSME/PIPO	70	single	D7, BP2
	6	99	DF	PP	PSME/PIPO	60	multi	D8, P1
T28N R28 W sec. 16	8	13	WL/DF	WL/DF	PSME/CARU	30	two	D5, L3, LP1, P0
Snell Creek	9	38	DF	PP	PSME/CAGE	20	multi	D8, P1
	10	99	DF	PP	PSME/PIPO	40	multi	D8, P1, L0, LP0
	11	72	WL/DF	PP	PSME/ARUV	130	multi	D5, L2, P1, LP0
	13	56	WL/DF	PP	PSME/PIPO	70	multi	D7, P1, L1
	14	18	WL/DF	PP	PSME/ARUV	30	multi	D6, L2, P1, LP0
	16	9	PP	PP	PSME/ARUV	0	single	P6, D3
	17	14	MC	WL/DF	PSME/CARU	120	multi	D4, AF3, L2, LP0
	18	37	DF	DF	PSME/FESC	20	single	D9, P0
	1	36	DF	PP	PSME/ARUV	50	multi	D8, L0, P0
	2	31	SUBALP	WL/DF	ABLA/VAGL	100	multi	D3, GF2, AF2, L2
	3	19	LP	WL/DF	ABGR/XETE	20	multi	LP5, L3, D1, AF0
	4	58	SUBALP	WL/DF	ABLA/VAGL	80	multi	AF3, D3, L2, GF1
	5	21	SUBALP	WL/DF	ABLA/VAGL	110	multi	D3, L3, LP2, AF1
T28N R29W sec. 16	6	43	MC	WL/DF	ABGR/XETE	100	multi	D4, LP4, L1, GF1
	7	45	PP	PP	PSME/ARUV	100	multi	D3, L3, YP3, P0
Harris Creek	8	73	MC	WL/DF	ABGR/XETE	160	multi	GF6, D2, L2
	9	70	MC	MC	ABGR/LIBO	160	multi	GF8, D1, L1
	10	137	MC	WL/DF	ABGR/XETE	180	multi	L4, GF3, D2, LP0
	11	46	WL/DF	PP	PSME/CARU	90	multi	D5, GF2, L2, LP0
	12	14	MC	WL/DF	ABGR/XETE	90	multi	GF5, D2, L1, LP0
	13	43	WL/DF	PP	PSME/CARU	50	multi	D6, L2, LP1, AF0
T28N R29W sec. 36	1	44	WL/DF	PP	PSME/SYAL	140	single	D7, L2
	2	30	DF	PP	PSME/FESC	40	two	D9
McKillop Creek	3	86	WL/DF	WL/DF	PSME/SYAL	100	multi	L4, D3, LP1, S0
	4	45	WL/DF	WL/DF	ABGR/ARNU	160	multi	L5, S3, D2
	5	5	PP	PP	PSME/SYAL	10	two	LP3, D2, P2, L2
	6	10	MC	WL/DF	ABGR/CLUN	20	single	LP4, L2, D1, S1
	7	57	WL/DF	WL/DF	ABGR/LIBO	100	multi	D5, L4, S1
	8	29	WL/DF	WL/DF	ABGR/CLUN	140	multi	D5, L4, S1
	9	24	WL/DF	WL/DF	ABGR/LIBO	80	multi	D6, L4
	10	37	WL/DF	WL/DF	ABGR/LIBO	100	single	L5, D4, LP0
	11	159	WL/DF	WL/DF	ABGR/LIBO	100	multi	D5, L4, GF0, LP0
	12	28	WL/DF	WL/DF	TSHE/CLUN	60	multi	D5, L4
	13	10	WL/DF	WL/DF	TSHE/CLUN	20	multi	L9, D1
	14	5	PP	PP	ABGR/CLUN	0	single	LP4, L3, P2, D1
	15	10	WL/DF	PP	PSME/SYAL	60	multi	L5, D4
	16	6	PP	PP	PSME/CARU	0	single	P8, D2

	17	7	PP	PP	PSME/CARU	0	single	D8, P2
	18	7	DF	PP	PSME/SYAL	40	two	D9
	19	33	WL/DF	PP	PSME/SYAL	80	multi	L7, D2
T28N R30W sec. 16 Poker Hill	1	5	MC	WL/DF	THPL/CLUN	0	single	LP4, D2, GF1, L1
	2	29	MC	WWP	THPL/CLUN	140	multi	S2, L2, GF2, D2
	3	34	WL/DF	PP	ABGR/LIBO	100	multi	D5, L2, P1, GF1
	4	101	WL/DF	PP	PSME/CARU	50	multi	D6, L2, P1, GF0
	5	13	PP	PP	PSME/ARUV	80	multi	D6, P2, L1, LP0
	6	38	WL/DF	PP	ABGR/LIBO	130	multi	D5, L2, P1, GF0
	7	37	PP	PP	ABGR/XETE	100	multi	D4, L2, P2, GF1
	10	10	MC	PP	TSHE/CLUN	90	multi	D3, GF2, P1, L1
	13	94	WWP	WWP	ABGR/LIBO	140	multi	L2, D2, GF2, WP1
	14	78	WWP	WWP	TSHE/CLUN	130	multi	D4, GF2, L2, WP1
	15	48	MC	WWP	TSHE/CLUN	130	multi	GF2, L2, D2, WH1
	16	16	MC	WL/DF	TSHE/CLUN	0	two	L4, LP4, D1, C0
	17	46	MC	WWP	TSHE/CLUN	110	multi	L3, S2, D2, GF1
	50	8	MC	MC	ABGR/XETE	0	single	L4, LP2, S1, P1
	51	12	MC	WWP	THPL/CLUN	0	single	L3, LP3, D2, S1
	52	9	MC	WWP	TSHE/ARNU	0	single	L4, D2, P1, LP1
	53	5	MC	WWP	TSHE/CLUN	0	single	L4, D2, LP2, P1
	54	14	MC	WWP	TSHE/ARNU	0	single	L4, D2, P1, LP1
T29N R28W sec. 14 Backus Creek	1	51	PP	PP	PSME/ARUV	40	multi	D4, L2, P2, LP2
	2	18	MC	WL/DF	PSME/VACA	100	multi	D3, S2, GF2, L2
	3	10	WL/DF	PP	PSME/VACA	20	two	D5, L3, P1, LP1
T29N R28W sec. 16 Richards Creek	1	29	WL/DF	PP	PSME/CARU	60	multi	D5, L4
	2	79	PP	PP	PSME/PIPO	0	single	D3, L3, P3
	3	96	PP	PP	PSME/PIPO	20	single	D7, P3
	4	37	PP	PP	PSME/PIPO	60	two	P6, D3
	5	81	PP	PP	PSME/PIPO	20	multi	P7, D3
	7	85	WL/DF	PP	PSME/ARUV	60	single	D7, P1, L1
	8	20	WL/DF	PP	PSME/PIPO	40	single	D5, L4, P1
	9	20	DF	PP	PSME/CARU	60	single	D8, P1, L0
	10	18	WL/DF	PP	PSME/ARUV	60	single	D5, L2, BP1, LP0
	11	24	DF	PP	PSME/PIPO	60	two	D9
	12	13	PP	PP	PSME/PIPO	20	single	P5, D4
	13	32	DF	PP	PSME/CARU	20	single	D8, P1
	14	8	PP	PP	PSME/CARU	10	two	P6, D3
	15	13	PP	PP	PSME/ARUV	70	two	D7, P2, L0, LP0
	16	13	PP	PP	PSME/CARU	80	multi	D6, P2, L1
	17	30	PP	PP	PSME/PIPO	20	multi	D7, P2, L0
	18	34	PP	PP	PSME/PIPO	40	multi	D7, P2, L0
Grey highlight represents stands included in proposed harvest activities.								

8. Six Hills stand health and vigor

Overall vigor is poor for the overstory that is targeted for removal in the proposed harvest units in this sale. Mid and lower canopy levels are healthy and vigorous. Salvage efforts have been made to capture the value of dead and dying grand fir and Douglas-fir. Outbreaks of the Douglas-fir beetle (*Dendroctunus pseudotsugae*), Fir Engraver beetle (*Scolytus ventralis*), and root rots have and continue to negatively affect stand health and vigor.

9. Adjacent Lands' general forest conditions

Private industrial timberlands and US Forest Service lands border the parcels that are part of the proposed timber sale. The adjoining USFS has had moderate amounts of management activity history, and the industrial timberlands have been heavily managed.

B. Sensitive, Threatened, and Endangered Plants – existing condition

A review of the records from the Montana Natural Heritage Program indicated no plant species of special concern identified with the project area.

C. Noxious Weeds – existing condition

Lincoln County and DNRC have a "Cooperative Integrated Noxious Weed Management Agreement" in compliance with the state law known as the County Weed Control Act (Section 7-22-2151, MCA). An annual coordination meeting between the county Weed Control District and DNRC allows for identification of weed problems; and determines an integrated approach at managing and treating priority areas as related to county and DNRC weed control goals.

At the landscape level, past activities have had a big impact on noxious weed populations. Land use activities such as logging, road building, livestock grazing, wildfires, and recreation have led to increases in the amount and distribution of noxious weeds on the Libby Unit. This has occurred at the project level as well. In the county tansy ragwort and rush skeletonweed has been identified as a target control species. These species have not been observed within the project area. Spotted knapweed and hawkweed has been observed along road edges of the project area.

D. Effects Project Actions:

1. Proposed Project Actions:

a.) Harvest/Logging:

Unit H16-1: 52 acres	Shelter-wood harvest while maintaining those trees that contribute to Old Growth
Unit H16-2: 135 acres	Over-story removal and commercial thin
Unit M36-1: 56 acres	Over-story removal and commercial thin
Unit P16-1: 175 acres	Over-story removal and commercial thin
Unit S16-1: 430 acres	Over-story removal and commercial thin
Unit B14-1: 58 acres	Over-story removal and commercial thin
Unit R16-1: 179 acres	Over-story removal and commercial thin
Unit R16-2: 289 acres	Over-story removal and commercial thin
Unit R16-3: 49 acres	Over-story removal and commercial thin

b.) Roads:

~0.2 mile of existing road that needs to be reconstructed to meet BMP standards
~62.3 mile of existing road that needs to be maintained

c.) After harvest treatments:

Slash disposal will be conducted to meet the Hazard Reduction Standards as applied under the State Fire Hazard Reduction Law (76-13-403 MCA) on all harvested acres. Unit H16-1, mechanical scarification may be implemented to achieve the exposure of approximately 30% bare mineral soil, and planting with DF and WWP is prescribed. The remaining units will be evaluated for stand density and pre-commercial thinning may be prescribed if necessary to achieve free-to-grow condition.

2. Effects on Cover Type and Age Class Distribution:

a.) Direct and Indirect Effects

1. *NO ACTION:* Short term effects are not anticipated with the no action alternative. In the long term, the general trend of increasing percentages of shade tolerant species in stand species composition would continue without disturbance-increasing the acreage of Mixed Conifer and Douglas-fir cover types and moving the project area further away from desired future condition cover types. Fuel loading would be expected to increase and stands would become more susceptible to a stand replacement fire.

2. *ACTION ALTERNATIVE:* Harvesting according the silvicultural prescriptions would result in the overall reduction of acres in the older age class groups and the conversion of approximately 52 acres to the appropriate cover type.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Without disturbance, the no action alternative would allow the trend of increasing acreages and densities of shade tolerant species to continue. The number of acres with desirable seral species would continue to decline.

2. *ACTION ALTERNATIVE*: The action alternative would contribute to moving stand conditions towards more historical condition by decreasing the excess of shade tolerant trees and returning those acres to the historical cover types dominated by the seral species. The action alternative would increase the proportion of forested acres in the 0-39 year age class on state lands with the planting of 52 acres and in the 40-99 year age class with the harvest of the older over-story.

3. Effects on other forest stand characteristics, health and vigor

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands would continue to grow and develop without disturbance. Growth rates are likely to decline or become static without density control, and stand susceptibility to insects and disease would increase. Defect from stem decays in grand fir and Douglas-fir would slowly affect currently infected trees and spread to other trees, decreasing timber yield potential. Overall stand vigor would decline slowly as over-story

trees continue to decline and expire. Tree regeneration in canopy gaps or under poorly stocked upper canopies would be dominated by shade tolerant species, further diminishing the proportion of ponderosa pine in stand compositions.

2. *ACTION ALTERNATIVE*: Under this alternative 1423 acres would be managed. Of which 52 acres would be treated with a shelter-wood harvest, while maintaining those trees that contribute to the old growth condition. The less desirable climax species that currently occupy these sites would be replaced with more desirable seral species, thus promoting more historic species compositions. The remaining 1371 acres would have oldest, diseased and least vigorous trees harvested. The action would result in an improved health and vigor of the stands and a reduction of fuels.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE*: Forest stands within these sections would continue to develop, retaining a larger proportion of the surrounding landscape in older, denser forest stands.

2. *ACTION ALTERNATIVE*: 1423 acres would receive silvicultural treatments, increasing the acreage of open canopied forest and young, newly established forest in the surrounding landscape. All old growth stands would continue to be managed, and would retain those trees that contribute to the old growth condition. The 52 acres that are prescribed for planting, the treatment would provide conditions promoting development of future stands with more historic stand characteristics. The over-story removal would allow the mid and lower canopy levels that are healthy and vigorous to thrive in a free to grow condition.

4. Effects on Noxious Weeds:

a.) Direct and Indirect Effects:

1. *NO ACTION ALTERNATIVE:* Ground disturbing activities associated with timber harvesting and road maintenance or construction would not occur. Populations of spotted knapweed will increase in size and distribution along roads. As weed control priorities and funding allows under County Cooperative Weed Control Agreements, spaying along roads may occur within the next 5 years to contain or decrease existing weed populations.

2. *ACTION ALTERNATIVE:* Timber harvesting and road construction and maintenance activities will expose mineral soil and promote encroachment and spread of noxious weeds into the forest stands. In order to control and minimize the risk of increasing noxious weed populations, contract clauses would require the timber sale purchaser to: apply grass seed on areas with soil exposed from road construction or maintenance activities; wash and clean off-road equipment so it is free of weed parts and have it inspected prior to moving onto site; and, incorporate slash into skid trails or apply grass seed to

heavily used trails that have soil exposed. Given sufficient funding, DNRC would have haul roads sprayed with herbicides prior to logging activities and after the completion of sale activities.

b.) Cumulative Effects:

1. *NO ACTION ALTERNATIVE:* Current noxious weed populations would continue to spread or new weed populations would invade the general area at the current rate given continuance of road and land uses.

2. *ACTION ALTERNATIVE:* The risk of additional noxious weed encroachment or invasion is higher under the alternative. Mitigations discussed above have been effective in containing or controlling noxious weed populations.

Attachment E

WILDLIFE ANALYSIS- SIX HILLS TIMBER SALE PROPOSAL

INTRODUCTION

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated effects that may result from each alternative of this proposal. FM Rules and several comments during initial scoping led to the following list of issues:

-Timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely upon these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.
-Timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.
-Timber harvesting and associated activities could alter cover, increase access and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.
Timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components, leading to a decreased ability for the area to support lynx.
-Timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites and/or alter prey availability.
-Timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of course woody debris.
-Timber harvesting and associated activities could alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.
-Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
-Timber harvesting and associated activities could remove forest cover on white-tailed deer winter range, which could reduce the carrying capacity of the winter range.

The following sections disclose the anticipated direct, indirect and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past and current activities on all ownerships within each analysis area as well as planned future agency actions have been taken into account for the cumulative effects analysis.

Analysis Area

The discussions of existing conditions and environmental effects will focus on two different scales. The first will be the "project area", which consists of approximately 3,214 acres of DNRC managed lands in the following sections 14 and 16 in T29N, R28W, sections 16 and 36 in T28N, R29W, section 16 in T28N, R28W, and section 16 in T28N, R30W. The second scale or the "analysis area" relates to the surrounding landscape for assessing cumulative effects to wildlife and their habitats. The scales of these analysis areas vary according to the species being discussed, but generally approximate the size of the home range of the discussed species.

Analysis Methods

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (ARM 36.11.404). Appropriate stand structures are based on ecological characteristics (e.g., land type, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter" approach for threatened, endangered, and sensitive species (ARM 36.11.406). The fine-filter approach focuses on a single species' habitat requirements.

For each species or habitat issue, existing conditions of wildlife habitats are described and compared to the anticipated effects of the proposed No Action Alternative and Action Alternative to determine the foreseeable impacts to associated wildlife habitats.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program (MNHP) data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

Relevant Agreements, Laws, Plans, Rules, and Regulations

Various legal documents dictate management criteria for management of wildlife and their habitats on state lands. The documents most pertinent to this project include: DNRC Forest Management ARMs, the Endangered Species Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act.

COARSE FILTER WILDLIFE ANALYSIS

Of the 108 mammal species known for the state, 71 are suspected or known to occur in Lincoln County (Foresman 2001). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Eight amphibian and eight reptile species have also been documented in Lincoln County (Maxell et al. 2003) and at least 104 species of birds have been documented in the vicinity in the last 10 years (Lenard et al. 2003). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have increased and shade-tolerant species, such as Douglas-fir and grand fir have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats. However, within the vicinity of the project area, the forests are a mosaic of mature stands, which benefit species relying on mature forests, and regenerating forests, benefiting wildlife species that use early seral stages either exclusively or seasonally. Past timber harvesting that led to the early seral stages has likely reduced the quality and quantity of snags and coarse woody debris compared to historical conditions, reducing habitat for those wildlife species that require these components.

MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY

Issue: Timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely upon these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.

INTRODUCTION

A variety of wildlife species rely upon mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid non-forested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on 2 different cumulative effects analysis areas; the first was the 36,282-acre area used as the cumulative effects analysis area in the grizzly bear section (Poker Hill cumulative effects analysis area), and the second was the 63,739-acre portion of the Fisher River/ Wolf Creek drainages between the confluence of Calx Creek with Wolf Creek down to the

confluence between the Fisher River and Teepee Creek (Fisher-Wolf cumulative effects analysis area). The scale of each of these cumulative effects analysis areas would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, aerial photograph interpretation, and GIS analysis. Factors considered within the analysis include the level of timber harvesting, amount of densely forested habitats, and connectivity.

EXISTING ENVIRONMENT

The project area currently contains approximately 1,773 acres of mature stands (100 plus years in age) of mature Douglas-fir/western larch, Douglas-fir, and mixed conifer stands that have a reasonably closed canopy. These stands are interspersed with a variety of Douglas fir/western larch, Douglas-fir, ponderosa pine, and mixed-conifer stands of varying ages and stocking densities. There are at least 73 acres that meet the definition of old growth (Green et al. 1992) in the project area, with numerous other areas that were not field-verified to determine if they meet the requirements to be old growth. Generally, forested areas cover a large portion of the project area; relatively open forested conditions exist in portions of the project area that have been harvested in the last 30-40 years. Use of the project area by those species requiring connected forested conditions and/or forested interior habitats likely occurs. However, connectivity within the project area has been partially compromised with past timber harvesting and the network of open roads.

The network of open roads in the cumulative effects analysis area coupled with timber management within each of the cumulative effects analysis areas in the past 40 years has reduced landscape-level connectivity. No other timber management is proposed or ongoing on any of the DNRC-managed parcels in either of the cumulative effects analysis areas; timber harvesting could continue on other lands within the cumulative effects analysis areas. Across the cumulative effects analysis areas, landscape connectivity has been compromised, but some connectivity, particularly along streams and riparian features has been partially retained. Considerable forested habitats exist in the cumulative effects analysis areas, but much of these forested habitats have been bisected with roads and/or have been harvested in the past. There are areas of forested-interior habitats that provide habitats for the suite of species that rely upon these habitat conditions in both of the cumulative effects analysis areas; however, these habitats are far less common than they were historically.

ENVIRONMENTAL EFFECTS

<u>Direct and Indirect Effects of the No-Action Alternative on mature forested habitats and connectivity</u>

Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Forest conditions would continue to age and denser stands of shade-tolerant tree species with high amounts of canopy cover would gradually develop, thus providing potential improvements in habitats for species requiring mature forested habitats and/or connected landscapes. Continual conversion to shade-tolerant species would reduce the quality of habitat for pileated woodpeckers over time. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No changes in wildlife use would be expected. Habitats for forested interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would gradually improve with time; however ponderosa pine, western larch, and western white pine that are preferred snag species could decline in abundance over time. Thus, since 1) no changes to existing stands would occur, 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated, and 3) no changes to wildlife use would be expected, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area.

<u>Direct and Indirect Effects of the Action Alternative on mature forested habitats and connectivity</u>

Approximately 1,439 acres of ponderosa pine, Douglas-fir/western larch, Douglas-fir, and mixed-conifer stands would be harvested, including roughly 370 acres of mature stands with a relatively closed canopy. Roughly 318 acres (22%) of these acres of mature, forested habitats acres would receive an overstory removal-type treatment, which largely eliminate habitat for those species relying upon mature, closed-canopy forested habitats in those stands. This reduction in mature forested habitats would include the proposed harvesting of approximately 52 acres that meet the old-growth definition (see vegetation section). Overall, the resultant changes in stand age and density would largely eliminate low quality habitats for species associated with older stands, such as American

marten and pileated woodpeckers, while retaining habitats for species relying upon younger stands. Minor changes to landscape connectivity would be realized with the proposed harvesting; however, landscape connectivity has been compromised in the project area with past harvesting and the network of open roads. In general, under this alternative habitat conditions would improve for species adapted to more open forest conditions, while slowing the development of habitats for species that prefer dense, mature forest conditions. Thus, since 1) harvesting would reverse succession in several stands, further reducing stand age and the amount of mature, forested cover, 2) minor changes to landscape connectivity would occur, and 3) some changes to wildlife use would be expected, minor adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area.

Cumulative Effects of the No-Action Alternative on mature forested habitats and connectivity
Habitats in both of the cumulative effects analysis areas are a mosaic of habitat types and age classes. Past harvesting has reduced the amount of mature, forested habitats; however many of these previously-harvested stands would be expected to continue maturing with time. No changes in the amount of the cumulative effects analysis area in mature forested stands would be expected. Losses of individuals and pockets of trees would not likely alter the overall age or landscape connectivity. Ongoing activities on other ownerships could continue reducing forested habitats and/or altering connectivity; no other activities are occurring on DNRC-managed lands in the cumulative effects analysis areas nor are any activities proposed within either of the cumulative effects analysis areas. Under this alternative, use of the cumulative effects analysis areas by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would not be expected to change. Habitats for forested-interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would also not change. Thus, since 1) no changes to existing stands would occur, 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated, and 3) no appreciable changes to wildlife use would be expected, no cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative effects analysis areas.

Cumulative Effects of the Action Alternative on mature forested habitats and connectivity
Habitats in both of the cumulative effects analysis areas are a mosaic of habitat types and age classes. Past harvesting has reduced the amount of mature, forested habitats; however many of these previously-harvested stands would be expected to continue maturing with time. Reductions in mature, forested habitats would be additive to losses associated with past harvesting activities and any ongoing activities in the cumulative effects analysis areas. Across the cumulative effects analysis areas, some forested habitats would still exist and limited landscape connectivity would persist; negligible changes to landscape connectivity would be anticipated. Habitats for forested interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would be reduced further in these landscapes where these habitats are less common; however use of the cumulative effects analysis areas would not be expected to change appreciably. Thus, since 1) harvesting would remove mature stands along with mature trees in younger stands that could develop into mature stands in the future, which collectively would further reduce the availability of forested cover in the cumulative effects analysis areas, 2) negligible changes to landscape connectivity would occur, and 3) some changes to wildlife use would be expected, minor adverse cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative effects analysis area.

SNAGS AND COARSE WOODY DEBRIS

Issue: Timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.

INTRODUCTION

Snags and coarse woody debris are important components of forested ecosystems. The following are five primary functions of dead wood in the forested ecosystems: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide critical habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (Parks and Shaw 1996).

Snags and defective trees (e.g. partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual

component of Northern Rocky Mountain forests for wildlife species (Hejl and Woods 1991). The quantity, quality, and distribution of snags affect the presence and population size of many of these wildlife species relying on these resources. Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites (Bull et al. 1997). Many species that use smaller diameter snags will also use large snags; however, the opposite is not true. Typically, older-aged stands will have greater numbers of large snags. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting but having others nearby for foraging or roosting opportunities.

Meanwhile, coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food-storage sites for several wildlife species. Several mammals rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their capacity to meet these life requisites. Logs less than six feet in length tent to dry out and provide limited habitat for wildlife species. Single scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals an weasels, while log piles provide foraging sites for weasels and denning sites for lynx.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the on the 8 sections surrounding around each parcel as well as the remaining portion of the section in which the parcel is found, if it is not a whole parcel. This scale of analysis would be large enough to support a diversity of species that use coarse woody debris resources, from birds to small mammals and meso-carnivores.

Analysis Methods

Snags and coarse woody debris were assessed during site visits and reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags and coarse woody debris, and risk level of firewood harvesting.

EXISTING ENVIRONMENT

During field visits to the proposed units, between 0 and 6 variably spaced snags per acre of different sizes and species were observed. Large snags (>21" dbh) were fairly limited, but were more common in the Harris, Poker Hill, and McKillop parcels. Smaller snags (<15" dbh) and medium sized snags (15-21" dbh) existed across the project area. In portions of the project area, evidence of snag use for feeding and/or cavity building was observed. Elsewhere in the project area, units that have been harvested in the past decade or so typically have a few snags per acre and abundant coarse woody debris. However, the network of open roads in the project area has facilitated firewood gathering, which has affected snag and coarse woody debris levels in the vicinity.

Past harvesting in many of the cumulative effects analysis areas have reduced the availability of snags and snag recruits while increasing coarse woody debris levels, however depending upon the landowner, varying amounts were retained. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and firewood gathering likely occurs in many of the cumulative effects analysis areas given the network of open roads.

ENVIRONMENTAL EFFECTS

<u>Direct and Indirect Effects of the No-Action Alternative on snags and coarse woody debris</u>

No direct changes in the deadwood resources would be expected. Field data indicate that snag sizes and densities are rather varied across the units, but appear more heavily weighted towards the medium-sized snags (15-21" dbh), with a fairly high component of Douglas-fir and western larch. Some larger snags exist in portions of the project area. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. In the long-term, densities of shade-intolerant trees and resulting snags could decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Coarse woody debris would persist without other disturbances influencing its distribution and quality. Continued decay and decline in existing

snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, since, 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations, and 2) no changes to human access for firewood gathering would occur, negligible direct and indirect effects would be anticipated to snags and coarse woody debris would be expected to affect wildlife species requiring these habitat attributes.

Direct and Indirect Effects of the Action Alternative on snags and coarse woody debris
Present and future snags and CWD would be reduced due to timber harvesting on 1,439 acres within the project area. Field data indicate that snags sizes and densities are rather varied across the units, but numerous snags, mostly in the medium-size class (15-21" dbh) as well as some larger snags (21+" dbh) and some smaller sized snags (<15" dbh) would be retained. Those portions of the project area adjacent to open roads would not see appreciable changes in availability of large snags and/or coarse woody debris since these attributes are currently limited in those areas; similarly stands that lack larger snags also would not see appreciable changes in availability of large snags. Prescriptions call for a minimum of 1-2 large snags per acre (> 21 in. dbh where they exist, otherwise the next largest size class), 1-2 large snag recruits per acre (>21 in. dbh where they exist, otherwise the next largest size class), and 10-15 tons of CWD per acre would be planned for retention within the proposed units. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with ARM 36.11.411. Future snag quality in the harvested units would be enhanced with proposed silvicultural prescriptions that should lead to the re-establishment of shade-intolerant species that tend to provide important habitats, such as long lasting nesting structures and foraging habitats for cavity nesting birds. Given the amounts, range of variability in sizes, and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. No changes in human access would occur and thus no changes to the potential risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, since 1) harvesting would reduce snag, snag recruitment trees, while potentially increasing CWD levels, and 2) no changes to human access for firewood gathering would occur, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes.

Cumulative Effects of the No-Action Alternative on snags and coarse woody debris
Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during some of the past harvesting in some of the cumulative effects analysis areas. Firewood and other forest product gathering have reduced these deadwood resources in many of the cumulative effects analysis areas. Wildlife species in the cumulative effects analysis areas that rely on snags and coarse woody debris would be expected to persist. Thus, since 1) no further harvesting would occur, 2) negligible changes in the numbers of snags, and 3) no change in the level of firewood gathering, no cumulative effects to snags and coarse woody debris would be anticipated.

Cumulative Effects of the Action Alternative on snags and coarse woody debris
Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Across all the cumulative effects analysis areas, varied ownerships and management patterns have altered snags and coarse woody debris. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past harvesting and any potential ongoing harvesting. However, the proposed harvesting looks to retain a 1-2 large snags per acre (>21 in. dbh where they exist, otherwise the next largest size class), 1-2 large snag recruits per acre (> 21 in. dbh where they exist, otherwise the next largest size class), and 10-15 tons of CWD per acre would offset some of these additional cumulative effects. Additional field data indicates that in several of the proposed units, achieving the retention of large snags and recruits may be difficult, but that in several other units, more large snags and recruits than the minimum thresholds would likely persist. No changes in human access would be anticipated, thus no changes to the potential loss of snags and coarse woody debris to firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative effects analysis areas would be expected to persist at similar levels, with likely reduced use of the proposed harvest sites following treatment. Thus, since 1) a slight, but cumulative amount of the cumulative effects analysis areas would be harvested reducing snags and snag recruit trees while increasing CWD levels, 2) no changes in access for the general public and associated firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term,

minor adverse effects to wildlife requiring snags and CWD would be anticipated that would affect these species in the cumulative effects analysis areas.

FINE-FILTER ANALYSIS

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and species managed as big game by DFWP. Table W-1 summarizes how each species considered was included in the following analysis or removed from further analysis because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components. Given the nature of the project area with several scattered parcels, several tables were used to display habitat relationships and anticipated use areas by the wildlife being analyzed that further led to further delineation between the various parcels, including Table W-2, which dismisses certain species from being analyzed on certain parcels.

TABLE W-1 –Status of species considered in the fine filter analysis foe this proposed project.

SPECIES		DETERMINATION – BASIS
Threatened and Endangered Species	Grizzly Bear (*Ursus arctos*) Habitat: recovery areas, security from human activity	***Included*** – The Poker Hill section of the project area is in the 'occupied habitat' area, and the rest of the project area is outside of the 'occupied habitat' area.
	Canada Lynx (*Felis lynx*) Habitat: Subalpine-fir hab. types, dense sapling, old forest, deep snow zone	***Included*** – The Poker Hill section of the project area contains limited Canada lynx habitats.
	Gray Wolf (*Canis lupus*) Habitat: ample big game pops., security from human activity	***Included*** – Portions of the project area are within the annual home ranges of 2 different wolf packs.
Sensitive Species	Bald eagle (*Haliaeetus leucocephalus*) Habitat: late-successional forest <1 mile from open water	No further analysis conducted – The project area is roughly 3 miles from the nearest known bald eagle nest in the Wolf Mouth territory and is separated from the nest by large areas of unsuitable habitats. Thus, no direct, indirect, and cumulative effects to bald eagles would be expected as a result of either alternative.
	Black-backed woodpecker (*Picoides arcticus*) Habitat: mature to old burned or beetle-infested forest	No further analysis conducted – No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene salamander (*Plethodon idahoensis*) Habitat: waterfall spray zones, talus near cascading streams	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: grassland, shrubland, riparian, agriculture	No further analysis conducted – No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loon (*Gavia immer*)	No further analysis conducted – No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to

	Habitat: cold mountain lakes, nest in emergent vegetation	common loons would be expected to occur as a result of either alternative.
	Fisher (*Martes pennanti*) Habitat: dense mature to old forest <6,000 ft. elev. and riparian	***Included*** – Limited potential riparian fisher habitats occur in the project area.
	Flammulated owl (*Otus flammeolus*) Habitat: late-successional ponderosa pine and Doug.-fir forest	**Included** –Suitable dry ponderosa pine and Douglas-fir habitats occur within the project area.
	Harlequin duck (*Histrionicus histrionicus*) Habitat: white-water streams, boulder and cobble substrates	No further analysis conducted– no suitable high-gradient stream or river habitats occur in the project area. Thus, no direct, indirect, or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern bog lemming (*Synaptomys borealis*) Habitat: sphagnum meadows, bogs, fens with thick moss mats	No further analysis conducted – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine falcon (*Falco peregrinus*) Habitat: cliff features near open foraging areas and/or wetlands	No further analysis conducted – No suitable cliffs/rock outcrops occur within the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated woodpecker (*Dryocopus pileatus*) Habitat: late-successional ponderosa pine and larch-fir forest	***Included*** – Mature western larch/Douglas-fir, Douglas-fir, and ponderosa pine habitats exist in the project area.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: caves, caverns, old mines	No further analysis conducted –No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.
Big Game Species	Big Game Winter Range	***Included*** – White-tailed deer, mule deer, and elk winter range exists in the project area.
	Elk Security Habitat	No further analysis conducted – Limited elk security habitat exists in 1 parcel (Snell) and a couple of the parcels support small blocks that could contribute to larger security blocks outside of the state parcel, however since no changes to the amount of open roads nor any appreciable changes in cover for elk would occur, no changes to existing elk security habitats would be anticipated under either alternative. Thus, no direct, indirect, or cumulative effects to elk security habitat would be anticipated as a result of either alternative.

TABLE W-2 – Status of the project area parcels in relation to the included wildlife species.

	Poker Hill	**Harris Creek**	**McKillop**	**Snell**	**Richards**	**Backus**
Grizzly Bear	In "occupied habitat" area and will be analyzed.	Removed from further consideration. Outside of recovery zone and "occupied	Removed from further consideration. Outside of recovery zone and "occupied	Removed from further consideration. Outside of recovery zone and "occupied	Removed from further consideration. Outside of recovery zone and "occupied	Removed from further consideration. Outside of recovery zone and "occupied

		habitat".	habitat".	habitat".	habitat".	habitat".
Canada Lynx	Limited lynx habitats exist in the Poker Hill section and will be analyzed.	Removed from further consideration. No lynx habitats exist in the parcel.	Removed from further consideration. No lynx habitats exist in the parcel.	Removed from further consideration. No lynx habitats exist in the parcel.	Removed from further consideration. No lynx habitats exist in the parcel.	Removed from further consideration. No lynx habitats exist in the parcel.
Gray Wolf	Removed from further consideration. Outside of any known wolf pack annual home range.	Removed from further consideration. Outside of any known wolf pack annual home range.	In Meadow Peak wolf pack area and will be analyzed.	In Meadow Peak wolf pack area and will be analyzed.	In Meadow Peak wolf pack area and will be analyzed.	In Wolf Prairie wolf pack area and will be analyzed.
Fisher	Habitats present along Hoodoo Creek and will be analyzed.	Habitats present along Harris Creek and will be analyzed.	Habitats present along North McKillop Creek and will be analyzed.	Habitats present along Snell Creek and will be analyzed.	Removed from further consideration. No habitats exist in the parcel.	Removed from further consideration. No habitats exist in the parcel.
Flammulated Owl	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.
Pileated Woodpecker	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.	Habitats present in the parcel and will be analyzed.
Big Game Winter Range	White-tailed deer winter range exists in the parcel and will be analyzed.	White-tailed deer, mule deer, and elk winter range exists in the parcel and will be analyzed.	White-tailed deer, mule deer, and elk winter range exists in the parcel and will be analyzed.	White-tailed deer, mule deer, and elk winter range exists in the parcel and will be analyzed.	White-tailed deer, mule deer, and elk winter range exists in the parcel and will be analyzed.	White-tailed deer, mule deer, and elk winter range exists in the parcel and will be analyzed.

THREATENED AND ENDANGERED SPECIES

In northwestern Montana, 3 terrestrial species are classified as "threatened" or "endangered" under the Endangered Species Act of 1973. The grizzly bear and Canada lynx are classified as "threatened," and the gray wolf is classified as "endangered" under this act. The USFWS recently de-listed the gray wolf (March 28, 2008); however, a preliminary injunction recently (July 18, 2008) lead to the re-listing of wolves in this area as "endangered." Following the injunction, the USFWS requested the Court allow them to voluntarily withdraw its decision to delist wolves and re-evaluate information and make a new decision, which was granted (October 14, 2008). Subsequently, USFWS has reopened the public comment period on its proposal to delist gray wolves in the Rocky Mountains (October 24, 2008). Thus, gray wolves are listed as "endangered" currently and will be included in this section.

GRIZZLY BEAR

Issue: Timber harvesting and associated activities could alter cover, increase access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.

INTRODUCTION

Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. Within the project area, primary habitat components include meadows, riparian areas, and big game winter ranges. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (Mace and Waller 1997). Forest-management activities may affect grizzly bears by altering cover and/or by increasing access to humans into secure areas by creating roads (Mace et al. 1997). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in an increased risk of human-caused mortality by bringing humans and bears closer together and/or making bears more detectable, which can increase their risk of being shot illegally. Displacing bears from preferred areas may increase their energetic costs, which, may in turn, lower their ability to survive and/or reproduce successfully.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the Poker Hill portion of the project area. Cumulative effects were analyzed on a 36,282-acre area that includes the portion of the "occupied habitat" adjacent to the Snowshoe, St. Paul, and Cedar subunits of the Cabinet-Yaak Ecosystem between the Kootenai River and Swamp Creek. This combined area approximates the home range size of a female grizzly bear.

Analysis Methods

Field evaluations, aerial photograph interpretation, and GIS analysis were the basis for this analysis. Open road densities in the cumulative effects analysis area were calculated using a simple linear calculation method and areas that are free of motorized human access that could contribute to security habitats were determined using GIS. Security habitats are areas that are > 0.3 miles (500 meters) from any open road, restricted road, or high use roads and trails and meet a minimum size of 2,500 acres. Factors considered in the analysis include amount of the area with open road densities greater than 1 mile per square mile, the amount of available security habitat, and availability of timbered stands for hiding cover.

EXISTING ENVIRONMENT

The Poker Hill portion of the project area is outside of the Cabinet-Yaak Recovery Area, but within "occupied habitat" as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (T. Wittinger, Unpub. Interagency Map). The rest of the project area is outside of both the recovery zone and the "occupied habitat" area and use is unlikely, thus the remainder of this analysis will only focus on the Poker Hill parcel and associated cumulative effects analysis area. Grizzly bears have not been documented in the project area, but use of the Poker Hill section is possible. Grizzly bears generally use different habitats relative to season. The project area primarily provides habitat for grizzly bears in the spring, due to the lower elevations and the presence of riparian areas in which vegetation greens up earlier in the spring. Summer or autumn habitat values are moderate to low in the area.

Managing human access is a major factor in management for grizzly bear habitat. Open road densities in the cumulative effects analysis area are quite high with approximately 5.04 miles/square mile (simple linear calculation). No security habitat exists in the project area, and no security habitat exists in the cumulative effects analysis area due to the existing network of open roads. Considerable hiding cover exists within both the project area and cumulative effects analysis area. Within the cumulative effects analysis area, there is no ongoing harvesting on DNRC-managed lands, but the harvesting and human development could be occurring on other ownerships, which may be altering grizzly bear habitats and/or human disturbance levels.

ENVIRONMENTAL EFFECTS

<u>Direct and Indirect Effects of the No-Action Alternative on Grizzly Bears</u>

No direct effects to grizzly bears would be expected. No changes to the level of disturbance to grizzly bears would be anticipated. No changes in security habitat, open-road densities, or hiding cover would be anticipated.

Thus, since: 1) no disturbance or displacement would be expected, 2) no changes in hiding cover would occur, 3) security habitat would not be altered, and 4) no changes in long-term open road densities would be anticipated, no direct or indirect effects to grizzly bears would be anticipated.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing impacts to grizzly bears. The proposed harvesting would likely occur during the non-denning period, which would likely have minor direct effects to grizzly bears. Use of the project area by grizzly bears would likely be the greatest during the spring and mitigations to avoid the spring period (April 1 – June 15) would further reduce the likelihood of disturbing and displacing grizzly bears. Overall, the proposed activities would occur in areas where low levels of grizzly bear use would be anticipated or would occur during the time periods when grizzly bears would not be expected to be using the area, leading to negligible disturbance and displacement of grizzly bears.

Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on much of the 1,439 acres proposed for harvesting. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in many of the units, albeit at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrub regeneration proceeds over the next 5 to 10 years. Security core would not be entered or altered with this alternative.

No new roads would be constructed with the proposed activities, and all roads would revert to the existing status after proposed harvesting, thus no changes to open road densities, total road densities, public motorized access, or non-motorized human access levels would be anticipated. Thus, since 1) negligible disturbance and displacement would be anticipated, 2) hiding cover would be reduced in parts of the project area, but would remain in other parts, and would be expected to recover in the short-term, 3) no changes to security habitats would be expected, and 4) no changes to long-term open road densities or total road densities would be anticipated; minor adverse direct or indirect effects to grizzly bears in the local area would be expected in the short-term.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

Motorized access to the area, security habitat, and hiding cover would all remain unchanged. Existing forested stands throughout the cumulative effects analysis area would be expected to persist into the future; in the long term, forest succession would continue and may reduce food sources, but may increase the amount of hiding cover in the subunit. Human disturbance levels would be expected to continue into the future. No changes to existing levels of security habitats would be anticipated. Any potential disturbance and/or habitat modification associated any ongoing harvesting and development on other ownerships could continue. Thus, since 1) no changes in human disturbance levels would be expected, 2) no further losses of hiding cover would occur, 3) no changes to security habitats would be anticipated, and 4) no changes to open road densities would occur, no further adverse cumulative effects would be expected to affect grizzly bears in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Grizzly Bears

The increased use of road systems during the proposed project would temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis area. Proposed activities would occur in one of the areas within the cumulative effects analysis area already experiencing relatively moderate levels of human disturbance due to roads and private ownership and any disturbance associated with proposed activities would be additive to these other disturbances. Any use of the cumulative effects analysis area by grizzly bears would be expected to continue at similar levels. Reductions in hiding cover would be additive to the reductions from past timber harvesting as well as more permanent land-cover changes in the cumulative effects analysis area; however, appreciable amounts of the cumulative effects analysis area are currently providing hiding cover. No changes to existing security habitats would be anticipated. No changes in long-term open-road densities would be expected in the cumulative effects analysis area; a fairly extensive road system would persist that would facilitate considerable human access within the cumulative effects analysis area. Thus, since 1) minor increases in human disturbance levels would be expected within the cumulative effects analysis area, 2) hiding cover would be reduced within portions of the project area in the short-term, which accounts for a small portion of the cumulative

effects analysis area, 3) no changes to security habitats would be expected, and 4) no changes in long-term open road densities would be anticipated; minor adverse cumulative effects to grizzly bears would be expected in the short-term.

CANADA LYNX

Issue: Timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components, leading to a decreased ability for the area to support lynx.

INTRODUCTION

Canada lynx are listed as "threatened" under the Endangered Species Act. Currently, no recovery plan exists for Canada lynx, but a draft recovery plan outline has been written (USFWS 2005) and is being further developed and considered by the USFWS. Additionally, critical habitat has been proposed by USFWS, but does not include the project area.

Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). The proposed project area ranges from approximately 3,040 to 3,640 feet in elevation and on DNRC ownership is dominated by Douglas-fir/western larch with smaller amounts in mixed conifers and lodgepole pine. Lynx habitat in western Montana consists primarily stands that provide habitat for snowshoe hares, either dense, young coniferous stands or dense, mature forested stands, as well as mature subalpine fir types with abundant coarse woody debris for denning and cover for kittens, and densely forested cover for travel and security. These conditions are found in a variety of habitat types, particularly within the subalpine fir series (Pfister et al. 1977). Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) within continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce created extensive even-aged patches of regenerating forest intermixed with quite old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the Poker Hill portion of the project area. Cumulative effects were analyzed on the 36,282-acre cumulative effects analysis area defined in the grizzly bear section. This scale of analysis approximates the home range size of a lynx (Ruediger et al. 2000).

Analysis Methods

To assess lynx habitat, DNRC SLI data were used to map specific habitat classes used by lynx. Lynx habitat (ARM 36.11.403(40)) was assigned to a stand if the SLI data indicated habitat types (Pfister et al. 1977) that are consistent with those reportedly used by lynx (Ruediger et al. 2000). Other parameters (stand age, canopy cover, and amount of coarse woody debris) were used in modeling the availability of the following 5 specific lynx habitat elements:

1) denning,
2) young foraging,
3) mature foraging,
4) forested travel/other habitat, and
5) temporary non-lynx habitats.

Denning habitat provides important vegetative and woody structure needed to provide denning sites and security for juvenile lynx, while foraging habitat is critical for the survival of both adult and juvenile lynx. "Forested travel/other habitat" is a general habitat category that provides for secondary prey items and contains modest levels of forest structure usable by lynx. Temporary non-lynx habitat consists of non-forest and open forested stands that are not expected to be used by lynx until adequate horizontal cover reestablishes. Factors considered in the analysis include landscape connectivity and the amount of the cumulative effects analysis area in denning, foraging, and unsuitable habitats.

EXISTING ENVIRONMENT

Approximately 372 acres of lynx habitats (Table W-3) occur in the project area. Most of this habitat was identified as mature foraging habitats, with lesser amounts of forested travel/other and temporarily non-lynx habitats.

Collectively, lynx habitats in the project area are fairly limited in quality and quantity. Connectivity within the project area has been partially compromised with past timber harvesting and the network of open roads.

Habitats on DNRC-managed parcels in the cumulative effects analysis area are dominated by mature foraging, forested travel/other habitats, and temporary non-habitat with slightly less amounts of denning habitats (Table W-3). Habitat types that are commonly associated with Canada lynx are abundant in the cumulative effects analysis area, and coupled the combination of past timber harvesting and the lack of recent wildfire has developed a mosaic of lynx habitats across the cumulative effects analysis area. The lack of fire, including the effects of fire suppression, across the cumulative effects analysis area has led to the development and maintenance of mature foraging, denning, and forested travel/other habitats. Administrative rules of Montana (ARM 36.11.435 (8)(a) & (b)) require a minimum of 5 acres of denning habitats and 10 percent of the lynx habitats be in foraging habitats. Currently, the project area lacks any mapped denning habitats, so meeting the 5-acre minimum would not be possible, but adequate amounts of foraging habitats exist to exceed the threshold for foraging habitats established in the ARMs (Table W-3). With time, some of these mature foraging habitats could mature into denning habitats. Within the cumulative effects analysis area, there is no proposed or ongoing harvesting on DNRC-managed parcels; ongoing harvesting on other ownerships could be altering lynx habitats. Across the cumulative effects analysis area, landscape connectivity has been compromised by past harvesting and road construction, but some connectivity, particularly along streams and riparian features has been partially retained.

ENVIRONMENTAL EFFECTS

Direct and Indirect Effects of the No-Action Alternative on Canada Lynx

In the short-term, no changes in lynx habitat elements would be expected in the project area. In the longer term, natural succession would advance several classes forward, generally improving numerous classes of lynx habitats; however the net reduction in young foraging habitats would be expected in the absence of new regenerating stands to replace the stands succeeding out of young foraging habitats. When this occurs, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx. Mature foraging and denning habitats would be expected to remain at similar levels or increase in the future as shade-tolerant trees develop in the understory and coarse woody debris accumulates through time due to natural events. Therefore, in the short term, no effects to lynx would be expected. In the longer-term, without disturbance, young foraging opportunities in the project area would decrease. Landscape connectivity would not be altered in the near-term and may improve in the long-term. Thus, since: 1) denning habitats would continue to be absent in the short-term, 2) sufficient mature foraging habitat would exist, 3) longer term availability of young foraging habitats would likely decline without disturbance, 4) limited amounts of lynx habitats would be in the temporary non-lynx habitat category meaning most of the lynx habitats would be in a usable state for lynx, and 5) landscape connectivity would not be altered, no direct and indirect effects to lynx habitats would be expected.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 81 acres of lynx habitats would be harvested with this alternative (Table W-4). Within units proposed to receive overstory removal prescriptions, canopy cover and horizontal cover would be reduced to promote growth in the residual trees. These prescriptions would convert available lynx habitats (mostly mature foraging) into temporary non-lynx habitats (Table W-4). Continued maturation of the younger, residual trees would gradually move these stands towards forested travel/other habitats. In the proposed units, 10 to 15 tons of coarse woody debris would be retained to provide some horizontal cover and security structure for lynx. In the short-term, lynx would likely avoid proposed harvest units that would be converted to temporary non-lynx habitat; given low quality habitats in the project area, no appreciable change in use would be anticipated, thus any habitat shifts would not be expected to affect lynx in the project area. The increase in temporary non-habitat would increase the amount of the project area that is unsuitable above the 30% threshold recommended by Ruediger at al. (2000), but again the project area is not expected to receive considerable use. Forest connectivity would be slightly reduced, but some connectivity around the units would be maintained through riparian buffers and other forested habitats in the project area not altered. Collectively, since: 1) denning habitats would continue to be absent, 2) sufficient mature foraging habitats would exist, 3) young foraging habitats would decline in quality, 4) moderate to high amounts of lynx habitats would be in the temporary non-lynx habitat category meaning most of the lynx habitats would be in a usable state for lynx, and 5) some further reduction in landscape connectivity would be anticipated, minor adverse direct and indirect effects to lynx habitats that would be expected to affect Canada lynx.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable changes in lynx habitats would occur under this alternative (Table W-4) except for the continued maturation of stands. No other DNRC-projects would be occurring or are proposed in the cumulative effects analysis area; existing lynx habitats would persist. Any ongoing management on other ownerships could continue altering lynx habitats. Across all ownerships, continued stand maturation, in the absence of other disturbance, would move temporary non-lynx habitat towards young foraging habitat or forested travel/other habitat. Gradually, however, as these young foraging stands continue maturing out of the young foraging category and into forested travel/other habitats, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx in the long-term. Similarly, mature foraging and denning habitats would be expected to increase in the future as shade-tolerant trees develop in the understory, coarse woody debris accumulates through time due to natural events, and in general stands continue maturing out of young foraging and forested travel/other habitats. In the longer-term, without disturbance, young foraging opportunities could decrease as stands mature towards mature foraging, denning, and forested travel/other habitats. The 31% of the cumulative effects analysis area on DNRC-managed lands that are temporary non-lynx habitats would gradually develop into suitable lynx habitats; similarly, temporary non-habitat on adjacent ownerships would also improve with time. No further changes in landscape connectivity would be anticipated due to DNRC activities. Thus, since: 1) adequate denning habitats would persist, 2) sufficient mature foraging habitats would exist, 3) limited young foraging habitats would gradually decline in quality due to advances in succession, thus habitat quality for snowshoe hares would decline through time, 4) a relatively high amount of the cumulative effects analysis area would be in temporary non-habitat, and 5) landscape connectivity would persist, minor beneficial cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Canada Lynx

Within the cumulative effects analysis area, considerable lynx habitats would continue to persist (Table W-4). Reductions in mature foraging habitats in the proposed units would not be expected to appreciably alter lynx use of the cumulative effects analysis area. These reductions and the subsequent increase in temporary non-lynx habitats would be additive to existing temporary non-lynx habitats that exist in the cumulative effects analysis area, which are already rather high on DNRC-managed parcels as well as within the larger cumulative effects analysis area. The amount of DNRC-managed lands in the cumulative effects analysis area that are unsuitable for lynx would increase from 31% to 34%. Following harvesting, sufficient denning and foraging habitats would be retained (Table W-4) to satisfy DNRC's commitment (ARM 36.11.435) for lynx habitats. No other DNRC-projects would be occurring or are proposed in the cumulative effects analysis area; existing lynx habitats would persist. Any ongoing management on other ownerships could continue altering lynx habitats. Across all ownerships, continued stand maturation, in the absence of other disturbance, would move temporary non-lynx habitat towards young foraging habitat or forested travel/other habitat. Gradually, however, as these young foraging stands continue maturing out of the young foraging category and into forested travel/other habitats, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx in the long-term. Similarly, mature foraging and denning habitats would be expected to increase in the future as shade-tolerant trees develop in the understory, coarse woody debris accumulates through time due to natural events, and in general stands continue maturing out of young foraging and forested travel/other habitats. In the longer-term, without disturbance, young foraging opportunities could decrease as stands mature towards mature foraging, denning, and forested travel/other habitats. Landscape connectivity would be further reduced in the cumulative effects analysis area with the proposed harvesting. Thus, since: 1) adequate denning habitats would persist, 2) sufficient mature foraging habitats would exist, 3) young foraging habitats would continue developing for the next 20-50 years across the cumulative effects analysis area, 4) moderate to high amounts of lynx habitats would be in the temporary non-lynx habitat category, and 5) reductions in landscape connectivity would not prevent lynx movements, minor adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area.

TABLE W-3– Existing acres and proportions of lynx habitat elements on DNRC lands in the project area and cumulative effects analysis area.

	PROJECT AREA		CUMULATIVE EFFECTS ANALYSIS AREA	
LYNX HABITAT ELEMENT	ACRES	PERCENT OF LYNX HABITATS	ACRES	PERCENT OF LYNX HABITATS

Denning	0	0%	222	10%
Mature foraging	303	82%	756	34%
Forested travel/other	16	4%	549	24%
Young foraging	5	1%	23	1%
Temporary non-habitat	48	13%	685	31%
Grand Total-Lynx Habitats	372	100%	2,235	100%
Permanently Unsuitable	225		7,231	
Total Acres	597		9,466	

TABLE W-4– Changes in lynx habitat elements following implementation of the each of the alternatives in the project area and the cumulative effects analysis area.

	Project Area		**Cumulative Effects Analysis Area**	
LYNX HABITAT ELEMENT	**No Action Alternative**	**Action Alternative**	**No Action Alternative**	**Action Alternative**
Denning	0 (0%)	0 (0%)	222 (10%)	222 (10%)
Mature foraging	303 (82%)	227 (61%)	756 (34%)	680 (30%)
Forested travel/other	16 (4%)	16 (4%)	549 (24%)	549 (24%)
Young foraging	5 (1%)	1 (0%)	23 (1%)	19 (1%)
Temporary non-habitat	48 (13%)	129 (35%)	685 (31%)	765 (34%)
Grand Total-Lynx Habitats	**372**	**372**	**2,235**	**2,235**
Permanently Unsuitable	225	225	7,231	7,231
Total Acres	**597**	**597**	**9,466**	**9,466**

GRAY WOLF

Issue: Timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites and/or alter prey availability.

INTRODUCTION

The gray wolf was listed as "endangered" under the Endangered Species Act in the northern portion of Montana, which includes the project area. To meet the delisting criteria, the 3 recovery areas need to support a minimum of 30 breeding pairs for 3 consecutive years. The 3 recovery zones have met the recovery objectives for breeding pairs since 2000. In 2007, 107 packs that met the definition of a 'breeding pair" were documented within the tri-state region (USFWS et al. 2008). Of those 107 packs, 73 occurred in Montana, with 23 of those found in northern Montana portion of the recovery area along with 13 additional packs that didn't meet the requirements to be considered a "breeding pair" (Sime et al. 2008).

Wolves are a wide-ranging, mobile species that occupy a wide range of habitats, which possess adequate prey and minimal human disturbance, especially at den and/or rendezvous sites. Wolves are opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities (Oakleaf et al. 2006, Fuller et al. 1992). Wolves prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (Kunkel et al. 1999). However, some studies have shown that wolves may prey upon elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher (Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006). Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

Wolves typically den during late April in areas with gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. When the pups are 8 to 10 weeks old, wolves leave the den site and start leaving their pups at rendezvous sites while hunting. These sites are used throughout the summer and into the fall. Disturbance at den or rendezvous sites could result in avoidance of these areas by the

adults or force the adults to move the pups to a less adequate site. In both situations, the risk of pup mortality increases.

Analysis Area
Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the Meadow Peak and Wolf Prairie wolf pack areas, depending upon the section (Table W-2).

Analysis Methods
Since changes in winter range could have a sizable effect on availability of prey for wolves, portions of the analysis are tied to the big game winter range section, meanwhile, disturbance at den and rendezvous sites are important during certain portions of the year, timing of proposed activities in relation to these sites is also important. Direct and indirect as well as cumulative effects were analyzed using field evaluations, aerial photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of winter range modified and level of human disturbance in relation to any known wolf dens or rendezvous sites.

EXISTING ENVIRONMENT
Big game species are fairly abundant in the project area and considerable amounts of big game winter range (refer to the big game section for compete details) exist in the project area. Within the project area, numerous landscape features commonly associated with denning and rendezvous sites occur, including meadows and openings, big game winter range, and several water sources. Several wolf packs have been in the area in the past, with portions of the project area falling into the annual home ranges of at least 2 wolf packs; the Snell, Richards, and McKillop parcels were in the Meadow Peak home range in 2007, and the Backus parcel was not in an annual home range in 2007, but was in the 2006 range of the Wolf Prairie wolf pack along with portions of the Richards parcel. These home ranges would be expected to shift slightly annually, thus wolves would be expected to continue to be found in most or all of the parcels in the project area into the future. Wolves may be using the vicinity of the project area for hunting, breeding, and other life requirements. Approximately 2,102 acres of big game winter range exists in the project area. No known den or rendezvous sites occur in the project area; however, landscape features frequently associated with these sites occur in the project area.

Within the Meadow Peak and Wolf Prairie wolf pack home ranges, big game species are abundant and winter range is fairly widespread. Numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, and considerable big game winter range occurs in each of these pack areas. Both of these wolf packs have had reproductive set-backs in the recent, with both packs losing the alpha-females to human-induced mortality. Reproduction this past year in the Meadow Peak wolf pack was not suspected; reproduction in the Wolf Prairie pack is also unknown for 2008. Den sites and rendezvous sites for these wolf packs are unknown, and could occur in the vicinity of the project areas; however these packs have not been documented to be reproducing in the last few years (*K. Laudon, DFWP, personal communication, January 30, 2009).* Wolves from these packs would be expected to continue using this area into the future. Past harvesting on all ownerships in the wolf pack home ranges likely altered big game and wolf habitats. Similarly, ongoing harvesting on other ownerships in the wolf home ranges may be altering white-tailed deer use, and subsequently wolf use, while elevating human disturbance levels. No other DNRC activities are occurring in either of the wolf pack home ranges, and thus no changes in white-tailed deer use, wolf use, or human disturbance levels due to DNRC activities are occurring.

ENVIRONMENTAL EFFECTS
<u>Direct and Indirect Effects of the No-Action Alternative on Gray Wolves</u>
Disturbance to wolves would not increase. No changes in big game habitat, including no changes to forested cover on white-tailed deer, mule deer, or elk winter range would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. Wolf use of the project area would be expected to continue at current levels. Thus, since 1) no changes in human disturbance levels would occur, and 2) no changes to big game winter range would occur, no direct and indirect effects would be expected to affect gray wolves in the project area.

Direct and Indirect Effects of the Action Alternative on Gray Wolves
Wolves using the area could be disturbed by harvesting activities, and are most sensitive at den and rendezvous sites, which are not known to occur within the project area. After harvesting activities, human disturbance levels would likely revert to pre-harvest levels and no changes in human access or open road densities would be anticipated. Likewise, wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. In the short term, the proposed harvest units could lead to shifts in big game use, which could lead to a shift in wolf use of the project area. Reduction of thermal cover and snow intercept on roughly 877 acres of big game winter range would not be expected to alter big game survival appreciably, thus little or no change in wolf prey would be anticipated. Thus, since 1) minor, short-term increases and negligible long-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites anticipated, and 2) no changes to big game winter range would occur, negligible direct and indirect effects would be expected to affect gray wolves in the project area.

Cumulative Effects of the No-Action Alternative on Gray Wolves
White-tailed deer, mule deer, and elk winter range would not be affected and substantive change in big game populations, distribution, or habitat use would not be anticipated. Levels of human disturbance would be expected to remain similar to present levels. No other DNRC activities would be occurring or are proposed in either of the wolf pack home ranges that could be causing shifts in white-tailed deer use and subsequently gray wolf use of the home ranges. Thus, since 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites, and 2) no changes to big game winter range would occur, no further cumulative effects would be expected to affect gray wolves in the Meadow Peak or Wolf Prairie wolf packs.

Cumulative Effects of the Action Alternative on Gray Wolves
Some slight shifts of big game use may occur. Reductions in cover may cause slight decreases in use by deer and elk; however, no appreciable changes would be expected within either of the wolf pack home ranges. Reductions in thermal cover and snow intercept within small portions of each of the wolf pack home ranges could cause shifts in winter use, but would not be expected to alter big game survival. These reductions in cover and particularly winter range cover and snow intercept would be additive to losses from past timber-harvesting activities and any potential habitat alterations associated with any ongoing harvesting on other ownerships within the wolf pack home ranges. Human-disturbance levels would be expected to revert to levels similar to current levels after the proposed harvesting has been completed and roads would again be closed. No substantive change in wolf use of the Meadow Peak or Wolf Prairie wolf pack home ranges would be expected; wolves would continue to use the area in the long term. Thus, since 1) negligible short-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites being anticipated, and 2) negligible changes to big game winter range would occur, negligible further cumulative effects would be expected to affect gray wolves in the Meadow Peak or Wolf Prairie wolf packs.

SENSITIVE SPECIES

When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or may, if management activities result in continued adverse impacts, become listed under the Federal Endangered Species Act. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the Montana Natural Heritage Database documented common loons and bald eagles in the vicinity of the project area. As shown in Table W-1, the sensitive species portion of this analysis will focus on fisher, flammulated owls, and pileated woodpeckers.

FISHER

Issue: Timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.

INTRODUCTION

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds (Powell and Zielinski 1994). They also take advantage of carrion and seasonally available fruits and berries (Foresman 2001). Fishers use a variety of successional stages, but are

disproportionately found in stands with dense canopies (Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994) and avoid openings or young forested stands (Buskirk and Powell 1994). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (Jones 1991). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on 2 different cumulative effects analysis areas; the first was the 36,282-acre area used as the cumulative effects analysis area in the grizzly bear section (Poker Hill cumulative effects analysis area), and the second was the 36,823-acre portion of the Fisher River drainage between the confluence of Wolf Creek and Teepee Creek (Fisher River cumulative effects analysis area). The scale of each of these cumulative effects analysis areas includes enough area to approximate overlapping home ranges of male and female fishers (Heinemeyer and Jones 1994).

Analysis Methods

To assess potential fisher habitat and travel cover on DNRC-managed lands in the cumulative effects analysis area, sawtimber stands within preferred fisher covertypes (ARM 36.11.403(60)) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to streams and based upon stream class. Effects were analyzed using field evaluations, GIS analysis of potential habitat, and aerial photograph interpretation. Factors considered include amount of suitable fisher habitats, landscape connectivity, and human access.

EXISTING ENVIRONMENT

The project area ranges from 2,800 to 5,720 feet in elevation, with approximately 3.8 miles of perennial streams and roughly 2.5 miles of intermittent streams. DNRC manages preferred fisher covertypes within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the saw-timber size class in moderate to well-stocked density (ARM 36.11.440(1)(b)(i)). Approximately 106 acres are in these riparian areas in the project area along the Class 1 and 2 streams. Modeling fisher habitats using SLI data generated an estimate of 1,585 acres of fisher foraging, resting, denning, and travel habitats (1,498 upland acres and 87 riparian acres; Table W-5) in the project area (Heinemeyer and Jones 1994). Within the riparian areas, most of the preferred fisher covertypes (87 of 90 acres, or 97%) are moderately or well-stocked and likely support the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity. Considerable amounts of the project area are unsuitable covertypes consisting of a high percentage of ponderosa pine and dry Douglas-fir.

Within the Poker Hill cumulative effects analysis area there are roughly 1,472 acres within 100 feet of the 61 miles of perennial streams and 50 feet of the 111 miles of intermittent streams. Within the Fisher River cumulative effects analysis area there are roughly 2,844 acres within 100 feet of the 28 miles of perennial streams and 50 feet of the 67 miles of intermittent streams. Within the riparian habitats on DNRC-managed lands in the Poker Hill cumulative effects analysis area, roughly 85.5 percent (105 of 123 acres) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats, which exceeds the required threshold of 75 percent. Additionally, roughly 3,154 acres of upland fisher habitats exist on DNRC-managed lands in the Poker Hill cumulative effects analysis area. Within the riparian habitats on DNRC-managed lands in the Fisher River cumulative effects analysis area, roughly 100 percent (53 of 53 acres) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats, which exceeds the required threshold of 75 percent. Additionally, roughly 1,150 acres of upland fisher habitats exist on DNRC-managed lands in the Fisher River cumulative effects analysis area. Preferred fisher covertypes occur across portions of the cumulative effects analysis areas; suitable habitats likely occur on a smaller subset of those lands. The networks of open roads in the cumulative effects analysis areas coupled with timber management within each of the cumulative effects analysis areas in the past 40 years has reduced landscape-level connectivity. No other timber management is proposed or ongoing on any of the DNRC-managed parcels in either of the cumulative effects analysis areas; timber harvesting could continue on other lands within the cumulative effects analysis areas. Across

the cumulative effects analysis areas, landscape connectivity has been compromised, but some connectivity, particularly along streams and riparian features has been partially retained.

TABLE W-5 - Acres of preferred covertypes [1] and fisher habitats [2] on DNRC lands in each parcel following each alternative.

		Alternative	
Parcel	**Fisher Habitat**	**No Action Alternative**	**Action Alternative**
Poker Hill	Acres of upland preferred fisher covertypes [1]	440	440
	Acres of upland fisher habitats [2]	379	316
	Percent of upland fisher habitats [2] remaining	**86%**	**72%**
	Acres of riparian preferred fisher covertypes [1]	38	38
	Acres of riparian fisher habitats [2]	35	35
	Percent of riparian fisher habitats [2] remaining	**92%**	**92%**
McKillop	Acres of upland preferred fisher covertypes [1]	489	489
	Acres of upland fisher habitats [2]	483	471
	Percent of upland fisher habitats [2] remaining	**99%**	**96%**
	Acres of riparian preferred fisher covertypes [1]	33.6	33.6
	Acres of riparian fisher habitats [2]	33.6	33.6
	Percent of riparian fisher habitats [2] remaining	**100%**	**100%**
Snell	Acres of upland preferred fisher covertypes [1]	112	112
	Acres of upland fisher habitats [2]	112	106
	Percent of upland fisher habitats [2] remaining	**100%**	**95%**
	Acres of riparian preferred fisher covertypes [1]	5	5
	Acres of riparian fisher habitats [2]	5	5
	Percent of riparian fisher habitats [2] remaining	**100%**	**100%**
Harris Creek	Acres of upland preferred fisher covertypes [1]	524	524
	Acres of upland fisher habitats [2]	524	382
	Percent of upland fisher habitats [2] remaining	**100%**	**73%**
	Acres of riparian preferred fisher covertypes [1]	14	14
	Acres of riparian fisher habitats [2]	14	5
	Percent of riparian fisher habitats [2] remaining	**100%**	**36%**
Total	Acres of upland preferred fisher covertypes [1]	1,564	1,564
	Acres of upland fisher habitats [2]	1,498	1,280
	Percent of upland fisher habitats [2] remaining	**96%**	**82%**
	Acres of riparian preferred fisher covertypes [1]	90	90
	Acres of riparian fisher habitats [2]	87	78
	Percent of riparian fisher habitats [2] remaining	**97%**	**87%**

[1] Preferred covertypes are selected types used by fisher—this includes all stand stages.
[2] Fisher habitats are those lands in preferred covertypes that are sawtimber size class in moderate to well-stocked density.

ENVIRONMENTAL EFFECTS

Direct and Indirect Effects of the No-Action Alternative on Fishers

No effects to fishers would be expected under this alternative. Minimal changes to the stands providing fisher habitats would be expected. The limited habitats that are conducive to fisher denning and travel may improve in time due to increases in tree growth and canopy closure; however, foraging opportunities may decline in future decades if disturbance is minimized, as habitats such as edges and younger age-class stands that support a variety

of prey species would decline in abundance on the landscape. Human disturbance and potential trapping mortality would be expected to remain similar to current levels. No changes in landscape connectivity would occur. Thus, since: 1) no changes to existing habitats would be anticipated, 2) landscape connectivity would not be altered, 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated, and 4) no changes to human access or potential for trapping mortality would be anticipated, no direct and indirect effects would affect fishers in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 8.8 acres of the 90 acres (10%) of riparian fisher habitats in the project area would be included in proposed units. Almost all of this acreage (8.7 of 8.8 acres; 99%) is associated with Harris Creek. Based upon field verification it was determined that the unit boundary was more than 50 feet from the stream for much of the length of the stream within that section, so this is likely an over-estimation of the amount of riparian acreage included in the proposed unit. Overall these riparian habitats would be less suitable for fisher after proposed harvesting utilizing old growth maintenance prescriptions yielding stands that would be too open for use by fisher. Retention of numerous a few trees (1-2/acre), several large snags (2-4/acre), and coarse woody debris (10 – 15 tons/acre) would benefit fisher and could facilitate some use by fisher. Additionally, approximately 223 of the 1,498 acres (14.9%) of upland fisher habitats within the project area would receive treatments, with much of those acres likely being too open for appreciable fisher use. No changes in open roads would be anticipated, which would not likely alter trapping pressure and potential for fisher mortality. Minor reductions in connectivity would be expected where connectivity has already been compromised (see WILDLIFE- MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY). Thus, since: 1) harvesting would largely avoid riparian areas, 2) harvesting would reduce or remove upland fisher habitats, 3) minor reductions in landscape connectivity would occur, 4) harvesting would reduce snag levels, however some of these resources would be retained, and coarse woody debris levels would likely increase, and 5) no changes in motorized human access levels would be anticipated, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area for 70 to 100 years.

Cumulative Effects of the No-Action Alternative on Fishers

Fisher denning and resting habitats would be retained. No other DNRC-projects would be occurring or are proposed within either of the cumulative effects analysis areas; existing fisher foraging, denning, and resting habitats would persist. Habitats on other ownerships could continue to be altered with any ongoing and recently completed timber management activities. Landscape connectivity within both the cumulative effects analysis areas has been compromised, but some connectivity with each of the areas exists; no changes to landscape connectivity would be anticipated. Road access within the cumulative effects analysis area would not change; therefore, fisher vulnerability to trapping would remain unchanged. Thus, since: 1) no changes to existing habitats on DNRC ownership would occur, 2) landscape connectivity afforded by the stands on DNRC ownership would not appreciably change, 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected, and 4) no changes to human access or potential for trapping mortality would be anticipated, no further cumulative effects to fishers would be anticipated in either of the cumulative effects analysis areas.

Cumulative Effects of the Action Alternative on Fishers

Approximately 8.8 acres of potential riparian fisher habitats would be harvested in the Fisher River cumulative effects analysis areas; no changes to riparian fisher habitats would occur in the Poker Hill cumulative effects analysis area. This would reduce the amount of the preferred fisher covertypes meeting structural requirements for fishers in the Fisher River cumulative effects analysis area from 85.5% to 78.3%; no change from the 100% of riparian habitats on DNRC-managed parcels in the Poker Hill cumulative effects analysis area would be anticipated. Both cumulative effects analysis areas would exceed the 75% threshold established in ARM 36.11.440(1)(b)(i). Roughly 63 acres of the 3,154 acres (2%) of potential upland fisher foraging and travel habitats would be harvested in the Poker Hill cumulative effects analysis area; and 160 acres of the 1,150 acres (14%) of potential upland fisher foraging and travel habitats would be harvested in the Fisher River cumulative effects analysis area. These reductions would be additive to the losses associated with past timber harvesting in the cumulative effects analysis areas, as well as any ongoing timber management. Negligible changes to landscape connectivity would not be expected to appreciably alter fisher use of the cumulative effects analysis areas. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, since: 1) harvesting would remove upland fisher habitats, but considerable upland habitats would persist, 2) minor reductions in preferred covertypes or fisher habitats associated with the riparian areas in the cumulative effects

analysis area would be anticipated, 3) negligible reductions in landscape connectivity would be anticipated, 4) harvesting would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces, 5) no changes to motorized human access would occur, minor adverse cumulative effects would be anticipated that would affect fisher in the cumulative effects analysis areas.

FLAMMULATED OWL

Issue: Timber harvesting and associated activities could alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

INTRODUCTION

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroach upon ponderosa pine stands, increasing stand density and resulting in decreased habitat quality for flammulated owls.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the on the 8 sections surrounding around each parcel as well as the remaining portion of the section in which the parcel is found, if it is not a whole parcel. Each of these areas includes enough area to support several pairs of flammulated owls (McCallum 1994).

Analysis Methods

To assess potential flammulated owl habitats on the project area, SLI data were used to identify stands in preferred habitat types (ARM 36.11.403(28)). Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats. Factors considered within the cumulative effects analysis area included the degree of harvesting and the amount of continuous forest within the cumulative effects analysis area.

EXISTING ENVIRONMENT

The stands in the project area are largely ponderosa pine, Douglas-fir, and western larch/Douglas-fir and many of the stands are appropriately ponderosa pine/dry Douglas-fir types. Within the project area there are approximately 1,550 acres of flammulated owl habitats. Additionally, there are numerous old units that were harvested 15-25 years ago and led to some open ponderosa pine and Douglas-fir stands, which likely benefited flammulated owls in the project area. Elsewhere in the project area, habitat quality is limited due to encroachment by Douglas-fir leading to fairly dense stands of Douglas-fir/western larch and ponderosa pine types. During field visits, larger snags were fairly limited in the project area. Flammulated owls have been documented in the project area (USFS 2006).

In each of the cumulative effects analysis areas surrounding the individual state parcels, the existing stands are a mosaic of stands in different stages of stand succession. All cumulative effects analysis areas have considerable private, corporate timberlands that have been at least partially harvested in the recent past. Habitats likely exist on portions of these lands; however retention of certain attributes that would facilitate flammulated owl use does not appear to have been part of the management objective on many of these lands. The young stands on many of those acres could serve as foraging habitats, but would not be expected to be nesting habitats. Within many of the cumulative effects analysis areas are also a USFS component that appears to be largely mature, dense stands which are not providing flammulated owl habitats. A couple of the cumulative effects analysis areas also have a component of DNRC-managed lands, which are also not providing high quality flammulated owl habitats due to the denser stands that exist in many of those areas. Modern fire suppression has allowed Douglas-fir in-growth on the USFS and DNRC-managed lands, leading to the denser stands of ponderosa pine and Douglas-fir in portions of each of the cumulative effects analysis areas, reducing habitat quality for flammulated owls. Collectively, flammulated owl habitats in the cumulative effects analysis areas are low- to moderate quality due to the past management and/or modern fire suppression.

ENVIRONMENTAL EFFECTS

Direct and Indirect Effects of the No-Action Alternative on Flammulated Owls
Existing flammulated nesting habitats within the project area would persist; likewise younger stands from the past harvesting are also maturing and becoming denser, which would reduce the quality of this area for foraging. In the long term, the relatively open stands in portions of the project area could continue to be converted to denser stands of Douglas-fir stands with advances in succession, become densely stocked, and exist at high risk to insects, disease and stand-replacement fire. Elsewhere in the project area, those dense stands that are not suitable flammulated owl habitats would continue to be converted to Douglas-fir stands through succession and continue to be densely stocked. Habitats for flammulated owls would continue to be absent from those stands. Generally, habitat sustainability and quality for flammulated owls would continue to decline across the project area. Thus, since 1) no harvesting would occur, thus no changes to the amount of mature, forested stands would occur, 2) no changes to potential nesting habitats would be anticipated, and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands, negligible adverse direct and indirect effects would be expected to affect flammulated owls in the project area would be expected.

Direct and Indirect Effects of the Action Alternative on Flammulated Owls
Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively impact flammulated owls should they be using existing habitat during the nesting period. Much of the proposed harvesting would occur in those stands harvested 15-25 years ago and would likely decrease habitat quality for flammulated owls on much of the existing habitats (67%-94%; 76% of all habitats) in the project area (Table W-6). Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 1 snag per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (10-15 tons per acre), and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size class) would be retained in the proposed units, which could continue to provide limited flammulated owl habitats. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (see snags and coarse woody debris section), which further affects flammulated owls now and into the future. Elsewhere in the project area, those dense stands that are not suitable flammulated owl habitats would continue to be converted to Douglas-fir stands through succession and would continue to be densely stocked and not be suitable for flammulated owls. Thus, since 1) harvesting would further remove larger, mature ponderosa pine and Douglas-fir, which would decrease habitat quality on much of the existing flammulated owl habitats in the project area, 2) mature, forested stands in the project area that are marginally suitable or not suitable for flammulated owl use would not change appreciably, 3) elements of forest structure (snags, snag recruits, and CWD) used for foraging and nesting by flammulated owl would be retained, and 4) prescriptions would promote future development of ponderosa pine within the units, minor adverse direct and indirect effects would be expected to affect flammulated owls in the project area for the next 30-80 years.

Cumulative Effects of the No-Action Alternative on Flammulated Owls
Existing flammulated owl habitats would persist in the state parcels. Gradually through time, those habitats within the previously harvested areas would gradually become denser and have a higher percentage of Douglas-fir, which would gradually reduce habitat quality for flammulated owls in those stands. Flammulated owl habitats would continue to be absent from those dense stands that are not currently providing habitats for flammulated owls. Portions of the cumulative effects analysis areas have been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. No further harvesting would occur and areas exhibiting mature forested conditions would be expected to persist and could provide flammulated owl nesting habitats. Collectively, stands would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls, but an increase in future nesting habitats could occur in those recently managed stands that are likely suitable for foraging presently. Thus, since 1) no harvesting would occur, thus no changes to the amount of mature, forested stands would occur, 2) no changes to potential nesting habitats would be anticipated, and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands, negligible adverse direct and indirect effects would be expected to affect flammulated owls in the cumulative effects analysis areas.

Cumulative Effects of the Action Alternative on Flammulated Owls
Proposed harvesting would add to the amount within each of the cumulative effects analysis areas that have been recently harvested, which would add to the amount of foraging habitats available in the near-term; foraging

habitats appear fairly abundant within each of the cumulative effects analysis areas. These increases in foraging habitats would come at the expense of nesting habitats, which are likely more limiting in each of the cumulative effects analysis areas. Collectively, across the cumulative effects analysis areas, stands would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls, but an increase in future nesting habitats could occur in those recently managed stands that are likely suitable for foraging presently. Thus, since 1) harvesting would further remove larger, mature ponderosa pine and Douglas-fir, which would decrease habitat quality on a portion of the existing flammulated owl habitats in each of the cumulative effects analysis areas, and 2) a slight increase in stands that would be more representative of historic conditions in each of the cumulative effects analysis areas would improve flammulated owl foraging habitats, minor adverse cumulative effects would be expected to affect flammulated owls in each of the cumulative effects analysis areas.

TABLE W-6 - Acres of potential flammulated owl habitats in the project area and acres (and %) affected under each alternative.

		Poker Hill	**Harris Creek**	**McKillop**	**Snell**	**Richards**	**Backus**	**Total**
Existing Condition	Habitat	101	89	48	600	632	79	1,550
No Action Alternative	Acres altered Percent	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Action Alternative	Acres altered Percent	95 94%	80 90%	37 77%	403 67%	512 81%	58 73%	1,185 76%

PILEATED WOODPECKER

Issue: Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

INTRODUCTION

Pileated woodpeckers play an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. Aney and McClelland (1985) described pileated nesting habitat as..."stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979).

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the on the 8 sections surrounding around each parcel as well as the remaining portion of the section in which the parcel is found, if it is not a whole parcel. Each of these areas includes enough area to support many pairs of pileated woodpeckers (Bull and Jackson 1995).

Analysis Methods

To assess potential pileated woodpecker nesting habitats on DNRC-managed lands in the cumulative effects analysis area, SLI data were used to identify sawtimber stands with more than 100 square feet basal area per acre, older than 100 years old, had greater than 40 percent canopy closure, and occurring below 5,000 feet in elevation. Foraging habitats are areas that do not meet the definition above, but include the remaining sawtimber stands below 5,000 feet in elevation with greater than 40 percent canopy cover. Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and these mapped potential habitats. Factors considered included the amount of potential habitat, degree of harvesting, and the amount of continuous forested habitat.

EXISTING ENVIRONMENT

In the project area, potential pileated woodpecker nesting habitat exists on approximately 1,616 acres (Table W-7) that are dominated by Douglas-fir/western larch, Douglas-fir, and ponderosa pine. Additionally, 1,284 acres of sawtimber stands dominated by Douglas-fir exist in the project area that may be lower quality foraging stands. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers. There are at least 73 acres that meet the definition of old growth (Green et al. 1992) in the project area, with numerous other areas that are suspected to meet the definition, but were not field-verified to determine if they too are old growth.

Removal of large western larch and ponderosa pine by past timber-harvesting activity has reduced the quality of habitat for pileated woodpeckers. Large live and dead trees are less common than would occur naturally due to these past timber-harvesting activities in portions of the project area. During field visits, several larger snags were observed in the project area which provide foraging and nesting opportunities for pileated woodpeckers.

In each of the cumulative effects analysis areas surrounding the individual state parcels, the existing stands are a mosaic of stands in different stages of stand succession. All cumulative effects analysis areas have considerable private, corporate timberlands that have been at least partially harvested in the recent past. Limited habitats likely exist on portions of these lands, since harvesting removed mature, forested cover and retention of certain attributes that would facilitate pileated woodpecker use does not appear to have been part of the management objective on many of these lands. The young stands on many of those acres could develop into suitable habitats in the future. Within many of the cumulative effects analysis areas are also a USFS component that appears to be largely mature, dense stands which are likely providing pileated woodpecker foraging and possibly nesting habitats. A couple of the cumulative effects analysis areas also have a component of DNRC-managed lands, which are also providing pileated woodpecker foraging habitats, but largely lack nesting habitats. Collectively, pileated woodpecker habitats in the cumulative effects analysis areas are low- to moderate quality due to the past harvesting.

ENVIRONMENTAL EFFECTS

Direct and Indirect Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow and mature, thus providing potential improvements in nesting and foraging structure for pileated woodpeckers. Continual conversion to shade-tolerant species would reduce the quality of habitat for pileated woodpeckers over time. Therefore, a reduction in suitable nesting trees would be likely over time, which could lead to decreased reproduction in the project area. Thus, since: 1) no further harvesting would occur, 2) no changes in the amount of continuously forested habitats would be anticipated, 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated, and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers would be anticipated, negligible adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but might be temporarily displaced by the proposed harvesting. Harvesting 1,439 acres would reduce pileated woodpecker habitat components, however, much of these acres (>90%) are likely too open to receive much pileated woodpecker use presently. At least 302 acres of potential nesting habitat would be removed and an additional 1,005 acres of potential foraging habitats would be removed (Table W-7). Where overstory removal harvests are proposed, potential pileated nesting and foraging habitats would be removed for 30 to 100 years, depending on the density of trees retained. Conversely, where old growth maintenance-type treatments are proposed, some reductions in pileated nesting and foraging habitats would be anticipated, but those areas could continue to function in those capacities after proposed harvesting. Across all proposed units, elements of the forest structure important for nesting pileated woodpeckers, including snags (1-2 snags > 21 inch dbh per acre where they exist), coarse woody debris (10 to 15 tons per acre), numerous leave trees, and snag recruits (1-2 per acre >21 inch dbh where they exist) would be retained. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), pileated woodpecker densities in the project area would be expected to be reduced on 1,439 acres. The silvicultural prescriptions would retain healthy ponderosa pine, western larch, western white pine, and Douglas-fir while promoting the regeneration of these same species, which

would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, since: 1) harvesting would further reduce available habitat components, but would occur largely in stands that are too open to receive considerable pileated woodpecker use, 2) potential nesting and foraging habitats would be reduced, 3) several snags and snag recruits per acre would be removed; however mitigation measures to retain a minimum of 1-2 snags per acre and 1-2 snag recruits per acre would be included, and 4) harvest prescriptions would promote seral species in the proposed units, minor direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers
No disturbance to pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Regeneration of ponderosa pine in most of the recently harvested stands would be expected to develop into potential foraging and nesting habitats in the long-term. Any use of the cumulative effects analysis areas by pileated woodpeckers would be expected to continue. Any harvesting that may be occurring on other ownerships could continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative effects analysis area that would be in mature, forested covertypes. Thus, since: 1) no further changes to existing habitats would occur, 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated, and 3) long-term, succession-related increases in potential foraging habitats and future nesting habitats would occur, negligible adverse cumulative to pileated woodpeckers in the cumulative effects analysis areas would be expected.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers
Reductions in pileated woodpecker habitats would be expected. Several snags, coarse woody debris, and some potential nesting trees would be retained within the project area; however, future recruitment of these attributes may be reduced by the proposed activities. Within the proposed units, the stands would likely be too open to be used by pileated woodpeckers after treatment. Harvesting in the cumulative effects analysis areas have reduced pileated woodpecker habitats as well; the loss of pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting. Any use of the cumulative effects analysis areas would be expected to continue, perhaps at a slightly reduced level. Additionally, continued maturation of stands across the cumulative effects analysis areas are gradually developing suitable pileated woodpecker habitats. Thus, since: 1) harvesting would further reduce available habitat components, but would occur largely in stands that are too open to receive considerable pileated woodpecker use, 2) potential nesting and foraging habitats would be reduced, and these habitat elements are fairly limited in the cumulative effects analysis areas, 3) several snags and snag recruits per acre would be removed in the proposed units; however mitigation measures would retain some of these attributes in the units, and 4) harvest prescriptions would promote seral species in the proposed units, minor cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative effects analysis areas.

TABLE W-7 – Acres of potential pileated woodpecker nesting habitats in the project area and acres (and %) affected under each alternative.

		Poker Hill	**Harris Creek**	**McKillop**	**Snell**	**Richards**	**Backus**	**Total**
Existing Condition	Habitat	414	424	518	216	26	18	1,616
No Action Alternative	Acres altered Percent	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Action Alternative	Acres altered Percent	63 15%	83 20%	12 2%	118 55%	26 100%	0 0%	302 19%

BIG GAME WINTER RANGE

Issue: Timber harvesting and associated activities could remove forest cover on white-tailed deer winter range, which could reduce the carrying capacity of the winter range.

INTRODUCTION
Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during

the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow. The effect is that temperatures are moderated and snow depths are lowered, which enables big game movement and access to forage with less energy expenditure than in areas with deeper snow and colder temperatures. Snow depths differentially affect big game; white-tailed deer are most affected, followed by mule deer, elk, and then moose.

Analysis Area

Since white-tailed deer are more sensitive to winter range needs than mule deer or elk, the remainder of this analysis will focus upon white-tailed deer winter range. Direct and indirect effects were analyzed on the winter range in the project area. Cumulative effects were analyzed on the 122,116-acre portion of the larger white-tailed deer winter range that covers the Fisher River, Wolf Creek, and McKillop Creek areas south of Highway 37. This area contains all the winter range in the McKillop, Harris Creek, Snell, Richards, and Backus parcels and the scale includes enough area to support hundreds of white-tailed deer.

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of winter range harvested and level of human disturbance and development.

EXISTING ENVIRONMENT

Montana Department of Fish, Wildlife, and Parks identified elk (1,819 acres), white-tailed deer (2,102 acres), and mule deer (1,538 acres) winter ranges in the project area. These winter ranges are part of much larger elk, white-tailed deer, and mule deer winter ranges, respectively. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Winter range is very limited in the Poker Hill section and occurs in a portion of the parcel that would not be affected by either alternative and will not be discussed further in this section. Collectively, roughly 2,102 acres of winter range exist in the remaining 5 portions of the project area (Table W-8). Mature ponderosa pine, Douglas-fir/western larch, and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Harvesting in the project area in the last 30 years has removed much of thermal cover and snow intercept properties from roughly 904 acres of the winter range. Evidence of use by deer and elk was noted throughout the project area during field visits.

Presently, a variety of stands across the winter range in the cumulative effects analysis area are providing thermal cover and snow intercept for big game. This portion of the larger winter range contains appreciable amounts of private, timberlands, which have experienced moderate levels of harvesting in the recent past, which coupled with harvesting on other ownerships has reduced thermal cover and snow intercept for big game. Human disturbance within the winter range is largely associated with timber management, recreational snowmobile use, and minimal road use, which combined, likely influences wintering big game populations and their habitats.

ENVIRONMENTAL EFFECTS

Direct and Indirect Effects of the No-Action Alternative on Big Game Winter Range

No direct effects to big game winter range would be anticipated. No additional disturbance or displacement would be anticipated within the project area. Big game thermal cover in the project area would not be altered in the near term. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. No appreciable changes to winter carrying capacity would be anticipated. Since 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated, 2) the amount of mature forested habitats on the winter range would not change appreciably, and 3) the levels of human disturbance would remain similar, no direct or indirect effects to big game winter range would be anticipated.

Direct and Indirect Effects of the Action Alternative on Big Game Winter Range

Some displacement would be expected as a result of the proposed harvesting operations, particularly if any of the units would be harvested during the winter. However, winter logging provides felled tree tops, limbs, and slash piles that could concentrate feeding deer during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner could partially offset some of the effects associated with temporary displacement caused by logging disturbance. Most of the proposed units within the winter range (825 of 877 acres) were logged in the recent past and are not providing much thermal cover or snow intercept for

big game currently. Thermal cover and snow intercept would be expected to develop in these stands over the next 40-70 years when suitable sized trees (>40 ft. tall) start to provide these attributes again. Thermal cover and snow intercept would persist across the project area (Table W-8). Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production within the units. Thus, since 1) the relatively short-term that logging activities would create disturbance in this area, 2) areas of thermal cover and snow intercept exist in the project area outside of the proposed units, 3) thermal cover and snow intercept characteristics are fairly limited on most of the acres proposed for treatment, and 4) the behavioral adaptability of white-tailed deer, minor adverse direct or indirect effects to white-tailed deer would be expected.

TABLE W-8- Acres of winter range in the project area and acres (and %) affected under each alternative.

	Harris Creek	**McKillop**	**Snell**	**Richards**	**Backus**	**Total**
Existing Condition	635	631	103	632	79	2,102
No Action Alternative	0	0	0	0	0	0
Action Alternative	188 (30%)	58 (9%)	54 (52%)	519 (82%)	58 (73%)	877 (42%)

Cumulative Effects of the No-Action Alternative on Big Game Winter Range

No further changes would be anticipated in white-tailed deer winter range attributes during the short-term. Stands that are providing thermal cover would be expected to continue providing this resource under this alternative. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Harvesting on private lands could continue to displace wintering big game and reduce available winter range habitats. Human disturbance levels would be anticipated to continue at similar levels. Continued winter use of the larger winter range would be expected. Thus, since: 1) subtle changes in thermal cover due to advances in succession that would increase canopy densities would be anticipated over time, 2) the amount of mature forested habitats on the winter range would not change, and 3) the levels of human disturbance would remain similar, negligible beneficial cumulative effects to big game and big game winter range would be anticipated that would benefit big game in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Big Game Winter Range

Negligible reductions in winter range would be anticipated in the project area, but since much of these areas are providing marginal to no thermal cover and snow intercept, the reductions would not appreciably alter white-tailed deer use of the larger winter range. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Harvesting on private lands could continue to displace wintering big game and reduce available winter range habitats; displacement associated with this alternative could be additive to any displacement associated with ongoing timber harvesting. Thus, since 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area, 2) a small percentage of the winter range in the cumulative effects analysis area would be altered, which is not providing much thermal cover or snow intercept properties currently, 3) the behavioral adaptability of white-tailed deer, 4) availability of lower-quality cover on surrounding ownerships that provides some opportunity for deer should they be displaced, minor adverse cumulative effects to white-tailed deer would be expected.

Literature Cited:

Aney, W. and R. McClelland. 1985. Pileated Woodpecker Habitat Relationships (revised). Pages 10-17 in Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Arjo, W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary overlap between wolves and coyotes in Northwestern Montana. Journal of Mammalogy. 83:754-766.

Bull, E. L., and J. A. Jackson. 1995. Pileated woodpecker: Dryocopus pileatus. American Ornithologists' Union. Washington DC. 24pp.

Bull, E.L., C. G. Parks, and T. R. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. General Technical report PNW-391. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 55pp.

Buskirk, S.W., and R.A. Powell. 1994. Habitat ecology of fishers and American martens. Pages 283-296 *in* Buskirk, S.W., A. Harestad, M. Raphael, eds. Biology and conservation of martens, sables and fishers. Cornell University Press, Ithaca, NY.

Foresman, K.R.. 2001. The wild mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp.

Fuller, T. K., W. E. Berg, G. L. Radde, M. S. Lenarz, and G. B. Joselyn. 1992. A history and current estimate of wolf distribution and numbers in Minnesota. Wildlife Society Bulletin 20:42-55.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and assessment of wolf-ungulate interactions and population trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm.

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old Growth Forest Types of the Northern Region. R-1 SES. USDA Forest Service, Northern Region, Missoula MT 60pp.

Hejl, S. J. and R. E. Woods. 1991. Bird assemblages in old-growth and rotation-aged Douglas-fir/ponderosa pine stands in the Northern Rocky Mountains: a preliminary assessment. Pages 93-100 *in* D. M. Baumgartner and J. E. Lotan, eds. Proc. Symposium: Interior Douglas-fir: the species and its management. Washington State University, Pullman, WA. 306pp.

Heinemeyer, K. S., and J. L. Jones. 1994. Fisher biology and management in the western United States: A literature review and adaptive management strategy. USDA Forest Service, Northern Region, Missoula, Montana. 108pp.

Jones, J.L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho. 147 pp.

Johnson, S. 1984. Home range, movements, and habitat use of fishers in Wisconsin. M.S. Thesis, University Wisconsin, Stevens Point. 78pp.

Kunkel, K., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter prey selection by wolves and cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

Kunkel, K.E., D.H. Pletscher, D.K. Boyd, R.R. Ream, and M.W. Fairchild. 2004. Factors correlated with foraging behavior of wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68(1): 167-178.

Lenard, S; J. Carlson, J. Ellis, C. Jones, and C. Tilly. 2003. P.D. Skaar's Montana Bird Distribution, 6th Edition. Montana Audubon, Helena, Montana.

Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly bear ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, Montana. 191pp.

Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuuring. 1997. Relationships among grizzly bears, roads, and habitat in the Swan Mountains, Montana. Pages 64-80 *in* Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly bear ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, Montana. 191pp

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed

bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

McCallum, D. A. 1994. Review of technical knowledge: flammulated owls. Pages 14-46 *in* G. D. Hayward and J. Verner, tech eds. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. USDA Forest Service Gen. Tech. Rep. RM-253. Fort Collins, Colorado.

McClelland, B.R. 1979. The pileated woodpecker in forests of the Northern Rocky Mountains. Pages 283-299 *in* Role of insectivorous birds in forest ecosystems. Academic Press.

Oakleaf, J.K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat selection by recolonizing wolves in the northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-563.

Parks, C.G. and D.C. Shaw. 1996. Death and decay: A vital part of living canopies. Northwest science. Vol. 70, special issue: 46-53.

Pfister, R., B. Kovalchik, S. Arno, and R. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34. Intermountain Forest and Range Experiment Station Ogden, Utah. 174pp.

Powell, R. 1982. The fisher: National history, ecology, and behavior. University of Minnesota Press, Minneapolis, Minnesota. 217pp.

Powell, R. A. and W. J. Zielinski. 1994. Fisher. Pages 38-73 in Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service Gen. Tech. Rep. RM-254. Fort Collins CO.

Ruediger, B., J. Claar, S. Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, and S. Gniadek, 2000. Canada Lynx Conservation Assessment (2nd Edition). USDA Forest Service, USDI Fish and Wildlife Service, USDI Bureau of Land Management, and USDI National Park Service. Missoula, Montana. 122 pp.

Sime, Carolyn A., V. Asher, L. Bradley, K. Laudon, M. Ross, J. Trapp, M. Atkinson, and J. Steuber. 2008. Montana gray wolf conservation and management 2007 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 137 pp.

USFS. 2006. Smoked Fish Project Environmental Assessment. Libby Ranger District, Kootenai National Forest. Libby MT.

USFWS. 2005. Recovery Outline: Contiguous United States Distinct Population Segment of the Canada Lynx. USFWS Mountain-Prairie Region. http://mountain-prairie.fws.gov/species/mammals/lynx/final%20lynx%20RecoveryOutline9-05.pdf

USFWS, Nez Perce Tribe, National Park Service, Montana Fish, Wildlife & Parks, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Idaho Fish and Game, and USDA Wildlife Services. 2008. Rocky Mountain Wolf Recovery 2007 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601. 275pp.

Recommended Mitigations

- Consult a DNRC biologist if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) are needed.
- Restrict public access at all times on restricted roads that are opened using signs during active periods and a physical closure (gate, barriers, equipment, etc) during inactive periods (nights, weekends, etc).

- Reclose roads and skid trails opened with proposed activities to reduce the potential for unauthorized motor vehicle use.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, and western white pine.
- Restrict harvesting in the Poker Hill section between April 1 and June 15 to limit disturbance to potential spring grizzly bear habitats.

Attachment F: Summary of Mitigations Incorporated in the Action Alternative

Soil Resource Mitigations:

1. In order to prevent soil resource impacts, ground based mechanical felling or yarding are restricted to periods when one or more of the following conditions occur:
   a. Soil moisture content at 4" depth less than 20% oven-dry weight.
   b. Minimum frost depth of 3.
   c. Minimum snow depth of 18 inches, loose, or 8 inches, packed.
2. Slash would be retained and distributed on site to contribute nutrients to the soil.
3. Coarse woody debris would be retained on site for maintaining soil productivity.
4. Slash would be trampled and incorporated into skid trails for erosion control.
5. Slopes in excess of 45% would be avoided during skidding or skid with skyline or helicopter logging systems.

Water Resource Mitigations:

1. Streamside Management Zones (SMZs) 50 to 100 feet in width (dependant on slope and benches) would be marked along all streams. Harvesting would be minimal within the SMZs.
2. Road surface drainage and erosion control features would be added or improved on existing roads and installed as part of the road construction to reduce erosion rates and reduce the risk of sediment delivery.
3. Grass seed and fertilizer would be applied to newly disturbed culvert installation sites and road cuts and fills to stabilize erodable slopes and minimize sediment production.
4. Temporary roads would be reclaimed after harvest activities are complete.

Vegetation Resource Mitigations:

1. Larger diameter snags will be protected as needed to assure retention of 1 snag per acre in all units.
2. Ponderosa pine, western larch, western white pine and Douglas-fir would be favored leave trees in all canopy levels.
3. All trees infected with dwarf mistletoe and blister rust would be removed.
4. To deter further establishment of noxious weeds along roads, grass seed and fertilizer would be applied to areas with soil exposed during road construction and maintenance activities.
5. To minimize noxious weed invasion away from roads, "off road" logging equipment would be inspected and required to be free of weed parts prior to moving onto the site.
6. Grass seed would be applied or slash incorporated into heavily used trails with bare soil exposed to limit establishment of noxious weeds.

Wildlife Resource Mitigations:

1. Consult a DNRC biologist if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) are needed.
2. Restrict public access at all times on restricted roads that are opened using signs during active periods and a physical closure (gate, barriers, equipment, etc) during inactive periods (nights, weekends, etc).
3. Reclose roads and skid trails opened with proposed activities to reduce the potential for unauthorized motor vehicle use.
4. Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
5. Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, and western white pine.
6. Restrict harvesting in the Poker Hill section between April 1 and June 15 to limit disturbance to potential spring grizzly bear habitats.