ENVIRONMENTAL ASSESSMENT

FOR THE

Bold Peak Timber Sale

PREPARED BY

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Montana Department of Natural Resources and Conservation

January 2011

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CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Bold Peak Timber Sale
Proposed Implementation Date:	
Proponent:	Department of Natural Resource and Conservation, Northwest Land Office, Kalispell Unit
Location:	Section 16, Township 25N, Range 25W
County:	Flathead

I. TYPE AND PURPOSE OF ACTION

The Montana Department of Natural Resources and Conservation (DNRC) Kalispell Unit, is proposing a timber harvest on trust lands located in the Bold Peak Section, Section 16 Township 25N Range 25W (See Attachment 1, Area Maps, and Project Plan). The section is located approximately 6 miles south of McGregor Lake. The DNRC estimates that approximately 4MMBF from 524 acres would be harvested within this section. Silvicultural prescriptions would include seed tree and shelterwood harvest. Approximately 3.5 miles of road would be built to access the sale area. The proposed action would produce estimated revenue of $480,000 for the Common Schools (CS) Trust and an additional $191,000 in Forest Improvement fees.

Proposed Project Objectives Include:

- Increasing the vigor and health of the stand by limiting the effects of bark beetles and reducing the stocking level.
- Increasing forest productivity beneficial to future actions.
- Generating revenue for the Common School Trust Fund.

Lands involved in this proposed project area are held by the State of Montana in trust for the support for specific beneficiary institutions such as the Common Schools Trust Grant, and other state institutions (Enabling Act of February 22, 1889: 1972 Montana Constitution, Article 1 Section 11). 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). DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (SFLMP: DNRC 1996) and the Administrative Rules for Forest Management (Rules: ARM 36.11.401 through 456) as well as other applicable state and federal laws.

II. PROJECT DEVELOPMENT

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

The DNRC sent 14 scoping letters and 13 e-mails to adjacent land owners and other known interested parties and organizations. One comment was received concerning a trail in the section. A legal advertisement was printed in *The Daily Inter Lake* on 08-01-2010 and 08-08-2010. Hydrological, soils, wildlife and vegetative issues were identified by DNRC specialists and field foresters for both the No Action and the Action Alternative.

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

DNRC would need to obtain temporary road use permits from both the USFS and Plum Creek Timber Company along potential portions of the haul route.

The DNRC is classified as a major open burner by the Montana Department of Environmental Quality (DEQ), and is issued a permit from the DEQ to conduct burning activities on State lands managed by the DNRC. As a major open burning permit holder, DNRC agrees to comply with all of the limitations and conditions of the permit.

The DNRC is a member of the Montana/Idaho Airshed Group which was formed to coordinate burning activities among members in order to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction. As a member of the Airshed Group, DNRC agrees to burn only on days approved for good smoke dispersion as determined by the Smoke Management Unit in Missoula, MT.

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3. ALTERNATIVES CONSIDERED:

No Action Alternative: Under this alternative, there would be no management activities taking place.

Action Alternative: Under the Action Alternative, the DNRC would harvest approximately 4 MMBF on 524 acres in Section 16 T25N R25W. The timber would be harvested using conventional ground skidding and cable logging. The shade tolerant species and those infected or susceptible to insect and disease mortality would be removed to increase forest health and decrease the stocking level. There would be approximately 3.5 miles of road built to access the majority of the section.

Issues surrounding this proposed action have either been resolved or mitigated through project design or would be included as specific restrictive requirements of this project. Recommendations to minimize direct, indirect and cumulative effects have been incorporated in the project design (Attachment I, Bold Peak Maps; Attachment II, Resource Analyses; Attachment III, Prescriptions: Attachment IV, Mitigations; Attachment V, Preparers and Consultants).

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.*

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4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Harvest activities would comply with Best Management Practices (BMP's). Mitigations include: limiting equipment operations to minimize soil compaction and rutting, planning appropriate skid trails, limiting skidding to slopes less than 40% and less than 20% of the harvest unit acreage, limiting disturbance and scarification, and retaining adequate amounts of large woody debris and fine litter following harvest. Thus, direct, indirect, and cumulative effects to the soil resource would be minimal.

Please refer to Attachment II, Soils Analysis for a more detailed analysis, and Attachment IV, Mitigations for a more detailed description of mitigations.

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5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

Harvest activities would use existing roads and segments of existing skid trails where feasible, would require DNRC approved drainage features on skid trails, and would comply with BMPs and

all laws pertaining to Streamside Management Zones (SMZs). Due to the minimal amount of streams within the state parcel, well-drained soil conditions, the project design and compliance with applicable regulations and rules, direct, indirect, and cumulative effects to the water resource would be minimal.

Please refer to Attachment II, Water Resources Analysis for a more detailed analysis, and Attachment IV, Mitigations for a description of mitigations.

6. AIR QUALITY:

The project is located in Montana State Airshed 2 which encompasses all of Flathead and Lake Counties, most of Sanders County, and portions of Missoula and Powell Counties. This Airshed contains the Kalispell Impact Zone, an area that is smoke sensitive and has existing air quality problems. The proposed project area occurs outside of this impact zone.. Under the Action Alternative, potential post-harvest burning of logging slash would produce some particulate matter. The DNRC would make all attempts to utilize logging slash to minimize the amount of burning needed. 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. DNRC would burn only on approved days. Harvesting and log hauling could create dust which may affect the air quality within the project area and along the haul route. Harvesting operations would be short in duration thereby minimizing dust dispersal within the local residential areas. Direct, indirect, and cumulative effects to air quality due to slash pile burning, harvesting, and hauling associated with the proposed action are expected to be minimal.

7. VEGETATION COVER, QUANTITY AND QUALITY:

There has been no logging activity done to this section. The stand is 120 to 140 years old and there is no old growth as defined by *Green et al*. Noxious weeds, primarily spotted knapweed, are present along existing roads. There are no sensitive plants present according to the Montana Natural Heritage Program.

Under the Action Alternative, timber harvest would occur on approximately 524 acres and would promote the development of the desired future condition of western larch/Douglas-fir. The overall forest health would improve due to the removal of unhealthy trees that are susceptible to insects and diseases that would increase the productivity of the stands. The decrease in tree mortality would cause a decrease in the amount of fuel loading for the site which would decrease the chance of a stand replacing fire. The Occurrence of noxious weeds may increase due to logging disturbance.

The direct, indirect, and cumulative effects would be minimized in the project design (See Attachment I, Area Maps and Project Plan; Attachment II, Resource Analysis, Vegetation Analysis; Attachment III, Prescriptions; Attachment IV, Mitigation; Attachment V, Consultants and References).

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

A DNRC wildlife biologist reviewed the project area, transportation system and harvest plan. There were four wildlife resources that were identified and analyzed. There were no aquatic resources identified in the immediate area so there would be no further analysis. Recommendations to minimize impacts have been incorporated into the project design. (See Attachment II, Resource Analysis, Wildlife Analysis; Attachment IV, Mitigation)

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

A DNRC wildlife biologist reviewed the project area, transportation system and harvest plan. Three threatened, endangered and sensitive species were identified. (See Attachment II Wildlife Analysis for a more detailed analysis and Attachment IV, Mitigations, for a more detailed description of mitigations.)

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

A DNRC archeologist has reviewed this project. No significant sites or artifacts were identified when the section was inventoried in 1990. A Confederated Salish & Kootenai Tribal Historic Preservation Cultural Resource Assistant also came to see the trail and determine if it had historical value.

11. AESTHETICS:

The project area can be seen from Hubbart Reservoir and the Bold Peak Road. Harvest activities are expected to change the visual quality of the project area as seen from the reservoir and the road. Harvest units would appear to be lighter in color due to the reduction in tree cover. Since many of the sections surrounding the project area have been harvested in the past, the proposed action is not expected to create any new or unique lines, shapes, or colors that do not already occur within the area. In fact, the impacts would be consistent with the surrounding landscape. Some of the new road construction may be visible from some areas of the road. Over time, both the new road construction and the open areas within the harvest area would become less visible due to natural regeneration. Direct, indirect, and cumulative aesthetic impacts associated with the proposed action are thus expected to be minimal and relatively short in duration.

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

No direct, indirect, or cumulative impacts would be expected under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

NA

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:

Human health would not be impacted by the proposed timber sale or associated activity. There are no unusual safety considerations associated with the proposed timber sale.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Timber harvest would provide continuing industrial production in the Flathead Valley.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there would be no measurable cumulative impact from this proposed action.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

People are currently paying taxes from the wood products industry in the region. Due to the relatively small size of the timber sale, there would be no measurable cumulative impact from this proposed action on tax revenues.

18. DEMAND FOR GOVERNMENT SERVICES:

Log trucks hauling to the purchasing mill would result in temporary increased in traffic on USFS road #879, #5583, and US Highway 2. This increase would be considered a normal contributor to the activities of the local community and industrial base.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

On June 17, 1996, the Land Board approved the SFLMP. The SFLMP provides the philosophy adopted by DNRC through programmatic review (DNRC, 1996). The DNRC will manage the lands in this project according to this philosophy, which states:

> *Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biological diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream…In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.*

On March 13, 2003, the DNRC adopted Rules (Administrative Rules of Montana [ARM] 36.11.401 through 450). These Rules provide DNRC personnel with consistent policy, direction, and guidance for the management of forested trust lands. Together, the SFLMP and Rules define the programmatic framework for this project.

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

The area receives some use from hikers and hunters. There is an old unmaintained Forest Service trail that runs through the western third of the section. Since the Forest Service does not currently maintain the trail, there will be no steps taken to protect the trail. The implementation of the proposed project is not expected to adversely affect the recreation opportunities.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

There would be no measurable impacts related to population and housing due to the relatively small size of this project, and the fact that people are already employed in this occupation in the region.

22. SOCIAL STRUCTURES AND MORES:

No impacts related to social structures and mores would be expected under either alternative.

23. CULTURAL UNIQUENESS AND DIVERSITY:

No impacts related to cultural uniqueness and diversity would be expected under either alternative.

24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:

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 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 timber. The effect of the proposed project would produce an estimated return to the Common Schools (CS) Trust of $480,000 and $191,000 in Forest Improvement fees under the alternative action. The no-action alternative would not produce revenue for the Common Schools (CS) Trust.

EA Checklist Prepared By:	**Name:** Tyrell Colombo	**Date:** January 13, 2011
	Title: Management Forester	

V. FINDING

25. ALTERNATIVE SELECTED:

The interdisciplinary team has completed the Environmental Assessment for the Bold Peak Timber Sale. In the development of this EA two alternatives were considered, Action and No Action. These two alternatives were evaluated on their ability to: 1) Increase the vigor and health of the stand by limiting the effects of bark beetles and reducing the stocking level; 2) Generate revenue for the Common School Trust Fund; and 3) Increase forest productivity beneficial to future actions.

After a thorough review of the EA, project file, public correspondence, Department policies, standards, guidelines, I have selected the action alternative for implementation on this project.

I have selected the Action Alternative for implementation with the understanding that resource mitigation measures identified in the Environmental Assessment will be applied to meet the intended protection.

The Action Alternative has been selected for the following reasons:

1) The Action Alternative meets the Purpose of Action and the specific project objectives listed on page 3 of the EA.
2) DNRC is required to administer these lands to produce the largest measure of reasonable and legitimate long-term return for beneficiaries *(Montana Codes Annotated 77-1-202*). DNRC meets this obligation by managing intensively for healthy and biologically diverse forests.
3) The Action Alternative includes the necessary mitigations and a consensus of professional opinion on limits of acceptable environmental impact.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

I find that none of the project impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of the natural resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, and I find no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

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

EA Checklist Approved By:	**Name:** *Greg Poncin*
	Title: Kalispell Unit Manager
Signature:	**Date**: 1/18/11

Attachment I

Project Area Maps

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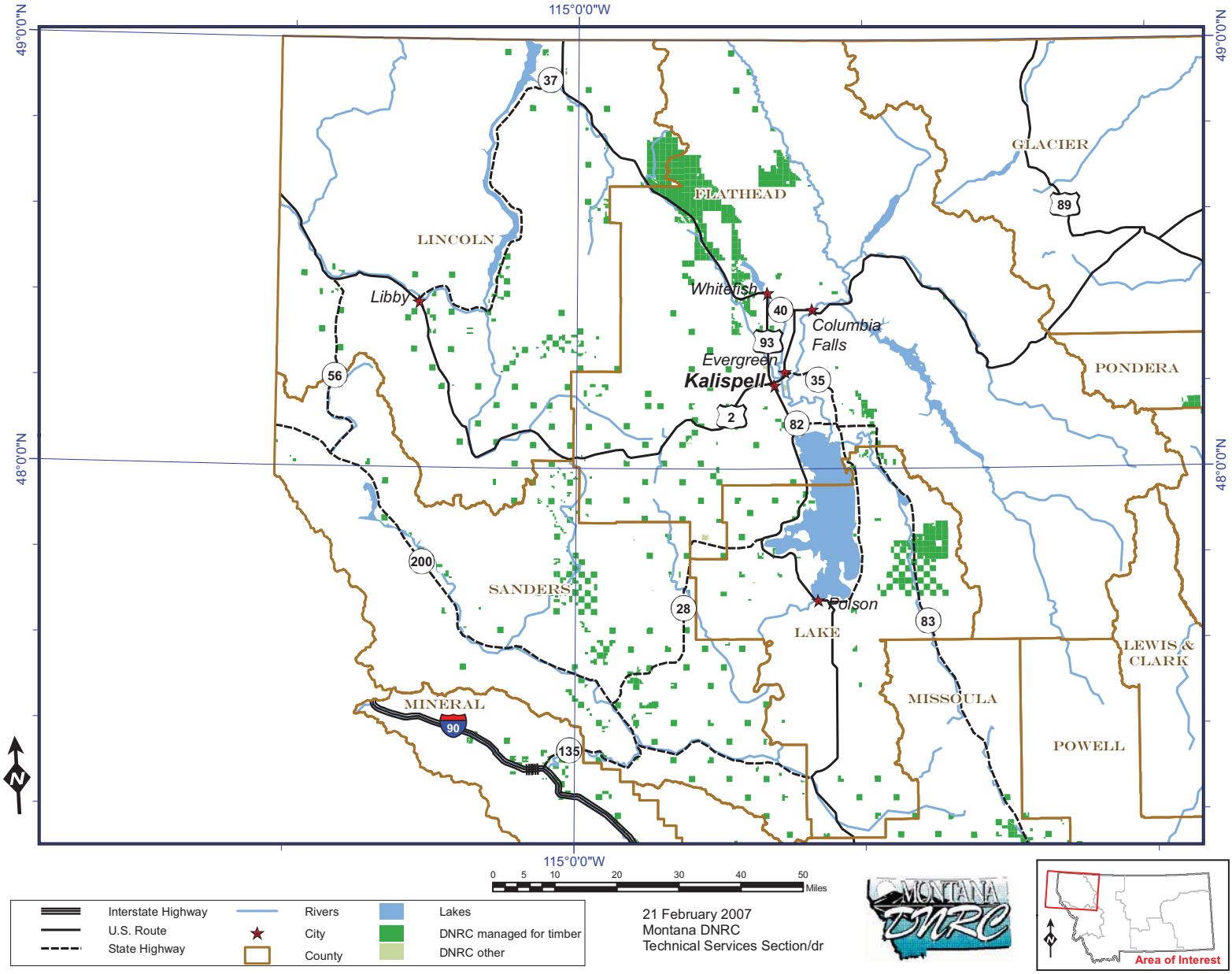
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LINCOLN
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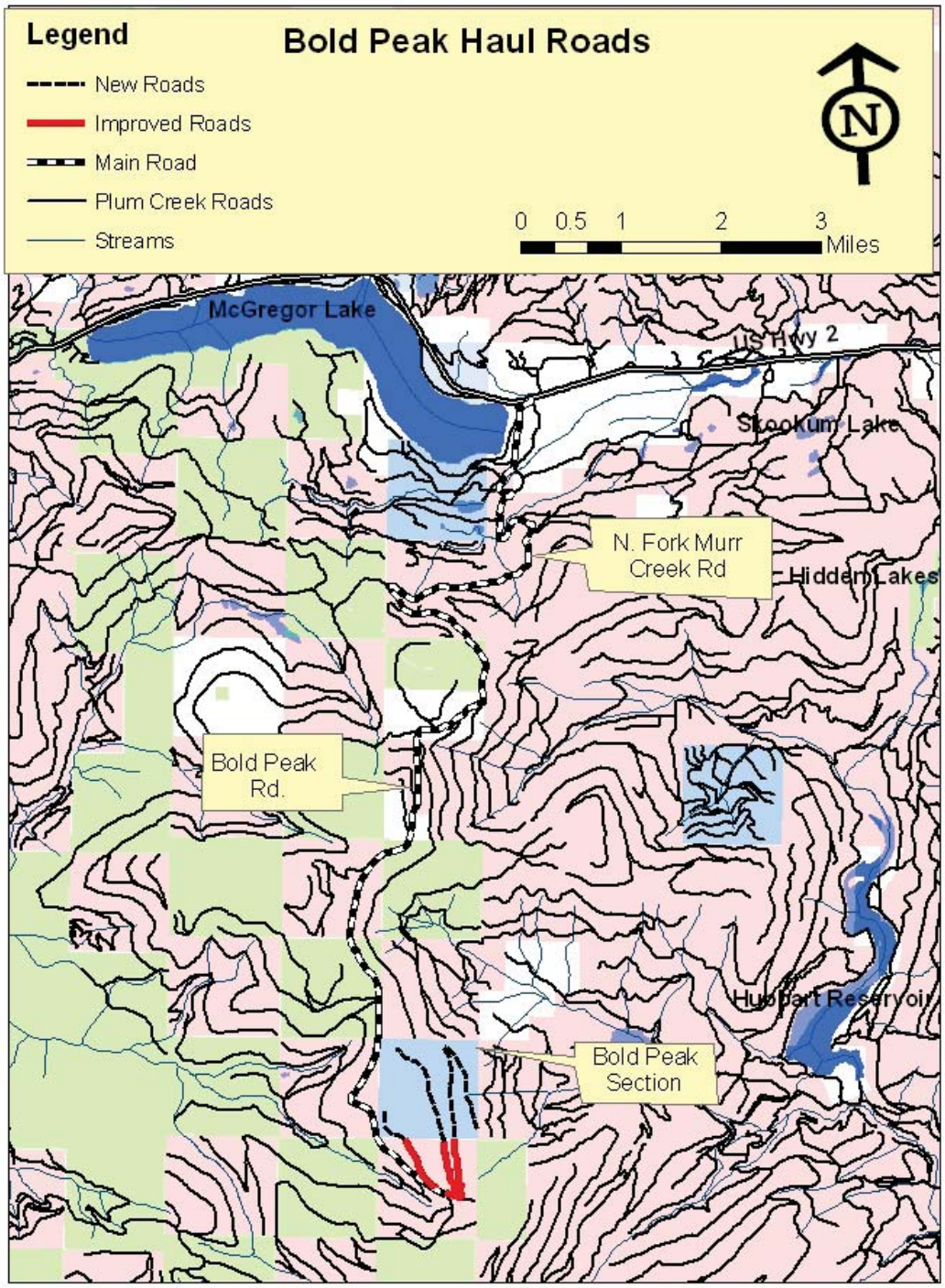
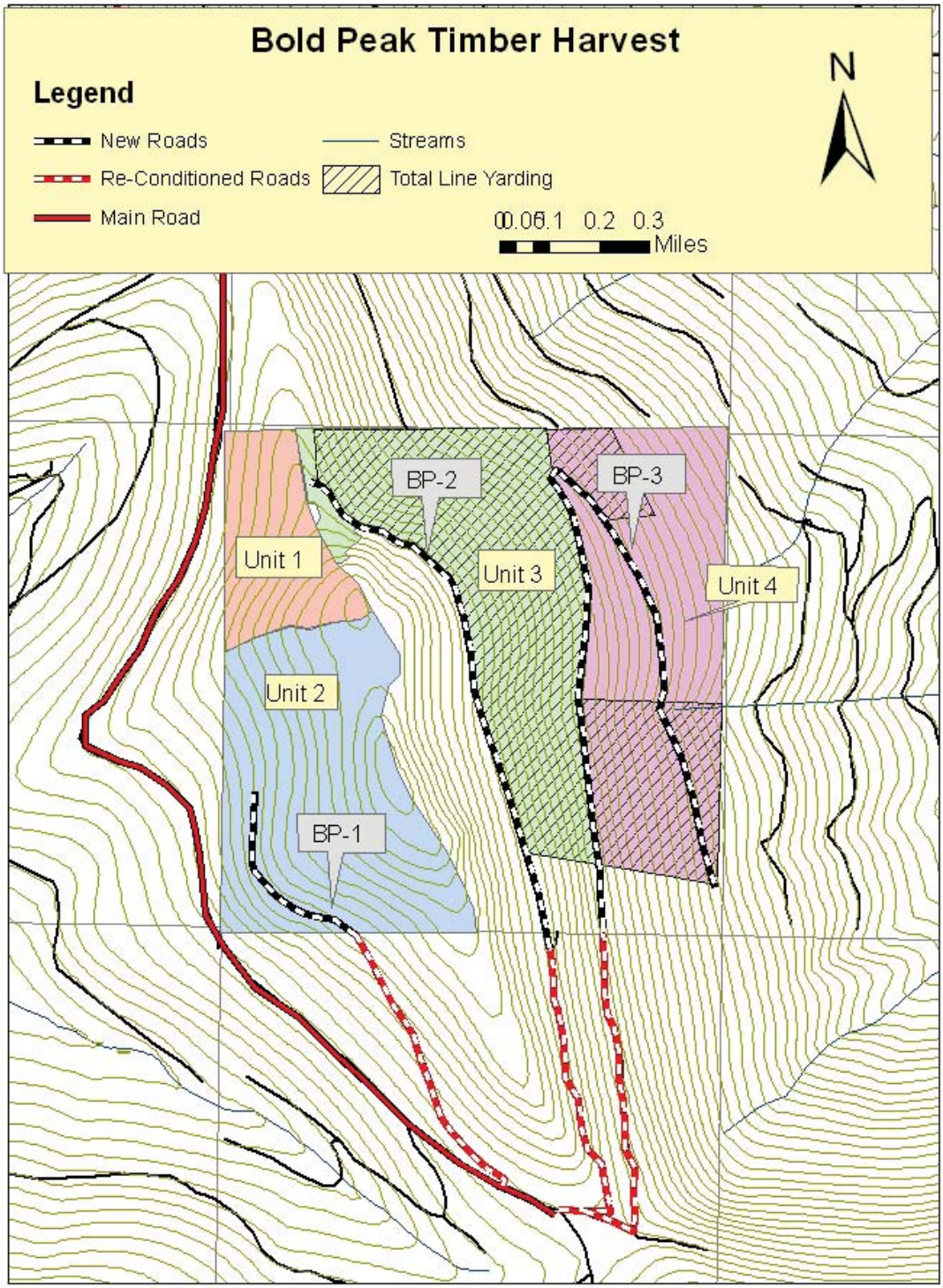
Area of Interest


Legend
Bold Peak Haul Roads
New Roads
Improved Roads
Main Road
Plum Creek Roads
Streams
0 0.5 1 2 3
Miles
N
McGregor Lake
US Hwy 2
Skookum Lake
N. Fork Murr
Creek Rd
Hidden Lakes
Bold Peak
Rd.
Hubbart Reservoir
Bold Peak
Section


Bold Peak Timber Harvest
Legend
New Roads
Re-Conditioned Roads
Main Road
Streams
Total Line Yarding
0 0.05 0.1 0.2 0.3
Miles
N
BP-1
BP-2
BP-3
Unit 1
Unit 2
Unit 3
Unit 4

Attachment II

Resource Analysis

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VEGETATION ANALYSIS

INTRODUCTION

This analysis is used to look at the existing conditions of the vegetation in the proposed area and determine the possible effects that could result from the alternatives of the project. During the initial scoping, issues were developed by the public and internally regarding vegetative concerns. The following concerns were expressed from these comments regarding proposed timber harvesting and related activities:

- Forest Health: There are concerns that endemic populations of diseases and insects are increasing on the site and have the potential to reach epidemic proportions or reduce productivity.

- Fire Ecology: There is a concern that the exclusion of fire from the landscape has changed the historical stand compositions from the desired conditions. This change is prevalent at Bold Peak and the surrounding area.

- Fuel Loading: There are concerns that forest fuels have accumulated to a point that would leave this area predisposed to a catastrophic fire event. There is a large amount of downed woody debris. The encroachment of sub-alpine fir and Engelmann spruce has created latter fuels that would allow a fire to move from the forest floor to the canopy.

- Forest Productivity: There are concerns with the canopy closure and the increased competition between trees which will decrease the productivity of the trees. The increase in competition will also stress the trees which will increase the trees susceptibility for disease and insect outbreaks.

GENERAL DESCRIPTION OF THE AREA

The proposed Bold Peak Timber Sale is located approximately 6 miles south of McGregor Lake. It is located in Section 16, Township 25N, Range 25W and includes 640 acres of State Trust Land. The section is adjacent to Plum Creek Timber land and U.S.F.S. land that have been heavily managed. On the west side of the section there is Murr Creek drainage and Briggs Creek drainage on the east side.

ANALYSIS METHOD AND AREAS

The Kalispell Unit typically prepares two to four timber sales per year. Each project is evaluated for its potential effects on lands managed by the DNRC and the surrounding landscape. Methods used in the analysis included review of stand level inventory (SLI) Data, field visits, review of scientific literature, aerial photography, and consultation with other professionals. The area used to determine the direct and indirect impacts to vegetation is Section 16, Township 25 North, Range 25 West located at Bold Peak. The area used to determine cumulative impacts is the Kalispell Unit.

EXISTING CONDITIONS

The section currently is dominated by sub-alpine fir and lodgepole pine encroaching on the western larch and Douglas-fir. This is a departure from the appropriate cover types as shown in Table 2-2. The habitat types are historically characterized by high frequency, low intensity wildfires before the early 1900's. Since the early 1900's the fires have become less frequent due to fire suppression. There have been no entries into this section. The last disturbance was a large fire that burnt over the section in 1889 so the stand age is about 120 years old.

Stands within the project area are beginning to show increase in fuel loading as advanced shade tolerant regeneration (Engelmann spruce, grand fir and alpine fir) has become a green ladder fuel. This type of fuel loading is developing in parts of all stands within the project area. Insect and disease mortality in all stand components is contributing to dead fuel loading. The main cause of the increased fuel loading is the lodgepole that is dying due to the mountain pine beetle (*Dendroctonus ponderosae).* The primary disease that is found in the stand is Dwarf mistletoe (*Arceuthobium laricis*) and this can be found in the western larch. There is also sub-alpine fir that is dying and falling over due to fir engraver (*Scolytus ventalis*). The overstory, intermediate components and the overstocked understory are all being affected at a moderate level now, but increasing due to competition from overstocking and advanced age.

There are noxious weeds, mainly spotted knapweed (*Centaurea stoebel)*, that are mostly prevalent along the open roads.

Table 2–1. Current and appropriate cover types for the Kalispell Unit.

Cover Type	Current Cover Type (Acres	Appropriate Cover Type (Acres)	Current Type Minus (-) Appropriate Type (Acres)
SAF	2249.9	254.8	1995.1
DF	1646.5	1029.4	617.1
HW	449	207	242
LP	2269.2	1376.8	892.4
MC	10265.8	2282.3	7983.3
PP	10636.9	11936.2	-1299.3
OTHER	3635.4	3576.2	59.2
WL/DF	25494.6	32974.5	-7479.9
WWP	567.6	3577.7	-3010.1
TOTAL	57214.9	57214.9	--

SAF = subalpine fir. DF = Douglas-fir. LP = lodgepole pine. MC = mixed conifer. PP = ponderosa pine. WL/DF = western larch/ Douglas-fir. WWP = western white pine. Other = non stocked lands, nonforest, or water. The Current Type minus Appropriate Type column above lists the excess and deficit (-) acres for each Cover Type.

Table 2–2. Current and appropriate cover types & stand compositions for the Bold Peak project area.

Cover Type	Current Cover Type (Acres)	Appropriate Cover Type (Acres)	Current Type Minus (-) Appropriate Type (Acres)
SAF	183	0	183
DF	0	0	0
HW	0	0	0
LP	362	155	207
MC	0	0	0
PP	0	0	0
Other	0	0	0
WL/DF	95	350	-255
WWP	0	135	-135
TOTAL	640	640	--

SAF = subalpine fir. DF = Douglas-fir. LP = lodgepole pine. MC = mixed conifer. PP = ponderosa pine. WL/DF = western larch/ Douglas-fir. WWP = western white pine. Other = non stocked lands or nonforest. The Current Type minus Appropriate Type column above lists the excess and deficit (-) acres for each Cover Type.

ENVIRONMENTAL EFFECTS

Direct and Indirect

No Action Alternative

No timber harvest or associated activities would occur under this alternative. Timber types would continue to advance towards climax conditions and away from desired future conditions. Sub-alpine fir has already started to dominate the understory and will continue to shade out the seedlings from more desirable species as it advances into the upper canopy levels. Growth and vigor of the trees present in the analysis area would continue to decline as competition for resources increases. The diseases and insects will continue to thrive which will lead to increased mortality and fuel loading. Alder (Alnus spp.) will continue to thrive in the understory which will also create increased competition for nutrients and seedling establishment. Noxious weeds would continue to exist along the roads and move into the forested areas as natural disturbances prepare appropriate seedbeds.

Action Alternative

The proposed alternative would harvest timber on approximately 524 acres and promote the desired future condition of western larch/Douglas-fir. The harvest would be focused on the removal of those trees affected by or susceptible to insect and disease mortality, as well as shade tolerant tree species. More detailed information for treatment can be obtained in Attachment III, “Prescriptions”. Proposed harvest would move the 524 acres toward a western larch/Douglas-fir cover type. Through harvest and site preparation activities, fuel loadings would be reduced by the removal of ladder fuels from the understory and intermediate components of these stands as well as crown spacing in the intermediate and overstory components. Growth and vigor would increase because

residual tree spacing would allow full light to crowns and more access to water. Logging operations would create roads, openings, landings, and skid trails that would be more visible from the Bold Peak roads and Hubbart Reservoir. The end result would be a more densely forested parcel with larger trees than most of the surrounding ownership. Noxious weeds may increase due to the disturbance and the opening in the canopy. However, this will be monitored and addressed through an integrated pest management plan including chemical and biological control methods.

Cumulative Effects

No Action Alternative

Under this alternative, stand structure and species composition on State land across the Kalispell Unit are expected to continue the change towards more shade tolerant species. Fuel loading is also expected to increase due to tree mortality and ladder fuels.

Action Alternative

The timber harvesting treatments occurring under the Action Alternative would, in combination with other State timber harvesting activities, alter the current cover type distribution by promoting the development of desired future cover types on the Kalispell Unit. Specifically, these projects would reduce the acreage of mixed conifer, sublalpine fir, lodgepole pine, and Douglas-fir types and increase the western larch/Douglas-fir, ponderosa pine, and western white pine cover types. Untreated stands would be expected over time to develop an increasing component of shade-tolerant species that would in most cases lead stands away from DNRC's desired future conditions.

The timber harvest treatments would also increase the stand productivity by decreasing the stocking levels of the stands. By decreasing the stocking levels, this would cause the trees to get adequate space to become healthier and more resistant to insects and diseases. The amount of tree mortality will decrease which would decrease the fuel loading. The site disturbance from the timber harvest would potentially cause the spread of noxious weeds. The spread of weeds would be controlled by washing of equipment before it is moved on site and with weed treatments along roads.

The proposed action would occur on about 524 acres of the Kalispell Unit total 57,215 acres or approximately 1% of the total Kalispell Unit acreage. These changes would result in minor and inconsequential impacts across the landscape of the Kalispell Unit.

WATERSHED AND HYDROLOGY ANALYSIS FOR THE BOLD PEAK TIMBER SALE

INTRODUCTION

Water Quality

Timber harvesting and related activities, such as road construction, can lead to water-quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosive power of stream flows.

Water Yield

Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal (*Haupt 1976*), because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt. Openings will melt earlier in the spring with solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

ANALYSIS METHODS

Water Quality

Existing conditions for water quality were analyzed using field site visits and visual inspection of roads, drainage structures and drainage features in the proposed project area.

Water Yield

The water-yield increase for the watershed in the project area was determined using the ECA method as outlined in *Forest Hydrology Part II* (*Haupt 1976*). ECA is a function of total area roaded and harvested, percent of crown removal in harvesting, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area.

For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees begin to grow and move toward preharvest water use.

In order to evaluate the watershed risk of potential water-yield increase effectively, a threshold of concern must be established. In order to determine a threshold of concern, acceptable risk level, resource value, and watershed sensitivity are evaluated according to *Young (1989)*. The watershed sensitivity is evaluated using qualitative assessments, as well as procedures outlined in *Forest Hydrology Part II* (*Haupt 1976*). The stability of a stream channel is an important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water-yield increases (*Rosgen 1996*).

Analysis Area

Water Quality

The analysis area for water quality is the proposed project area, and all forest roads that lead into the project area from other ownership. The primary focus of the sediment delivery analysis was on the discontinuous streams and draws located within the proposed project area. All of the draws and streams found within the proposed project area lie within the Briggs Creek watershed. The portion of the project area to the west of the ridge has no draws or streams, and lies within the Murr Creek watershed.

Water Yield

The analysis area for water yield is the Briggs Creek watershed, where approximately 2/3 of the proposed project lies. The remaining 1/3 of the proposed project area lies within the Murr Creek watershed. These acres will not be analyzed for water yield due to the lack of stream channels or draws, and a limited amount of proposed activity in this watershed compared to a very large watershed size. Any analysis of impacts in Murr Creek would not show up in numerical results of the ECA model, and the lack of any drainage features in this portion of the project area would have a very low risk of any measurable or observable changes in water yield.

Existing Conditions

Regulatory Framework

Montana Surface Water Quality Standards: According to ARM 17.30.607 (1), the Clark Fork River drainage and its tributaries, including Murr Creek, are all classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring

levels of sediment and minimal increases in turbidity. According to ARM 17.30.608 (1)(c)(iii), this portion of the Little Bitterroot River drainage and its tributaries, including Briggs Creek are all classified as B-2. Among other criteria for B-2 waters, no increases are allowed above naturally occurring levels of sediment and small increases in turbidity. "Naturally occurring," as defined by ARM 17.30.602 (17), includes conditions or materials present during runoff from developed land where all reasonable land, soil and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that may impact the resource.

There are no designated beneficial surface water uses within the project area due to a lack of connectivity of stream channels or delivery to downstream waters

Water Quality Limited Waterbodies: No portion of the proposed project area is listed in the 2010 Montana's Clean Water Act Information Center website produced by the Montana Department of Environmental Quality (DEQ, 2010). Downstream from Briggs Creek, the Little Bitterroot River is listed as partially supporting aquatic life and cold water fisheries, and primary contact recreation. Probable causes are listed as: chlorophyll-a, nitrate/nitrite (nitrite + nitrate as N), other flow regime alterations, phosphorus (total), sedimentation/siltation, total Kjehldahl nitrogen (TKN). Probable Sources are listed as: upstream source and upstream impoundments. These sources are primarily related to Hubbart Reservoir.

Montana Streamside Management Zone (SMZ) Law: By the definition in ARM 36.11.312 (5), the streams in the proposed project area are class 3 streams. There are two segments with defined channels, but none are continuous, and do not flow more than 6 months of the year.

Water Quality

There is no existing road system in the proposed project area. The road system leading to the project area is moderate standard, and meets applicable BMPs. There are no stream crossings or draw crossings in the Briggs Creek or Murr Creek watersheds on this existing road system. No other sources of erosion or deposition were identified through field review. None of the stream reaches in the proposed project area delivers to another body of water, so no sediment has been delivered to any downstream waters outside of the project area.

Water Yield

No management has occurred in the proposed project area in the past. Timber management and grazing management are the primary land uses outside of the proposed project area. These activities outside of the DNRC owned land have been conducted by the USDA Forest Service and Plum Creek Timber Company. This management has led to reductions in forest canopy cover, and construction of roads. Approximately 440 acres of the proposed project are located within the Briggs Creek watershed. The remaining acres are located within the Murr Creek watershed but there are no defined streams or draws within the proposed project area.

Field reconnaissance of the proposed project area showed that stream channels, where they exist, are stable and not actively eroding. In addition, channel stability assessments were completed through a contract in 1998 on Briggs Creek, and these found the channel stability to be good to excellent in each of three reaches. These findings were confirmed by DNRC personnel in the 2010 field season. Some instability was noted in 1998 and confirmed in 2010 that was related to cattle use, but the presence of active erosion or deposition were not found, just trampled banks. Based on channel conditions, the allowable water yield increase in the Briggs Creek watershed is 13% over a fully forested condition. Water yield increases resulting from past activities are currently 14.9% over a fully forested condition. While this is exceeds the threshold of concern, no channel stability problems were identified. The threshold of concern is a level around which a channel may begin to adjust to increases in annual and peak flows. Field review found that the stream system that contains most of the proposed project area was not actively eroding, had stable undercut banks and high rock content in the bed and banks of the channel. As a result, water yields in excess of recommended thresholds have had no observed measurable impacts to stream channel stability.

Direct and Indirect Effects

No Action Alternative

Direct and indirect effects of the No Action alternative would be similar to the conditions described under the existing conditions for water quality and water yield. The water quality and water yield would be unaffected by the no action alternative, and the intermittent streams in the proposed project area would continue to be affected by natural and pre-existing conditions.

Action Alternative

Water Quality

The action alternative would maintain existing erosion control and surface drainage on 9.5 miles of existing road, and keep it at applicable BMP standards. In addition, 3.4 miles of new permanent road and approximately 1 mile of temporary road would be constructed to access the proposed harvest units. All new road construction would comply with all applicable BMP standards. None of the proposed new roads would cross a stream. Several broad, ephemeral draws would be crossed with an armored drive-through. These draws have no evidence of a defined channel, and do not contribute to a stream or other body of water.

Water Yield

The proposed action alternative would harvest timber from approximately 349 acres within the Briggs Creek watershed. Proposed harvest activities would increase annual water yield by 1.9% in Briggs Creek. These levels of increase would not be large enough to cause channel instability, and would not exceed the allowable water yield increase. The stability of channels where they exist would be sufficient to handle these increases. It is not expected that these increases in water yield would create surface flow to any other body of water beyond that occurring under the existing conditions.

The remaining 203 acres of proposed harvest are located in the Murr Creek watershed. For reasons outlined under the Analysis Area portion of this analysis, these acres of harvest have a very low risk of measurable or observable changes in water yield.

CUMULATIVE EFFECTS

No Action Alternative

Cumulative effects of the No Action alternative on water quality and water yield would be similar to the situations described in the existing conditions. The water quality, water yield and fish populations would be unaffected by the No Action alternative, and the ephemeral draws in the proposed project area would continue to be affected by natural and pre-existing conditions.

Action Alternative

Water Quality

Risk of sediment delivery in the proposed project area would be very similar to current levels. Maintenance of erosion control and surface drainage on the existing road system would keep erosion rates near current levels and not measurably change the risk of sediment delivery to other areas. The risk of increased sediment loading to Briggs Creek, Murr Creek or any other body of water is very low due to the disconnected nature of the draws and streams within or downstream from the proposed project area.

Water Yield

Past activity in and around the proposed project area has mainly consisted of timber management. On some sites where timber was harvested, there has been substantial vegetative and hydrologic recovery with no apparent impact to stream channels from water yield increases.

The proposal is to seed tree harvest approximately 349 acres in the Briggs Creek watershed. These activities would move the projected water yield increase from 14.9% over a fully forested condition to 16.8% in the Briggs Creek watershed. This water-yield increase, and its associated ECA level, includes the impacts of all past management activity, existing and proposed roads, proposed timber harvesting, and vegetative hydrologic recovery in the Briggs Creek watershed. The water-yield increase expected from this alternative leaves the watershed above the established threshold of concern. It is possible that increases in flow could be observed through the implementation of the action alternative. Changes in channel conditions are unlikely, but could occur in individual reaches that have lower channel stability. These changes could include increased streambank erosion, channel down-cutting, and migration of channels away from current locations. Should in-channel erosion occur, deposition of bed and bank material could be deposited in flatter, gentler reaches. These projections are possible but unlikely given the good channel-stability ratings of the unnamed tributary to Briggs Creek that is drained by the proposed project. The action alternative would most likely not have measurable impacts to the stream channel. However, the estimated water-yield increases would leave a low to moderate risk of the described potential negative impacts in the less stable reaches and in isolated instances. The predicted water yield

increases in Briggs Creek are projected to decrease to below threshold levels in less than 10 years due to vegetative recovery of past harvest activities.

The remaining 203 acres of proposed harvest are located in the Murr Creek watershed. For reasons outlined under the Analysis Area portion of this analysis, these acres of harvest have a very low risk of measurable or observable changes in stream flow or channel stabililty in Murr Creek.

SOILS ANALYSIS
FOR THE
BOLD PEAK TIMBER SALE

INTRODUCTION

Landform Description

The Bold Peak project area lies at the top of the Briggs Creek watershed in a valley formed by glaciers and river processes. The dominant soil types found in the project area are deep to moderately deep weathered bedrock derived from argillite, siltite and limestone from the Belt Supergroup. Upper slopes and ridges are weathered bedrock scoured by glaciers.

Soil Physical Properties

This analysis addresses the issue that timber harvesting and associated activities may affect soil conditions in the proposed project area through ground-based activities, and through repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore space in soil, reduces its ability to absorb and retain water, and can increase runoff and overland flow. These conditions can also lead to a decrease in vegetation growth.

Slope Stability

Slope stability can be affected by timber management activities by removing stabilizing vegetation, concentrating runoff, or by increasing the soil moisture. The primary risk areas for slope stability problems include, but are not limited to, landtypes that are prone to soil mass movement, and soils on steep slopes (generally over 60 percent).

ANALYSIS METHODS

Soil Physical Properties

Impacts to soil physical properties will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. Percent of area affected is determined through pace transects, measurement, aerial photo interpretation, or GIS to determine skid trail spacing and skid trail width. From this, skid trail density and percent of area impacted are determined. Estimated effects of proposed activities will be assessed based on findings of DNRC soil Monitoring.

Slope Stability

Slope stability risk factors will be assessed by reviewing the Lolo National Forest Land Systems Inventory to identify landtypes listed as high risk for mass movement. Field

reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

Analysis Area

The analysis area for evaluating soil physical properties and slope stability will include DNRC owned land within the Bold Peak project area. Two unnamed tributaries to Briggs Creek encompass most of the project area.

Existing Conditions

Soil Physical Properties

In the proposed project area, no timber harvesting or other land management activities have been conducted. No roads or timber harvest units exist within the project area. A pack trail is located along the ridge leading to Bold Peak where a communication site once existed.

Slope Stability

Soil types in the project area are gentle to moderate (10-55%) residual soils found on hilly terrain. The Lolo National Forest Land Systems Inventory (USDA, 1989) identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated on this project in the remainder of this analysis. A list of soil types found in the Bold Peak project area and their associated management implications is found in table 3-vv.

Direct and Indirect Effects

No Action

This alternative would have no direct or indirect effects on soil physical properties. No ground-based activity would take place under this alternative, which would leave the soil in the project area unchanged from the description in the Existing Conditions portion of this analysis.

Action Alternative

Soil Physical Properties

This alternative includes 273 acres of ground-based mechanical harvesting, and 251 acres of cable skyline yarding. Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts would be expected on up to 60 of the total 524 acres proposed for harvesting. This value includes the projected impacts of construction of 3.3 miles of new system road and 1.0 mile of temporary road. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with ground-based machinery had a range of impacts from 3.0

to 21.0 percent of the acres treated, with an average disturbance rate of 11.4% (DNRC, 2009). The low range of impacts includes operations on frozen or snow-covered soils, and the high range includes operations on moist soils during non-winter conditions. Based on these monitoring results, the extent of impacts expected would likely fall within the range reported by DNRC (2009), or approximately 3.0 to 21 percent of ground-based harvested acres.

Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. Table 3-uu summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave approximately 12 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP*, and well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in ARM 36.11.422 and the SFLMP (DNRC, 1996).

TABLE 3-UU – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVE ON SOIL PHYSICAL PROPERTIES

Description of Parameter	**No Action**	**Action Alternative**
Acres of Harvest	0	524
Acres of ground based yarding	0	273
Acres of ground based impacts[1]	0	**31**
Acres of skyline yarding	0	251
Acres of skyline impacts[2]	0	**19**
Miles of new roads	0	3.3
Acres of new roads[3]	0	**10**
Total estimated acres of impacts	0	**60**
Percent of harvest area with impacts	0%	11.5%

[1] 11.4% of tractor units based on average impacts found on similar soils and sites by DNRC soil monitoring
[2] 10.0% of skyline units affected by corridors, and approximately 75% of skyline corridors impacted
[3] Assuming an average width of 25 feet, roads are approximately 3 acres per mile

CUMULATIVE EFFECTS

No Action

Soil Physical Properties

This alternative would have no cumulative impacts to physical properties of soils in the project area. The impacts of this alternative would be similar to those described in the Existing Conditions portion of this analysis. No soil would be disturbed and no re-entry of past harvest units would occur. All impacts from past management activities would continue to improve or degrade as dictated by natural and pre-existing conditions.

Action Alternative

Soil Physical Properties

Since no past management activities have occurred within the proposed project area, the cumulative effects to soils would be identical to those displayed in the Direct and Indirect Effects section of this analysis. Cumulative impacts to soil physical properties under the Action Alternative would fall below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996).

DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following: 1) mitigating the potential direct and indirect effects with soil moisture restrictions, season of operation, and method of harvest 2) retention of a portion of coarse woody debris and fine litter for nutrient cycling.

AP UNIT DESCRIPTIONS FOR THE BOLD PEAK PROJECT AREA

Soil Drainage	Road Limitations	Topsoil Displacement & Compaction	Seedling Establishment	Erosion (Bare Surface)	Notes
ell Drained	Low	Moderate	Mod/Good - Competition	Moderate	Deep, productive soil. Topsoil depth important.
ell Drained	Low	Moderate	Good	Moderate	Deep, productive soil. Topsoil depth important.
ell Drained	Low	Moderate	Good	Moderate	Stands will regenerate quickly, but growth is slow in early years.

References:

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

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

USDA Forest Service. 1989. *Lolo National Forest Land Systems Inventory.* USDA Forest Service and Natural Resources Conservation Service.

WILDLIFE ANALYSIS

INTRODUCTION

This analysis discloses the existing condition of relevant wildlife resources, and displays the anticipated effects that may result from each alternative of this proposal. Considerations and concerns raised by DNRC specialists and public comments received during initial scoping for the proposed project led to the following list of issues:

- Timber harvesting could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.
- Timber harvesting could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.
- Timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitats preferred by Canada lynx, which could decrease the area's suitability for lynx.
- Timber harvesting and associated activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter prey availability.
- Timber harvesting could decrease canopy cover, snag abundance, and the amount of coarse woody debris, which could reduce habitat suitability for fishers.
- Timber harvesting and associated activities could negatively affect pileated woodpecker habitat suitability and reproduction by removing canopy cover and snags used for foraging and nesting.
- Timber harvesting and associated activities could reduce habitat quality for big game, particularly for elk security.

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 in 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 2 different scales. The first will be the "project area", which consists of section 16 in T25N, R25W. The second scale or the "analysis area" relates to the surrounding landscape for assessing cumulative effects to wildlife species 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., landtype, 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.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, DNRC's stand level inventory (SLI) data, aerial photographs, USDA Forest Service GIS data, 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.

COARSE FILTER WILDLIFE ANALYSIS

Of the 108 mammal species found in Montana, 66 are suspected or known to occur in Flathead 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. Six amphibian and seven reptile species have also been documented in Flathead County (*Maxell et al. 2003*) and at least 68 species of birds have been documented in the vicinity in the last 15 years (*Lenard et al. 2003*). Altered wildfire regimes due to fire suppression have resulted in widespread increasing tree densities and levels of shade-tolerant species. Thus, tree species such as Douglas-fir and grand fir have become more prevalent on the landscape than they were historically. These departures from historical conditions 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. In the project area vicinity, there is a mosaic of mature and young stands, which benefit species relying on mature forests, and regenerating forests.

MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY

Issue: Timber harvesting could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.

Introduction

A variety of wildlife species rely on older, mature forest to meet some or all of their life history requirements. Mature forests, characterized by abundant large diameter trees and dense canopy cover, play an important role in providing food, shelter, breeding sites, and resting or travel corridors for certain animals. Wildlife use and/or preference of older, mature forests is species-specific; some species use this habitat exclusively, other species only temporarily or seasonally, and some species avoid mature forests altogether. Several species known to be strongly associated with mature forests include pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*).

Forested landscapes in the western United States were historically shaped by natural disturbance events, primarily wildfire, blowdown, and pest outbreaks. Resulting broader landscape patterns were a mosaic of forest patches varying in age, composition and development. Timber harvest, like stand-replacement fire and blowdown, is a disturbance event that can create open patches of young, early-successional habitats. Patch size, shape, abundance, and distance to similar patches (connectivity) can be factors influencing wildlife use. The way through which patch characteristics influence wildlife use and distribution are dependent upon the particular species and its habitat requirements. Temporary non-forested

openings, patches, and forest edges created by timber harvest may be avoided by certain wildlife species adapted to mature closed-canopy forest. In contrast, other wildlife species flourish in early seral habitats created by disturbance. Connectivity under historical fire regimes within forest types found in the vicinity of the project area was likely relatively high as fire differentially burned various habitats across the landscape (Fischer and Bradley 1987).

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on section 16 and the 8 sections surrounding the state parcel (approximately 5,760 acres). This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, aerial-photograph interpretation, USDA Forest Service data, and Geographical Information System (GIS) analysis. Factors considered in the analysis include the level of timber harvesting, amount of mature forested habitats, and connectivity.

Existing Environment

The project area currently contains approximately 640 acres of mature stands (100-plus years in age) of Douglas-fir/western larch, lodgepole pine and mixed-conifer stands that have a reasonably closed canopy. No stands in the project area meet the definition of old-growth (*Green et al. 1992;* see *VEGETATION ANALYSIS*). Roads are currently absent from the project area. An USDA forest service road open to year-round public use runs north-south near the west side of the section. In addition to summer/fall car traffic, this road may receive snowmobile use during the winter. While habitat connectivity within the project area is good, connectivity surrounding the project area has been reduced with past timber harvesting and road construction on private timberlands and federal property.

Presently, roughly 34 percent (1,952 acres) of the cumulative effects analysis area is comprised of mature, closed canopy forests. Average patch size of mature forest is 147 acres (13 patches). Past timber harvesting and road building have converted much of the remaining acres into young forest stands or non-forest, respectively. Additionally, approximately 6.4 miles of open road and 34 miles of restricted use roads (total all roads = 4.6 miles/sq. mile) in the cumulative-effects analysis area, coupled with timber management and land clearing has largely reduced landscape-level connectivity in the cumulative effects analysis area. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering forested habitats and landscape connectivity. Across the cumulative-effects analysis area, landscape connectivity has been appreciably compromised for species requiring connected stands of mature forests.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Mature Forested Habitats and Connectivity

Under this alternative no timber harvesting activities would occur. Thus, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area 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.

Direct and Indirect Effects of the Action Alternative on Mature Forested Habitats and Connectivity

Under the action alternative, approximately 524 acres of mature forest stands would be harvested. Approximately 116 acres within the square mile DNRC section would remain unharvested. All these acres would undergo harvest levels that would reduce habitat for species that rely on mature, closed-canopy forested habitats. Under the action alternative, 203 acres of lodgepole pine/mixed conifer stands, situated on the west side of Bold Peak, and 321 acres of western larch/Douglas-fir on the north and east side of Bold Peak would undergo a regeneration harvest designed to emulate mixed severity fire disturbance with an average of 12 trees per acre remaining post treatment. Overall, the resultant changes in stand structure would reduce habitats for species associated with dense, mature stands, such as American marten and pileated woodpecker, which benefited from the increasing stand ages and tree densities caused, in part, by modern fire suppression. In general, under this alternative, habitat conditions would improve for species adapted to the more-open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions. Approximately 3.4 miles of new roads would be built in association with harvesting and closed to public motorized access after project completion. Roads would be used thereafter for administrative purposes only.

Following proposed harvesting the majority of the project area would develop into younger-aged stands and would blend with the existing younger stands to the north, south, east and west. An unharvested area along the east side of the Bold Peak ridge running south and east down to the corner of the section would maintain connectivity with other mature forest on an adjacent USDA Forest Service half section. Field visits to this area, which as proposed would remain unharvested, confirmed evidence of wildlife use (e.g. elk, white-tailed deer). Numerous species, such as Canada lynx, use forested ridgelines and saddles as travel corridors (Ruediger et al. 2000). The action alternative would maintain some connectivity of matures forest along this landscape feature. Additionally, retention of a greater number of trees (12-18/acre) on the section's north and east sides would provide habitat characteristics that favor use by species utilizing open mature forest conditions comprised of large scattered trees. Thus, moderate adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) harvesting would substantially reduce tree density and existing cover on roughly 524 acres of mature forested stands (an 81% reduction of mature forest cover on the project area),; 2) moderate changes to landscape connectivity would occur due to reduced existing cover across the NW and SW section corners to USFS lands; and 3) some changes to wildlife use would be expected proportional to the acreage affected.

Cumulative Effects of the No-Action Alternative on Mature Forested Habitats and Connectivity

Under this alternative no timber harvesting activities would occur. Thus, no cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area 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 changes to wildlife use would be expected.

Cumulative Effects of the Action Alternative on Mature Forested Habitats and Connectivity

Past harvesting in the cumulative effects analysis areas has reduced the amount of mature, forested habitats available while altering landscape connectivity. Reductions in mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities and any ongoing activities on neighboring private lands. Across the cumulative-effects analysis area, a low percentage (25%) of forested habitats would exist and landscape connectivity would not be appreciably altered further given the existing compromised condition of the forested landscape due to past activities on neighboring ownerships. Habitats for forested interior species and species associated with dense, mature stands, would be further reduced, and would remain low in the cumulative effects analysis area After 10 to 20 years, wildlife species that use and prefer young forest stands would benefit from cumulative increases of such habitat that would be present the project area . Some landscape connectivity would be maintained through the 116 acre unharvested area, but connectivity of mature forest would remain low within the cumulative effects analysis area. Overall, connectivity of young forests would increase while connectivity of mature forested habitats would decrease in the short term. However, future development of connected, mature forests could occur as 4,333 acres of similarly-aged stands, including these stands proposed to be harvested with this alternative, would continue developing across the cumulative effects analysis area. Thus, moderate adverse cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area since: 1) harvesting would remove mature stands, further reducing the amount of forested cover in the cumulative-effects analysis area by ~23%; 2) moderate changes to landscape connectivity and fragmentation would occur attributable to reduced connectivity of existing forest cover and reduced effective patch size of existing forest cover on the project area; and 3) minor cumulative changes to wildlife use would be expected.

SNAGS AND COARSE WOODY DEBRIS

Issue: Timber harvesting could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.

Introduction

Snags and coarse woody debris are important components of forested ecosystems. The following are 5 primary functions of snags and downed logs in forest ecosystems: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide important habitat substrate 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 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 them. 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 to 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 species, 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.

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 downed logs and snags for survival and reproduction. The size, length, decay, and distribution of woody debris affect the capacity of various species to meet their life requisites. Single, scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles may provide foraging sites for weasels and secure areas for snowshoe hares.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on section 16 and the 8 sections surrounding the state 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

The abundance of snags and coarse woody debris were quantitatively estimated using 14 systematically placed plots in the proposed project area. Factors considered in the analysis included the level of proposed harvesting and number of snags and coarse woody debris.

Existing Environment

During field visits to the project area, relatively few (= 0.5/ac, range 0-6.6) large (>21” dbh) snags per acre were observed. All snags >8” dbh were more abundant (18/ac, range 0-33); being predominantly lodgepole pine, with lesser amounts western larch, Douglas-fir, and subalpine fir. The majority of snags sampled were lodgepole pine on the west side of Bold Peak, located in relatively dense, insect-infected lodgepole stands. In this area, lodgepole snags did not exceed 10” dbh and no snags >12” dbh were observed. The lack of large, high quality snags on the western side of the project area can be attributed to the forest type and wildfire history, rather than past logging practices or firewood gathering, which is virtually non-existent throughout the project area due to inaccessibility. Large snags (> 21 inches dbh) are only present on the north and east sides of Bold Peak, where western larch and Douglas-fir are the primary tree species. Evidence of snag use for feeding and/or cavity building was observed in northern and eastern portions of the unit. Coarse woody debris levels were also variable across the project area, with ~17 tons per acre (range 0-35 tons per acre). Similar to snags, coarse woody debris is generally more abundant and larger on the north and east sides of Bold Peak than on the west side.

Overall, snag and course woody debris resources exist at current levels to meet or exceed DNRC’s minimum-retention thresholds. Similar to other unaltered forested landscapes, these dead wood resources are not distributed evenly across the project area. Outside of the proposed project area, any ongoing harvesting on other ownerships could continue to alter snags, snag recruits, and coarse woody debris levels. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and firewood gathering occurs in the cumulative-effects analysis area. Snag and coarse woody debris levels on surrounding parcels likely vary widely depending on ownership, harvest and wildfire history.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Snags and Coarse Woody Debris

No direct changes in the deadwood resources would be expected. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. No direct and indirect effects would be expected to affect wildlife species requiring snags and coarse woody debris 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.

Direct and Indirect Effects of the Action Alternative on Snags and Coarse Woody Debris

Present and future snags and large coarse woody debris would be reduced due to timber harvesting on 524 acres in the project area. Portions of the project area or in stands that lack larger snags would not see appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Prescriptions call for all western larch and Douglas-fir snags >16" dbh, 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees may be left if sufficient large snags are not present), and 10 to 15 tons of coarse woody debris per acre retention in the proposed harvest areas. 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 areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species like western larch that tend to provide important habitats, such as high-quality nesting structures and foraging habitats. 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 help ensure that important attributes would be retained to support the suite of species that rely on these habitat components. No changes in human access would occur and, therefore, no changes to the potential future risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris, 2) no changes to human access for firewood gathering would occur, and 3) snags and future recruitment trees would be retained in all proposed treatment areas.

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 under this alternative. Thus, no cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur that could affect existing snag and coarse woody debris abundance, and 2) no change in the level of firewood gathering would occur.

Cumulative Effects of the Action Alternative on Snags and Coarse Woody Debris

Some snags could be removed from the project area, whereas coarse woody debris amounts would likely remain at current levels or additional material may be recruited. Surrounding lands in the cumulative effects analysis area have experienced different management regimes by the differing owners through time, and within each of these management regimes, snags and coarse woody debris have received different levels of consideration; however, harvesting on all ownerships in the vicinity has reduced these attributes. The losses of snags associated with this alternative would be additive to the losses associated with past harvesting and any ongoing

harvesting on neighboring ownerships. However, the project requirements to retain all western larch and Douglas-fir snags >16" dbh, 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), and 10 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Due to a lack of large snags, particularly on the west side of the Bold Peak project area, some areas could be large snag deficient. Thus, the action alternative would retain additional snags in areas where they are larger, more abundant and more likely to persist. No change in public access would be anticipated; thus, no changes to the potential loss of snags and coarse woody debris resulting from firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative-effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers in proposed units following treatment. Thus, since: 1) 524 acres of the cumulative-effects analysis area would be harvested reducing snags and snag-recruit trees while increasing or maintaining coarse woody debris levels, 2) no changes in access for the general public and associated firewood gathering would be anticipated, and 3) there would be slightly increased representation of shade-intolerant species that could become snags in the long term, minor adverse effects to wildlife requiring snags and coarse woody debris would be anticipated that would affect these species in the cumulative effects analysis area for 30-100 years.

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 Montana FWP. TABLE W-1 – FINE FILTER summarizes how each species considered was included in the following analysis or removed from further consideration because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE W-1 – FINE FILTER. *Species considered in the fine-filter analysis for this proposed project.*

	SPECIES/HABITAT	DETERMINATION – BASIS
Threatened and Endangered Species	Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	No further analysis conducted – The project area is over 14 miles from "occupied habitat" as mapped by T. Wittinger, Unpub. Interagency Map (2002). Given the relatively low quality habitat and high degree of human influences between the project area and the "occupied habitat" little or no use would be expected. Thus, no direct, indirect or cumulative effects to grizzly bears would be expected to occur as a result of either alternative.
	Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Included*** – Potential lynx habitats occur within the project area.

	Gray Wolf (*Canis lupus*) Habitat: Ample big game populations, security from human activities	No further analysis conducted – The project area is not near any recent wolf annual home ranges and does not contain big game winter range. Thus, no direct, indirect, or cumulative effects to wolves would be expected to occur as a result of either alternative.
Sensitive Species	Bald eagle (*Haliaeetus leucocephalus*) Habitat: Late-successional forest more than 1 mile from open water	There are no known nest territories in the vicinity of the project area and no large water bodies within 1 mile of the project area that might provide suitable locations for nesting. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	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 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 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*) Habitat: Cold mountain lakes, nest in emergent vegetation	No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
	Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	***Included*** – Potential fisher habitats occur in the project area.
	Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	No suitable dry ponderosa pine and Douglas-fir stands exist in the project area. Thus, no direct, indirect or cumulative effects to flammulated owls would be expected to occur as a result of either alternative.
	Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	No suitable high-gradient stream or river habitats occur in the project area. 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 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 suitable cliffs/rock outcrops occur in 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 habitats exist in the project area.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	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	No known big game winter range exists in the project area. Additionally, elevation and winter snow depth of the project area make big game winter use unlikely.
	Big game security habitat	***Included*** – Big game security habitat exists in the area.

THREATENED AND ENDANGERED SPECIES

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 habitats preferred by Canada lynx, which could decrease the area's suitability for lynx.

Introduction

Canada lynx are listed as "threatened" under the Endangered Species Act. 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 5,680 to 6,320 feet in elevation and is dominated by Douglas-fir, western larch, lodgepole pine and mixed conifers. Lynx abundance and habitat use are strongly associated with snowshoe hare populations; thus conditions which decrease habitat quality for snowshoe hares can reduce the availability of prey for lynx. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares, either dense, young coniferous stands or dense, mature forested stands. Mature subalpine fir stands with abundant coarse woody debris also provide structure important for denning and cover for kittens, and dense cover used for 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, northwest Montana contained a variety of

stand types with differing fire regimes; this, combined with patchy elevation and snow-depth gradients preferred by lynx, likely forming a non-continuous mosiac of lynx and non-lynx habitats (Fischer and Bradley 1987, Ruggiero et. al. 1999).

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 640 acre project area. Cumulative effects were analyzed on an 85,408 acre cumulative effects analysis area generally centered on the project area. This scale of analysis approximates the home range size of several 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 6 specific lynx habitat elements:

1) denning,

2) mature foraging,

3) denning/mature foraging

4) young foraging,

5) forested travel/other habitat, and

6) 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 important for the survival of both adult and juvenile lynx, however, it is not considered limiting for lynx in most forested landscapes in western Montana (USFS Northern Rockies Lynx Amendment ROD 2007). “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 appreciably by lynx until adequate horizontal cover reestablishes. Factors considered in the analysis include landscape connectivity and the amount DNRC-owned lands within the cumulative effects analysis area in denning, foraging, and unsuitable habitats.

Existing Environment

Approximately 640 acres of lynx habitat occurs in the 640 acre project area. Much of this habitat was identified as forested travel/other habitats, with lesser amounts of denning and mature foraging habitat (*TABLE W-2 – LYNX HABITATS*). Administrative rules of Montana (ARM 36.11.435 (8)(a) & (b)(i)) require a minimum of 5 acres and 10 percent of the project-scale lynx habitats on DNRC-managed lands to be in denning and foraging habitats, respectively. Connectivity within the project area has remained relatively intact within the last 100 years, as there is no history of timber harvest on this parcel.

DNRC ownes and manages approximetly 3,607 acres of the 85,408 acres, or 4% of the cumulative effects analysis area (*TABLE W-2 – LYNX HABITATS*). Other significant land owners in the cumulative effects area are Plum Creek Timber (74%) and USDA Forest Service (19%). Historical records have documented Canada lynx four miles north of the cumulative effects analysis area. DNRC-owned lynx habitats within the cumulative effects analysis area occur on 6 separate parcels and are dominated by forested travel/other habitat (*TABLE W-2 –*

LYNX HABITATS). The lack of fire, including the effects of fire suppression has likely led to a greater proportion of forested travel/other habitats, with smaller amounts of mature foraging and denning habitats on DNRC lands.

USDA vegetation data and interpretations of aerial photographs of lands not under DNRC ownership show approximately 66 percent in early regenerating forest growth and 34 percent to be mature forest with a reasonably closed (>40%) canopy. Without knowing dominant tree species, covertype, and understory structure in these mature stands, it is difficult to determine their situability for lynx use. It is reasonable to assume that a number of mature stands on non-DNRC ownership within the culmutive effects analysis area meet the guidelines as potential lynx denning and/or mature foraging habitat. Similarly, some portions of regenerating forest within the cumulative effects area may qualify as young foraging habitat for lynx. Forest type, stem densities, and time since harvesting play important roles in shaping the suitablilty of young foraging habitat for lynx. Given that examination of aerial photography suggests most of the cumulative effects analysis area was harvested within the last 30 years, it is likely that most regenerating, non-mature forested stands are not preferred young foraging habitat for lynx due to low stem densities and the prevelence of non-preferred cover types. Additionally, connectivity at the cumulative effects analysis level has been compromised by widespread harvesting and road construction. The distribution of the various lynx habitat elements in the remaining portions of the cumulative effects analysis area is the result, primarily, of past timber harvesting and wildfire history.

TABLE W-2 – LYNX HABITATS. 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 ON DNRC	PERCENT OF TOTAL CUMULATIVE AREA
Denning	164	26	212	11	0.25
Denning/Mature foraging	0	0	11	1	0.01
Mature foraging	26	4	177	9	0.21
Forested travel/other	450	70	1,342	68	1.57
Temporary non-habitat	0	0	191	10	0.22
Young foraging	0	0	45	2	0.05
Grand Total-Lynx Habitats	640	100	1978	100	2.32
Permanently Unsuitable	0		1,629		1.91
Total Acres	640		3,607		4.22

Environmental Effects

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

Under this alternative, no changes in lynx habitat elements would be expected in the project area and landscape connectivity would not be altered. Thus, since: 1) ample denning habitat would remain, 2) mature foraging habitat would exist and possibly increase, 3) most of the lynx habitats would be in a usable state for lynx, and 4) landscape connectivity would not be altered, no direct indirect effects to lynx habitats would be expected to occur in the project area.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 524 acres of lynx habitats would be harvested with this alternative (TABLE W-3 – CHANGES IN LYNX HABITATS). Within harvest units, prescriptions would convert available lynx habitat elements into temporary non-lynx habitat. Of these potential harvest acres, the majority of the lynx habitats are forested travel/other, with lesser amounts of denning and mature foraging. Portions of the Bold Peak ridgeline extending east and southeast would remain unharvested to conserve lynx denning and mature foraging habitat (addresses ARM 36.11.435 (8)(a) & (b)(i)), as well as maintain lynx habitat connectivity with an adjacent unharvested section. Because an insufficient number of mature foraging acres exists to meet 10% (64 acres) of the total project area (TABLE W-2 – LYNX HABITATS), the action alternative proposes to leave additional acres of denning habitat unharvested. Field visits to the proposed unharvested area suggested some of these denning acres could also function as mature foraging lynx habitat. Approximately 55 acres denning, 23 acres mature foraging, and 39 acres forested travel/other lynx habitat would remain unharvested in the project area. In the proposed harvest units, 15 to 20 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 habitats due to timber harvest disturbance. Overall forest connectivity of mature forested habitat would be reduced; however current landscape connectivity in the area has been compromised through past harvesting activities. Collectively, since: 1) moderate amounts of denning and mature foraging habitat would be retained, 2) moderate amounts of lynx habitats would be in the temporary non-lynx habitat category, and 3) minor landscape habitat connectivity would be maintained, minor adverse direct and indirect effects to lynx habitats would be expected to affect Canada lynx in the project area for about 20 years until successful regeneration and forest ingrowth into harvest units would occur.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable change in lynx habitats would occur under this alternative and no further changes in landscape connectivity would be anticipated due to DNRC activities at this time. Thus, since: 1) adequate denning habitats would persist, 2) sufficient mature foraging habitats would exist, 3) young foraging habitats would continue to provide habitat for snowshoe hares outside of DNRC ownership, 4) longer term availability of young foraging habitats would likely decline without disturbance, 5) temporary non-lynx habitats will continue to mature and move into habitats suitable for lynx use, and 6) landscape connectivity would persist, no cumulative effects to lynx would be expected to occur.

Cumulative Effects of the Action Alternative on Canada Lynx

Within the cumulative effects analysis area lynx habitats would continue to persist. Reductions in mature foraging, denning, and forested travel/other 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.

Additionally some modifications of lynx habitats could be possible with any management that may occur on industrial timberlands and other privately owned lands in the cumulative effects analysis area. Across all ownerships, continued stand maturation would move some habitats towards forested travel/other, mature foraging, and denning habitats and away from the young foraging stage, while other, more recently disturbed areas could grow into young foraging habitat. Existing denning habitat on DNRC-owned lands in the unharvest portion of the project area and larger cumulative effects areawould be expected to persist in the absence of timber harvesting or other natural disturbance reducing habitat quality. Landscape connectivity would be further, reduced with the proposed activities (see WILDLIFE- landscape connectivity). Thus, since: 1) adequate denning habitats would persist, 2) sufficient denning and 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) recently harvested or burned habitats may become young foraging habitat over the next 10-30 years, and 5) there may be some minor reductions in landscape connectivity, minor adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative effects analysis area for about 20 years.

TABLE W-3 –CHANGES IN LYNX HABITATS IN THE PROJECT AREA. Acres and percentages of lynx habitat elements on DNRC-managed lands in the project area following implementation of each alternative.

LYNX HABITAT ELEMENT	**ALTERNATIVES**	
	A – No Action	**B - Action**
Denning	164 (25.6%)	55 (8.6%)
Denning/Mature foraging	0 (0%)	0 (0%)
Mature foraging	26 (4.1%)	23 (3.6%)
Forested travel/other	450 (70.3%)	39 (6.1%)
Temporary non-habitat	0	524 (81.8%)
Young foraging	0	0
Total Lynx Habitats Affected	0	524
Total Lynx Habitat Unaffected	640	116

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 no sensitive species in the vicinity of the project area. As shown in ***TABLE W-1.***

FISHER

Issue: Timber harvesting could decrease canopy cover, snag abundance, and the amount of coarse woody debris, which could reduce habitat suitability for fishers.

Introduction

Fishers are generalist predators that prey upon a variety of small mammals and birds, as well as snowshoe hares and porcupines. 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 low to mid elevation mature 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 does 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 Areas

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed a 28,000 acre cumulative effects analysis area generally centered on the project area. This scale 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 cover types (ARM 36.11.403(60)) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. DNRC manages preferred fisher cover types 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 sawtimber size class in moderate to well-stocked density (ARM 36.11.440(1)(b)(i)). Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to streams and based upon stream class. Direct and indirect effects were analyzed using field evaluations and GIS analysis of potential habitat. Cumulative effects were analyzed using field evaluations and GIS analysis of potential habitat and aerial photograph interpretation of potential habitat on all other lands within the cumulative effects analysis area. Factors considered include amount of suitable fisher habitats, landscape connectivity, and human access. 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, relative amounts of coarse woody debris, and risk level of firewood harvesting.

Existing Environment

The project area ranges from 5,680 to 6,320 feet in elevation. There are no riparian fisher habitats, which are generally used for denning and resting, within the project area (Heinemeyer and Jones 1994). Modeling fisher habitats using SLI data generated an estimate of 133 upland fisher habitat acres in the project area (Heinemeyer and Jones 1994). Currently there are no roads within the project area. At the scale of the project area, the stands comprising this habitat comprise one moderately to densely forested patch that persists as an island surrounded by sapling stands of varied density on adjacent private industrial forest lands. Mature forested stands occur on adjacent sections that share corners with the project area parcel and offer limited connectivity. Within the upland areas on the project area, most of the preferred fisher cover types are moderately or well-stocked and likely support the structural features necessary for use as travel habitat.

Within the cumulative effects analysis area on 640 acres of DNRC managed lands, there are 133 acres of moderately or well-stocked upland fisher cover types potentially used by fishers. However, these habitats occur at the upper elevation gradient used by fishers in northwest Montana, decreasing the likelihood of occupancy or use. Two short (<200 feet) class 2 streams run out the west side of the project area, but they do not support all of the structural features necessary for fisher riparian habitat. One of these streams disappears at the section line border with logged, private land. Thus, DNRC lands in the cumulative effects analysis area inherently support little riparian habitat that would promote maintaining landscape connectivity Approximately 19 miles of perennial and 27 miles of intermittent streams occur on private industrial forest lands and federal lands within the cumulative effects analysis area. The forested areas adjacent to these streams may contribute to the total riparian fisher habitats within the cumulative effects analysis area, although streams in this region are sometimes found to be absent from the landscape when ground-truthed. Of these 46 total stream miles, approximately 14 miles flow through larger areas of mature forested habitat while the rest are located in recently burned or harvested areas. Streams in harvested areas on private and federal ownerships showed strips of surrounding forest habitat with an average width of 200 feet. These forested riparian strips could still provide habitat and connectivity for fishers, particularly in the form of travel corridors. It is likely that lands managed as private industrial forest lands and other private owners within the cumulative effects analysis area provide additional upland fisher habitats. Within the cumulative effects analysis area there is a network of existing roads, most of which are closed to public access, that may facilitate non-motorized traffic within the area. Within the cumulative effects analysis area, past harvesting has limited snag and coarse woody debris densities in much of the area. Timber harvest has reduced snag densities on adjacent lands to well below two snags per acres. Coarse woody debris on adjacent lands also appeared to heavily represent smaller class sizes (8-16” dbh).

Environmental Effects

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

No change to the stands providing fisher denning and foraging habitats would be expected as no timber harvesting activities would occur under this alternative. Also, 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 or indirect effects would affect fishers in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 107 of the 133 acres (81 percent) of upland fisher habitats in the project area would be included in proposed harvest units. All of these acres are presently meeting structural requirements for fisher use. The majority of the upland fisher habitats within the project area are proposed to receive treatments that would likely yield stands too open for appreciable fisher use. A 116 acre unharvested area in the project area would maintain some classified fisher habitat, as well as mature forest with higher canopy cover valued by fishers. Harvest prescriptions call for retention of all snags >16 in. dbh where they exist and operationally feasible, 2 large snag recruits per acre (>21 in. dbh where they exist, otherwise the next largest size class), and 15-20 tons of coarse woody debris per acre would be planned for retention within the proposed units where it exists. While the proposed harvest may reduce density of snags and their recruits in the near future the sustainability of snags in the area will be maintained by retention of appreciable numbers of leave trees and snag recruitment trees. Prescriptions call for retention of large snags larger, older age class trees in the project area; further improving the development and sustainability of large snags. These large snags and trees could be a source for fisher denning and resting sites in the near future (10-20 years). Approximately 3.4 miles of new road would be built within the project area, although they will be closed to public motorized use. Increased use of the area by trappers due to increased road access is not expected due to the low quality of fisher habitat in the area. Minor additional reductions in connectivity would be expected in this landscape where connectivity has already been compromised (see WILDLIFE- MATURE FORESTED HABITATS AND CONNECTIVITY). Thus, since: 1) harvesting would reduce or remove upland fisher habitats in preferred cover types, 2) minor reductions in landscape connectivity would occur, 3) the overall likelihood of fisher use in the project area is inherently low due to existing poor habitat quality, 4) harvesting would reduce snag levels, and 5) motorized human access levels would remain the same, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area for approximately 30 years.

Cumulative Effects of the No-Action Alternative on Fishers

No effects to riparian or upland fisher habitats on DNRC managed lands would be expected as no timber harvesting activities would occur under this alternative. Also, no changes to landscape connectivity within the cumulative effects analysis area would be expected. 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 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 the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Fishers

Approximately 107 acres of potential upland fisher habitats in the cumulative effects analysis area would be harvested. These reductions would be additive to the losses associated with past and current timber harvesting in the cumulative effects analysis area. Future harvest

operations or natural disturbance on non-DNRC ownerships could affect fisher habitat on the larger landscape. Roughly 5,300 acres of the 28,000 acre cumulative effects area (19%) remains in mature forested habitats, a portion of which may be suitable for fisher use. Minor reductions in landscape connectivity within the cumulative effects analysis area would occur, theses reductions would be additive to the losses associated with past timber harvesting. Human disturbance would be expected to return to pre-harvest levels following treatment. Thus, since: 1) harvesting would alter tree density and structure in stands of preferred fisher cover types, but some upland habitats within the cumulative effects analysis area would persist, 2) no changes to preferred cover types or fisher habitats associated with the riparian areas in the cumulative effects analysis area would be anticipated, 3) minor reductions in landscape connectivity for fishers 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, as the 3.4 miles of new roads constructed within the project area would be closed to public access and would not likely to be sought out by trappers, minor adverse cumulative effects would be anticipated that would affect fisher in the project area for approximately 30 years.

PILEATED WOODPECKER

Issue: Timber harvesting and associated activities could negatively affect pileated woodpecker habitat suitability and reproduction by removing canopy cover and snags used for foraging and nesting.

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 for activities conducted within the project area. For cumulative effects analysis purposes, the eight surrounding sections and the project area (approximately 5,760 acres) were used as the scale of the analysis. This scale includes enough area to support multiple pairs of pileated woodpeckers if enough suitable habitat is present (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, were older than 100 years old, and had greater than

40 percent canopy closure. Foraging habitats are areas that do not meet the definition above, but include the remaining sawtimber stands 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 Conditions

In the project area, DNRC identified approximately 175 acres of potential pileated woodpecker habitat. Potential pileated forest stands consist of western larch, Douglas-fir and mixed conifer located on the north and east sides of Bold Peak. Stands are situated at elevations between 5,680 and 6,320 feet. Thus, elevations in the project area are near the upper limit normally considered pileated woodpecker habitat in the northern Rockies. The west side of the project area primarily contains densely-growing small to medium-diameter lodgepole pine. Very few large snags and coarse woody debris occur and prevalent pileated woodpecker foraging was not observed. It is likely this area has low habitat quality for pileated woodpeckers. Conversely, large live and dead trees are fairly common in portions of the project area identified as potential pileated woodpecker habitat. During field visits, woodpecker feeding sites and 0-2 large (>21 in dbh) snags per acre were observed; these provide foraging and nesting opportunities for pileated woodpeckers.

Presently, roughly 66 percent of the cumulative effects analysis area is not in mature, forested conditions due to road building and past harvesting, and thus is not likely providing pileated woodpecker habitats. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering pileated woodpecker habitats.

Environmental Effects

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

No disturbance of pileated woodpeckers would occur as no timber harvesting activities would occur under this alternative. Thus, no adverse direct and indirect effects to pileated woodpeckers in the project area would be expected since: 1) no further harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no changes to existing pileated woodpecker habitats would be anticipated.

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 would reduce forested habitats for pileated woodpeckers and enlarge existing younger-aged stands. Roughly 157 acres of potential pileated woodpecker habitat would be altered with regeneration-type treatments and would be too open to be considered habitat following proposed treatments. Collectively, all 524 acres in the project area would probably be too open to be considered pileated woodpecker habitats, although smaller portions of cutting units could retain enough large live trees and snags to maintain habitat characteristics preferred by pileated woodpeckers. In the stands proposed for treatment, potential pileated nesting and foraging habitats would be removed for 30 to 100 years. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags greater than 21 inches dbh per acre), coarse woody debris (10 to 15 tons per acre), large diameter leave trees, and snag recruits (a minimum of 2 trees per acre greater than 21 inch dbh where they exist) would be retained in the

proposed harvest areas. Some areas on the west side of Bold Peak currently lack sufficient large snags. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*), pileated woodpecker habitat quality in the project area would be expected to be reduced on 524 acres. The silvicultural prescriptions would retain healthy western larch and Douglas-fir while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Low-quality habitat associated with lodgepole forests would likely be converted to a more desirable forest type, although it would take many years (~50-100) to mature into pileated habitat. Thus, moderate adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous forested habitats available, 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 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included, and 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas where pileated habitat is currently not present.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers or their habitat would occur under this alternative as no timber harvesting activities would occur. Thus, no adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; and 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Under this alternative, further reductions in pileated woodpecker habitat would be expected in the cumulative effects analysis area which contains approximately 1,952 acres of potential habitat. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. In the project area, the canopy on 524 acres proposed for regeneration-type treatments would likely be too open for appreciable pileated woodpecker use and would be more similar to existing stands on adjacent ownerships. Proposed harvesting would further reduce the quality of the cumulative effects analysis area for pileated woodpeckers by reducing the amount of the cumulative effects analysis area in mature forested conditions from 33 percent to 25 percent (1,952 to 1,428 acres). Recently harvested stands and ongoing harvesting in the cumulative effects analysis area have reduced pileated woodpecker habitats; reductions associated with this action alternative would be additive to those reductions. Continued maturation of stands across the cumulative-effects analysis area is increasing suitable pileated woodpecker habitats through time. Thus, moderate cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative-effects analysis area since: 1) harvesting would further reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but small areas of forested habitats would persist; 2) potential nesting and foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in the harvested area; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

BIG GAME SECURITY COVER

Issue: Timber harvesting and associated activities could reduce habitat quality for big game, particularly for elk security.

Introduction
Timber harvesting can increase big game (e.g. elk) vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during times of predation/hunting pressure (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and resulting decrease in hunter opportunity.

Dense (>30% crown closure), large (≥ 250 acres) forest patches at least ½ mile from an open road that would limit elk (and subsequently deer) visibility and hunter accessibility (Hillis et al. 1991) are considered security cover. It is expected that when elk security is substantially compromised, effects to deer can also be expected (albeit to a lesser degree than for elk).

Analysis Area
Direct and indirect effects were analyzed on the big game security habitat in the project area. Cumulative effects were analyzed on an 85,408 acre cumulative effects analysis area generally centered on the project area. This scale of analysis approximates an area capable of supporting an elk herd home range in during the fall.

Analysis Methods
Given that areas within 0.5 mile of an open road do not provide elk security habitat (*Hillis et al. 1991*), existing open roads were buffered 0.5 mile and identified as areas not meeting elk security habitat criteria. Within the cumulative effects analysis area recent timber harvest activities were taken into account as they likely reduce the amount of secure habitat for elk. Additionally, elk security habitat patches need to be large forested blocks (>250 acres) with adequate cover to afford elk security during the general big game hunting season, so areas failing to meet this criteria were also removed, leaving patches that were distant enough from open roads, were large enough to meet the minimum criteria, and had adequate forest cover density to provide elk security habitat (*Hillis et al. 1991*). Factors considered in the analysis include the amount of security habitat available and level of human access for recreational hunting.

Existing Environment
Within the project area, there are approximately 315 acres of security habitat. Additionally, hiding cover, which is inherently a component of elk security habitat, is abundant within the project area. The project area is relatively inaccessible because there are no open or restricted roads in the parcel. Available access to the parcel is primarily through sizable networks of closed roads restricted to motorized activities that occur on neighboring industrial forest lands. The nearest open road occurs near the western border of the section and touches both northwest and southwest corners.

Within the cumulative effects analysis area, there are 6,300 acres that all meet the cover, distance (>0.5mi from an open road) and size (>250 acres) requirements of elk security across ownerships within the cumulative effects analysis area. This amount of security habitat (7.4 percent of the analysis area) does not meet the 30 percent minimum threshold established by Hillis et al. (*1991*). Additionally a large portion of the cumulative effects analysis area that exhibits characteristics of elk security (>0.5 mi for an open road and >250 acres) has been harvested in the past 10-30 years resulting in low to moderate levels of cover. These recent harvests have reduced the quality and quantity of elk security habitat within the area. Hunter

access across the cumulative effects analysis area is relatively limited in terms of open roads, although an extensive network of closed roads could allow widespread non-motorized access. Evidence of non-winter use by elk and deer was noted throughout the project area during field reviews.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Big Game Security Cover

No changes in elk security cover would be expected as no timber harvesting activities would occur. Existing cover would continue to contribute to security habitat. Thus, since: 1) no changes to existing elk security habitat would be anticipated and continued maturation of forest cover would improve elk security habitats, 2) the level of human access would remain unchanged, no direct or indirect effects to elk security habitat in the project area would be anticipated.

Direct and Indirect Effects of the Action Alternative on Big Game Security Cover

No changes in open roads or motorized access would occur; however, up to 3.4 miles of restricted roads would be constructed within the project area. During all phases of the project, any roads opened with project activities would be restricted to the general public and closed after completion of project activities. Proposed new roads would be restricted to the general public, but could facilitate non-motorized access during the hunting season using mountain bikes, horses, and/or foot travel. Within the project area, proposed harvest units following treatment would likely be too open to provide elk security. Under the action alternative, approximately 271 acres of security habitat would be altered, rendering the 315-acre patch within the project area unsuitable. An unharvested portion of the project area would provide approximately 61 acres of cover, but would be well below the recommended 250 acres (*Hillis et al. 1991*). Overall, increased sight distances and the reduction in hiding cover may increase elk vulnerability risk in the project area. Collectively, since: 1) no changes in open roads or motorized access for the general public would be anticipated that would appreciably increase hunter access, 2) sizeable amounts of amounts of elk security habitat would be affected (271 acres), and 3) potential for decreases in bull elk survival, moderate adverse effects to elk security habitat would be anticipated that would affect elk vulnerability risk in the project area for 20 to 30 years.

Cumulative Effects of the No-Action Alternative on Big Game Security Cover

Approximately 7.4 percent of the cumulative effects analysis area would continue providing elk security habitat, which falls well below the 30 percent minimum threshold recommended by Hillis et al. (*1991*). No other changes in big game disturbance and potential mortality due to hunting would be anticipated as no timber harvesting activities would occur under this alternative. Thus, since: 1) no changes in open roads, motorized access, or human access would be anticipated, and 2) no further reductions in elk security habitat would occur, no cumulative effects to elk security habitat or hunter opportunity would be anticipated.

Cumulative Effects of the Action Alternative on Big Game Security Cover

No changes would be anticipated in the amount of open roads or motorized access for the general public that would influence elk vulnerability, but project-level alterations of cover and increases in restricted roads could reduce elk security habitat. Increased sight distances could reduce elk survival in the project area and proposed road construction could facilitate an increase in non-motorized traffic. Motorized access in the cumulative effects analysis area is relatively limited, but non-motorized access via closed roads is relatively high. Portions of the

cumulative effects analysis area have been harvested, reducing hiding cover and elk security habitat. Any harvesting that may occur on industrial private timberlands and other privately owned lands within the cumulative effects analysis area could reduce cover attributes further, however no changes in open roads or motorized human access are anticipated. Cover reductions that would occur under this alternative would be additive to past harvesting conducted on neighboring lands during the last 30 years within the cumulative effects analysis area. With the proposed action available security cover within the cumulative effects analysis area would be reduced from 7.4% to 7.1 %, which remains well below the 30 percent minimum threshold recommended by Hillis et al. (*1991*). Continued maturation of previously harvested stands within the cumulative effects analysis area would improve hiding cover within recent harvest units and partially offset these current losses within 10 to 30 years. Thus, since: 1) no changes in open roads or motorized access for the general public would be expected, 2) moderate changes to non-motorized access would occur, 3) a low to moderate amount of elk security habitat would be affected, and 4) slightly lower than existing levels of security habitat and hiding cover would persist in the cumulative effects analysis area, low to moderate adverse cumulative effects to elk security and hunter opportunity would be anticipated that would affect elk and hunters using the cumulative effects analysis area for 10-30 years.

Wildlife Mitigations associated with the Action Alternative

- A DNRC biologist will be consulted 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.
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).
- Roads and skid trails that are opened with the proposed activities will be reclosed 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 where feasible.
- Manage for snags, snag recruits, and coarse woody debris, particularly favoring western larch and Douglas-fir (ARM 36.11.439(1) (b)). Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1)(m)).

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.

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.

Fischer, W.C., and A.F. Bradley. 1987. Fire ecology of western Montana forest habitat types. USDA Forest Service, General Technical Report INT-223. 95pp.

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

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.

Hillis, J.M., and M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-43 in A.G. Christensen, L.J. Lyon, and T.N. Lonner, comps., Proc. Elk Vulnerability Symp., Mont. State Univ., Bozeman, Montana. 330pp.

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

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.

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.

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.

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.

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, 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

Riggiero, L. F., Aubry, K. B., Buskirk, S. W., Koehler, G. M., Krebs, C. J., McKelvey, K. S., and J. R. Squires. 1999. Ecology and conservation of lynx in the United States. General Technical Report RMRS-GTR-30WWW. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Fort Collins, CO. 473 pp.

Attachment III

Prescriptions

Bold Peak Timber Sale Harvest Unit Prescriptions

Prescription #1

Harvest Unit: 1 **Harvest Unit Acres:** 52 Acres

Elevation: 5760ft-6260ft **Slope:** 0%-45% **Aspect:** Variable

Habitat Type: ABLA/ALSI, ABLA/XETE-VASC

Current Cover Type: Lodgepole, Mixed Conifer

Desired Future Condition: Douglas-fir/Western Larch

Soil Type: Loamy Skeletal, Mixed

Location: Section 16, Township 25N, Range 25W

Harvest Unit: 2 **Harvest Unit Acres:** 151 Acres

Elevation: 5680ft-6340ft **Slope:** 0%-45% **Aspect:** Variable

Habitat Type: ABLA/XETE-VASC, ABLA/XETE-VAGL

Current Cover Type: Lodgepole, Mixed Conifer

Desired Future Condition: Douglas-fir/Western Larch

Soil Type: Loamy Skeletal, Mixed

Location: Section 16, Township 25N, Range 25W

Description of Existing Stand:

Unit 1 is located on the west side of Bold Peak. The unit is bordered by Plum Creek Timber land on the north and west sides. The unit is comprised of three different stands identified in the Stand Level Inventory. The lodgepole pine is dying due to the infestation of mountain pine beetle but most of the dead lodgepole remains standing. The stand age is about 120 years old. The overstory composition is 70% lodgepole pine, 13% sub-alpine fir, 10% Douglas-fir, and 7% western larch. The mid-story is comprised of mostly lodgepole pine with sub-alpine fir present. The understory is dominated by sub-alpine fir with patches of lodgepole pine. The stand has 15 ft^2 basal area per acre. The average height is 50ft tall and average diameter breast height is 6.5 in.

Unit 2 is located on the west side of Bold Peak. The unit is bordered by Plum Creek Timber land on the south and west sides. The unit is comprised of five different stands identified in the Stand Level Inventory. The lodgepole pine is dying due to the infestation of mountain pine beetle but

most of the dead lodgepole remains standing. The stand age is about 125 years old. The overstory composition is 70% lodgepole pine, 16% Douglas-fir, 13% sub-alpine fir, and 1% western larch. The mid-story is comprised of lodgepole pine and sub-alpine fir. The understory is mostly sub-alpine fir with intermittent lodgepole pine. The stand has 52 ft^2 basal area per acre. The average height is 56ft tall and average diameter breast height is 8 in.

Treatment Objectives:

- Remove unhealthy, diseased and insect infested trees, as well as those with poor vigor, from the overstory to promote long-term forest health.
- Thin intermediate and understory components of stand to enhance growth characteristics and reduce fuel loading.
- Promote natural western larch and Douglas-fir regeneration.
- Retain large diameter, decadent Douglas-fir and western larch for shading, cover and snag replacement.
- Protect soil productivity by minimizing soil displacement, compaction, and erosion during logging and road building operations. Retain logging slash for woody debris recruitment and nutrient cycling of foliage and fine fuels to maintain site productivity.

Prescribed Treatment:

- Modified shelterwood/seed-tree harvest leaving healthy, vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and co-dominant western larch and Douglas-fir while removing all merchantable sub-alpine fir and lodgepole pine.
- Average spacing for leave trees will be about 50ft. leaving approximately 17 trees per acre.
- Retain all Douglas-fir and western larch snags >16” DBH and two snag recruits per acre to remain standing if they are not a safety hazard.

Harvest Method:

- Tractor logging with conventional, mechanical, or cut-to-length operations are applicable to this unit.
- Return skid majority of tops.
- Western larch and Douglas-fir will be marked to cut.

Hazard Reduction:

- Pile and burn slash at landings following harvest if grinding slash is not feasible.
- Slash would be lopped and /or trampled to a depth of 24” or less.
- Machine pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre.
- All slash piles will be burned by the State.
- The purchaser will be required to meet hazard reduction standards as applied under the State Fire Hazard Reduction Law (76-13-403 MCA).

Regeneration/Site Preparation:

- Monitor success of natural regeneration and plant seedlings if necessary.
- Pre-commercially thin healthy regeneration to promote future growth and vigor if funding allows.
- Slashing of advanced shade tolerant regeneration and site preparation to encourage seral regeneration will be used in areas without adequate stocking.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration, planting needs and possible precommercial thinning opportunities as the stand progresses in age.

Prescription #2

Harvest Unit: 3 **Harvest Unit Acres:** 158 Acres

Elevation: 5400 ft - 5960 ft **Slope:** 35% - 55% **Aspect:** NE to E

Habitat Type: ABLA/ALSI, ABLA/XETE-VASC, ABLA/XETE-VAGL

Current Cover Type: Western Larch, Douglas-fir/Western Larch, Mixed Conifer, Lodgepole

Desired Future Condition: Douglas-fir/Western Larch

Soil Type: Loamy Skeletal, Mixed

Location: Section 16, Township 25N, Range 25W

Harvest Unit: 4 **Harvest Unit Acres:** 163 Acres

Elevation: 4720 ft – 5520 ft **Slope:** 25% - 35% **Aspect:** NE to E

Habitat Type: ABLA/ALSI, ABLA/XETE-VASC, ABLA/XETE-VAGL

Current Cover Type: Western Larch, Douglas-fir/Western Larch, Mixed Conifer, Lodgepole

Desired Future Condition: Douglas-fir/Western Larch

Soil Type: Loamy Skeletal, Mixed; Loamy Skeletal, Frigid Mixed

Location: Section 16, Township 25N, Range 25W

Description of Existing Stands:

Unit 3 is located on the east side of Bold Peak. This unit is comprised of eight different stands identified in the Stand Level Inventory. The lodgepole pine is dying and falling over due to the infestation of mountain pine beetle which has caused there to be a large amount of downed woody debris. Along the south side of this unit there is also a dense layer of Sitka alder. The stand age is about 125 years old. The overstory composition is 39% lodgepole pine, 29% western larch, 15% sub-alpine fir, 10% Engelmann spruce and 7% Douglas-fir. The mid-story is comprised of mostly sub-alpine fir with scattered patches of lodgepole pine. The understory is dominated by sub-alpine fir. The stand has 68 ft^2 basal area per acre. The average height is 78ft tall and average diameter breast height is 11.5 in.

Unit 4 is located on the east side of Bold Peak. This unit is comprised of eight different stands identified in the Stand Level Inventory. The lodgepole pine is dying and falling over due to the infestation of mountain pine beetle which has caused there to be a large amount of downed

woody debris. The stand age is about 130 years old. The overstory composition is 40% western larch, 27% Douglas-fir, 23% lodgepole pine, 10% sub-alpine fir, and 10% Engelmann spruce. The mid-story is comprised of mostly sub-alpine fir with patches of Douglas-fir, western larch, and lodgepole pine. The understory is comprised of mostly sub-alpine fir. The stand has 70 ft^2 basal area per acre. The average height is 86ft tall and average diameter breast height is 12.5 in.

Treatment Objectives:

- Remove unhealthy, diseased and insect infested trees, as well as those with poor vigor, from the overstory to promote long-term forest health.
- Thin intermediate and understory components of stand to enhance growth characteristics and reduce fuel loading.
- Promote natural western larch and Douglas-fir regeneration.
- Retain large diameter, decadent Douglas-fir and western larch for shading, cover and snag replacement.
- Protect soil productivity by minimizing soil displacement, compaction, and erosion during logging and road building operations. Retain logging slash for woody debris recruitment and nutrient cycling of foliage and fine fuels to maintain site productivity.

Prescribed Treatment:

- Modified shelterwood/seed-tree harvest leaving healthy, vigorous trees with good crown and bark characteristics.
- Favor leaving dominant and co-dominant western larch and Douglas-fir while removing all merchantable sub-alpine fir, lodgepole pine, and Engelmann spruce.
- Average spacing for leave trees will be about 50ft. leaving approximately 17 trees per acre.
- Retain all Douglas-fir and western larch snags >16” DBH and two snag recruits per acre to remain standing if they are not a safety hazard.

Harvest Method:

- Unit 3 will be 95% skyline logged with a small tractor logged unit.
- Unit 4 will be about 50% tractor logged with conventional, mechanical, or cut-to-length operations and about 50% will be skyline logged.
- Return skid majority of tops.
- Trees will be marked to leave.

Hazard Reduction:

- Pile and burn slash at landings following harvest if grinding slash is not feasible.
- Slash would be lopped and /or trampled to a depth of 24” or less.
- Machine pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre.
- All slash piles will be burned by the State.
- The purchaser will be required to meet hazard reduction standards as applied under the

State Fire Hazard Reduction Law (76-13-403 MCA).

Regeneration/Site Preparation:

- Unit 3 and Unit 4 site preparation will be done by mechanical scarification, herbicide, broadcast burning or a combination of methods.
- On slopes greater than 55%, slashing of alder and hand scalping may be required (approximately 60 acres in Unit 3).
- Monitor success of natural regeneration and plant seedlings if necessary.
- Precommercially thin healthy regeneration to promote future growth and vigor if funding allows.
- Slashing of advanced shade tolerant regeneration and site preparation to encourage seral regeneration will be used in areas without adequate stocking.

Anticipated Future Treatments:

- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.
- This stand would be evaluated for regeneration, planting needs and possible precommercial thinning opportunities as the stand progresses in age.

Attachment IV

Mitigations

Weed Management: Prior to entering site, off-road equipment would be cleaned and inspected as required in the timber sale contract to avoid see migration.

Wildlife Mitigations associated with the Action Alternative

- A DNRC biologist will be consulted 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.
- Public access would be limited to non-motorized use at all times on closed roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).
- Roads and skid trails that are opened for the proposed activities will be reclosed 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 where feasible.
- Manage for snags, snag recruits, and coarse woody debris, particularly favoring western larch and Douglas-fir (ARM 36.11.439(1) (b)). Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1)(m)).

Roads: A transportation system minimizing road miles and meeting Best Management Practices (BMPs) has been designed by the DNRC. The existing roads will be utilized in the project area and new roads will be constructed to minimized road density and still access the majority of the acres in the section.

Soils:

- Limit ground based equipment operations to periods when soils are relatively dry, (less than 18%), frozen or snow covered to minimize soil compaction and rutting, and maintain drainage features. Check soil moisture conditions prior to equipment start-up.
- On ground skidding 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.
- Tractor skidding should be limited to slopes less than 35% unless the operation can be completed without causing excessive erosion. Short steep slopes above incised draws may require a combination of mitigation measures based on site review, such as adverse skidding to ridge or winch line skidding from more moderate slopes less than 35%.

- Keep skid trails to 20% or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrent with operations.

- Slash Disposal- Limit disturbance and scarification combined to 30-40% of harvest units. Consider lop and scatter or jackpot burning on steeper slopes. Retain 10 to 15 tons per acre of material 3 inches and larger. Minimize removal of fine (<1/4" diameter) material for nutrient cycling.

Attachment V

Consultants and References

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References

- Forestry Best Management Practices.
- DNRC, 1996. State Forest Management Plan. Montana DNRC, Forest management Bureau. Missoula, MT.
- Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the Northern Region. USDA Forest Service, Northern region. Missoula, Montana.
- Losensky, J. 1997. Historical Vegetation of Montana. Contact #970900. Montana DNRC. Missoula, MT. 109pp.