Environmental Analysis
for the
Reid Divide/Logan Creek Timber Project

Prepared By
Kalispell Unit, Northwestern Land Office
Montana Department of Natural Resources and Conservation

March 2012

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CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Reid Divide/Logan Creek Timber Project
Implementation Date:	Summer 2012
Proponent:	Department of Natural Resources and Conservation, Northwestern Land Office, Kalispell Unit
Location:	Section 16 & 36, Township 30N, Range 24W
County:	Flathead

I. TYPE AND PURPOSE OF ACTION

The Kalispell Unit, Montana Department of Natural Resources and Conservation (DNRC) is proposing the Reid Divide/Logan Creek Timber Project. The project area is located approximately 16 air miles west of downtown Whitefish, Montana within Sections 16 & 36, T30N, R24W (see Vicinity Map in Attachment I). The acreage of state land involved in the project is held by the State in trust for the support of specific beneficiary institutions (*Enabling Act, 1889: 1972 Montana Constitution, Article X, Section 11).* s. 16 & 36 – Common Schools.

Under the proposed action, approximately 5 million board feet would be harvested from approximately 290 acres in Section 36 and 21 acres in section 16. Approximately 3,000 feet of temporary road may be constructed in section 36. Estimated revenue of $750,000 would be generated for the beneficiary. Specific objectives of this project are to maintain and improve forest health, reduce fuel loading, and increase forest productivity beneficial to future trust actions. If the Action Alternative is selected, activities could begin in the summer of 2012.

Project Purpose and Need:

1) Implement silvicultural treatments to improve forest health and vigor.

2) Sell forest products from trust lands within the project area to generate revenue for various trusts to produce the largest measure of reasonable and legitimate return over the long run for specific beneficiary institutions (*Section 77-1-202, Montana Codes Annotated (MCA)).*

Evaluations for road management and silvicultural treatments would also consider and incorporate: 1) old growth; 2) non-motorized recreational uses; and 3) control/containment of present weed infestations.

The lands in this project are held in trust by the State of Montana for the support of specific beneficiary institutions (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners (Land Board) and DNRC are legally required to administer these trust lands to produce the largest measure of reasonable and legitimate long-term return for the trust beneficiaries (Montana Code Annotated 77-1-202).

This project was developed in compliance with the State Forest Land Management Plan (SFLMP), the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 471), and conservation commitments contained in the Montana Forested State Trust Lands Habitat Conservation Plan (HCP), as well as other applicable state and federal laws.

II. PROJECT DEVELOPMENT

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

On 8/23/11, the DNRC sent scoping letters to adjacent landowners and other known interested parties and organizations. A public notice was posted in *The Daily Interlake* on 8/28/11 and 9/04/11. One letter was received and offered support of the project as proposed. 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 is classified as a major open burner by the 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.

USFWS - In December 2011, the U.S. Fish and Wildlife Service issued DNRC an Incidental Take Permit under Section 10 of the Endangered Species Act. The Permit applies to select forest management activities affecting the habitat of grizzly bear, Canada lynx, and three fish species — bull trout, westslope cutthroat trout, and Columbia redband trout — on project area lands covered under the HCP. DNRC and the USFWS will coordinate monitoring of certain aspects of the conservation commitments to ensure program compliance with the HCP.

3. ALTERNATIVES CONSIDERED:

No Action Alternative: Under the No Action Alternative, no activity would be undertaken. No timber would be harvested. The No Action alternative would likely result in decreased growth rates and increased fuel loading within the timber stands. The potential for insect infestations would likely increase. This alternative would not produce revenue for the Trust Beneficiary. Effects of the No Action Alternative are further described in the Resource Analyses in Attachment 2.

Action Alternative: Under the Action Alternative, DNRC would harvest up to 5 million board feet from approximately 290 acres in Section 36 and 21 acres in section 16. Timber would be harvested using tractor logging with conventional, mechanical or cut-to-length operations and would be focused on silvicultural treatments to promote the regeneration of western larch and to improve the overall health and vigor of the stands. In addition to timber harvest, approximately 3,000 feet of temporary road may need to be constructed to access a portion of the project area.

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

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Harvest activities would comply with Best Management Practices (BMP's) and would use existing roads and segments of existing skid trails where feasible. Mitigations include: limiting equipment operations to periods of dry, frozen or snow-covered conditions to minimize soil compaction and rutting, planning appropriate skid trails, limiting skidding to less than 20% of the harvest unit acreage, limiting disturbance and scarification, and retaining recommended amounts of large woody debris and fine litter following harvest. Thus, direct, indirect, and cumulative effects to the soil resource would be acceptable.

Please refer to Attachment 2, Soils Analysis for a more detailed analysis, and Attachment 4, Mitigations for a more detailed description of mitigations.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, therefore, a very low risk of sediment from timber-harvesting activities would result from the implementation of this alternative and no detrimental impacts due to sediment would be expected. The risk of long-term adverse direct or indirect effects to water quality or beneficial uses would be very low.

The level of tree retention at each stream would adequately provide for future recruitment into the channels to provide fisheries habitat complexity with a low degree of risk, and stream shading post project would be sufficient to maintain a low risk of a detectable stream temperature increase due to timber harvesting.

Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber-harvesting and road construction/reconstruction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

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 and outside the Kalispell Impact Zone. Under the Action Alternative, potential post-harvest burning of logging slash would produce some particulate matter. Impacts are expected to be minor and temporary with slash burning to be conducted when conditions favor good smoke dispersion. All burning would be conducted during times of adequate ventilation and within the existing rules and regulations. The DNRC will make all attempts to utilize logging slash.

7. VEGETATIVE COVER, QUANTITY AND QUALITY:

Logging activities have occurred within the project area since the 1960's. The predominant cover type is western larch / Douglas-fir. No sensitive plants listed by the Montana Natural Heritage Program were identified in the project area.

Under the Action Alternative, timber harvest would occur on approximately 290 acres in section 36 and 21 acres in section 16 and would be focused on the removal of shade tolerant species and those infected or susceptible to insect and disease mortality. Regeneration of western larch would be promoted by some regeneration cutting with follow-up site preparation. These changes would move stands in the project area toward desired future conditions. Occurrence of noxious weeds may increase.

Recommendations to minimize direct, indirect and cumulative effects have been incorporated into the project design (Attachment 1; Attachment 2, Vegetation Analysis; Attachment 3, Prescriptions; Attachment 4, Mitigations). Measures to minimize noxious weeds, insects and disease are included in the project design (Attachment 4, Mitigations).

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Direct, indirect and cumulative effects to aquatic life and habitats would be limited due to the riparian buffers, tree retention and implementation of BMPs during harvest operations. A summary of expected impacts to fisheries habitat parameters is displayed in Section 5 above or see Attachment II: Water Resources Analysis for a detailed description of potential impacts.
For all other resources related to this heading, please refer to Attachments 2, Wildlife and Water Resource Analyses for a detailed analysis and Attachment 4, Mitigations for a detailed description of mitigations.

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

Please refer to Attachment 2 Wildlife Analysis for a more detailed analysis and Attachment 4, Mitigations, for a more detailed description of mitigations.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

A DNRC archaeologist has reviewed this project. Significant sites or artifacts were not identified during these reviews.

11. AESTHETICS:

Section 16 is bordered by on 2 sides by private land. The main Logan Creek Road also passes through this section (see map in Attachment A). Given the small amount of acres proposed to be harvested in this area (21), minimal affects to aesthetics are anticipated in section 16. Section 36 is not visible from any open roads or the nearby private lands. A US Forest Service trail passes through the southwest corner section 36. Logging will occur along the trail. Project implementation should not have an adverse visual impact in the area (Attachment 4, Mitigation).

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

No impacts are likely to occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

US Forest Service, Tally Lake Ranger District 'Valley Face Fuels Reduction Project'

IV. IMPACTS ON THE HUMAN POPULATION

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 AGRICULTURAL 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. According to Montana Bureau of Business and Economic Research, approximately 10 jobs are supported for one year for every 1 MMBF that is harvested. For this project, that equates to approximately 50 jobs per year.

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 the Star Meadows County Road and the Farm to Market County Road. This increase is a normal contributor to the activities of the local community and industrial base, and they cannot be considered a new or increased source of demand.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

In 1996, the Land Board approved the Record of Decision (ROD) for the State Forest Land Management Plan (SFLMP). The SFLMP provides philosophical basis, consistent policy, technical rationale, and guidance for the management of forested state trust lands. In 2003, DNRC adopted the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 456). The Forest Management Rules are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program.

In December 2011, the Land Board approved the Record of Decision (ROD) for the Montana Forested State Trust Lands Habitat Conservation Plan (HCP). Approval of the ROD was followed by the issuance of an Incidental Take Permit (Permit) by the U.S. Fish and Wildlife Service (USFWS). The HCP is a required component of an application for a Permit which may be issued by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to state agencies or private citizens in situations where otherwise lawful activities might result in the incidental take of federally-listed species. The HCP is the plan under which DNRC intends to conduct forest management activities on select forested state trust lands while implementing specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout.

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

The project area receives dispersed recreation in the form of hunting. A US forest Service trail passes through the southwest corner of section 36. Motorized use is permitted on this trail. Implementation of the proposed project will not displace any current uses of the area. Use is expected to remain the same following this project.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

There would be no measurable cumulative 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 a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, or anything that could affect to buyer's willingness to pay for. The Action

Alternative would generate an estimated return to the school trust of $750,000. The No Action alternative would not generate any return to the trust.

EA Checklist Prepared By:	**Name:** Pete Seigmund **Date:** March 2012 **Title:** Management Forester

V. FINDING

25. ALTERNATIVE SELECTED:

Upon review of the final EA checklist for the Reid Divide/Logan Creek Timber Sale, as well as the public comments, applicable DNRC policies, standards and guidelines, and the State Forest Land Management Plan (SFLMP), I find the EA adequately addresses the issues identified during project development and displayed the information needed to make the decisions.

I have selected the Action Alternative for implementation for the following reasons:

1) It clearly meets the objectives as describe on page 3 under Purpose and Need

2) The analysis of identified issues did not reveal information compelling the DNRC not to implement the timber sale.

3) The Action Alternative identifies associated mitigation measures to address issues raised in the scoping process and internal review. Those mitigations are listed in Attachment IV, and include actions specific to water resources and soil productivity, vegetation, and wildlife habitat.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within threshold limits. These proposed timber sale activities are common practices and none of the project activities are being conducted on important, fragile, or unique sites. The proposed timber sale conforms to the management philosophy adopted by DNRC in the SFLMP and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of proposed action.
Upon review of the above primary issues considered as part of this EA 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 various resources will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, nor do I find conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to an extent that they are not significant.

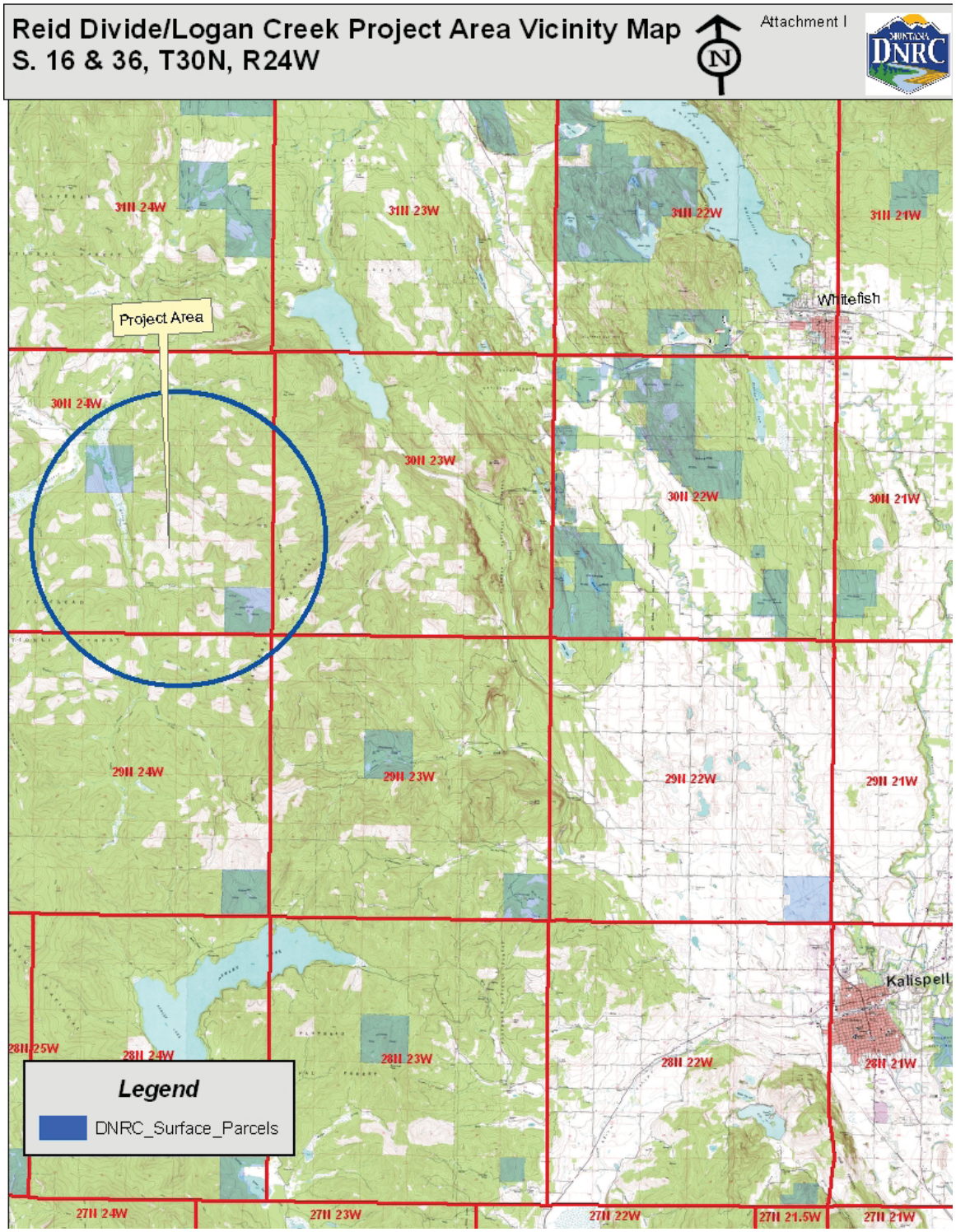
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

☐ EIS ☐ More Detailed EA ☒ No Further Analysis

EA Checklist Approved By:	**Name:** Greg Poncin **Title:** Kalispell Unit Resource Program Manager
Signature: /s/ Greg Poncin	**Date:** 4/3/12

Attachment I: MAPS

Vicinity Map
&
Sale Map


Reid Divide/Logan Creek Project Area Vicinity Map
S. 16 & 36, T30N, R24W
Attachment I
N
Project Area
Whitefish
Kalispell
31N 24W
31N 23W
31N 22W
31N 21W
30N 24W
30N 23W
30N 22W
30N 21W
29N 24W
29N 23W
29N 22W
29N 21W
28N 25W
28N 24W
28N 23W
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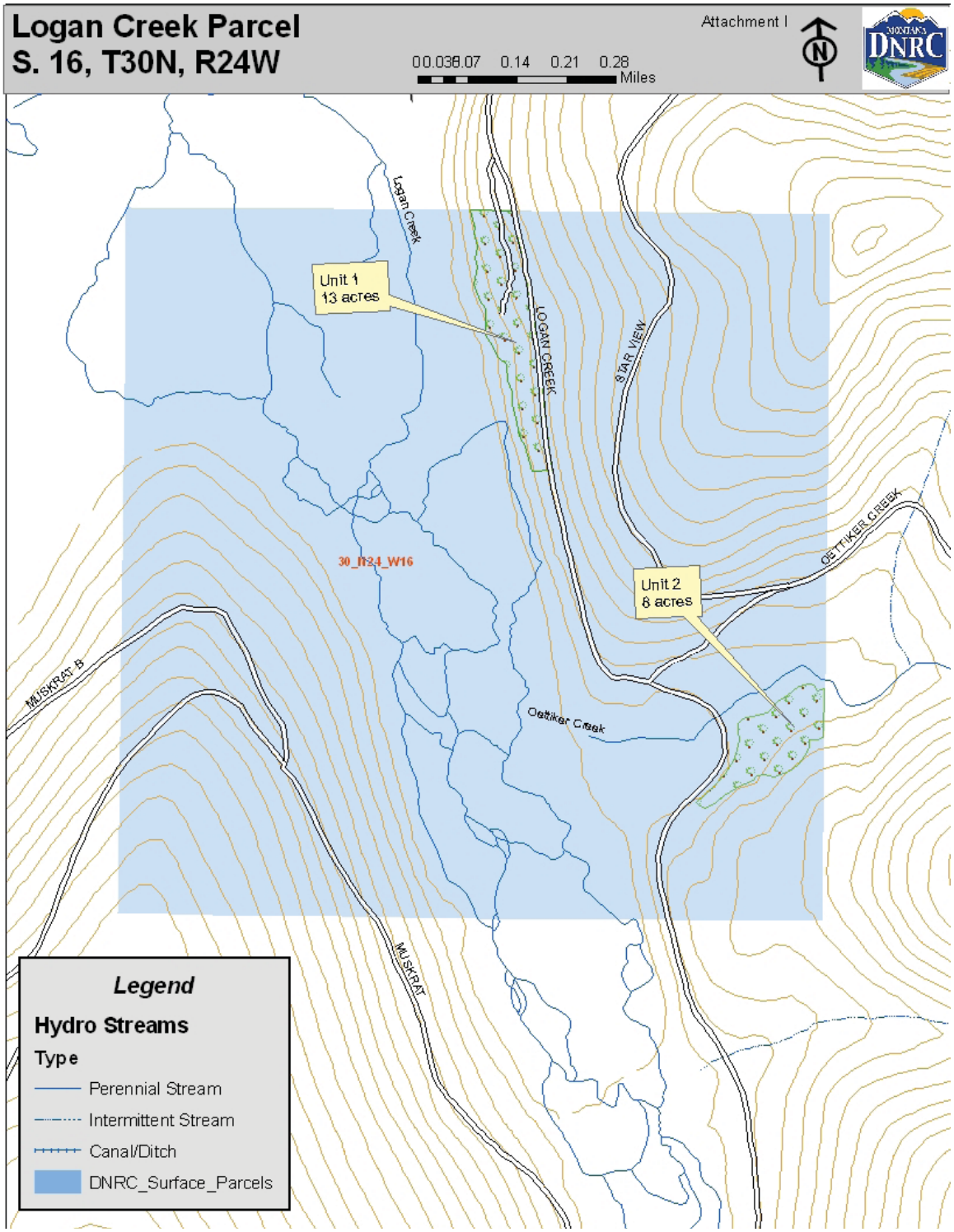
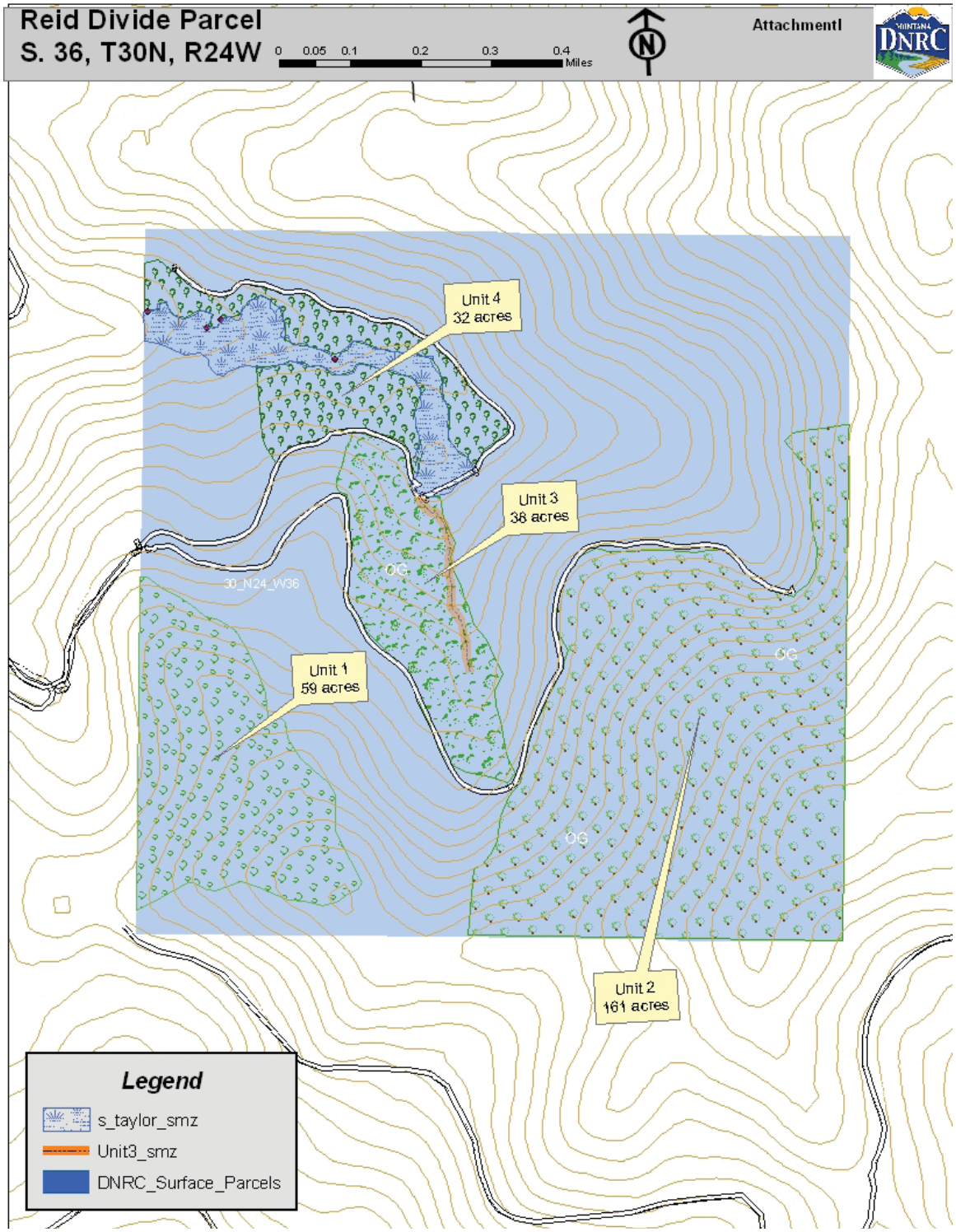
27N 21W
Legend
DNRC_Surface_Parcels


Logan Creek Parcel
S. 16, T30N, R24W
Attachment I
0 0.036 0.07 0.14 0.21 0.28
Miles
Logan Creek
Unit 1
13 acres
LOGAN CREEK
STAR VIEW
GETTIKER CREEK
30_N24_W16
Unit 2
8 acres
MUSKRAT B
Gettiker Creek
MUSKRAT
Legend
Hydro Streams
Type
Perennial Stream
Intermittent Stream
Canal/Ditch
DNRC_Surface_Parcels



Attachment II

Resource Analyses: Existing Conditions & Direct, Indirect and Cumulative Effects

Vegetation Analysis

Water Resources Analysis

Soils Analysis

Wildlife Analysis

Attachment II: Resource Analyses
Existing Conditions & Direct, Indirect and Cumulative Effects

Introduction

This section identifies and describes those resources that may be affected by the proposed action and describes the environmental effects of each alternative on the resources. The section is organized by general resource categories and their associated issues. The descriptions of the existing conditions found in this section can be used as a baseline for comparison with the Action Alternative.

Cumulative effects from current management and foreseeable future State actions are discussed. These include other active timber sales, those in the planning stage, ongoing maintenance, and other uses of the areas being analyzed. Direct, indirect and cumulative effects on the resources being analyzed were considered.

General description of the area

The proposed Reid Divide/Logan Creek Timber Project area is located approximately 16 air miles west of Whitefish, Montana and includes approximately 1,274 acres of State Trust Lands. It is located within Sections 16 & 36, T30N, R24W. State Trust Lands within the project share property boundaries with numerous private landowners and the US Forest Service. Several other analysis areas were delineated to assess direct, indirect and cumulative effects of the alternatives considered. More specific details about these are contained under each corresponding resource heading.

Vegetation Analysis

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and the Action Alternatives. Issues expressed during initial scoping by the public and internally were:

- Current stand conditions are increasing the risk of insect infestations and may contribute to widespread bark beetle induced mortality.
- Insects and disease may affect timber productivity and value.
- Timber harvesting and associated activities may increase noxious weeds in the project area.

These issues can be evaluated by analyzing the anticipated changes in current forest conditions in the project area, in conjunction with the extent and location of silvicultural treatments.

Analysis Methods

Administrative Rules of Montana (ARM 36.11.404) direct DNRC to take a coarse filter approach to favor an appropriate mix of stand structures and compositions on state lands, referred to as a desired future condition. The following characteristics: forest composition, age class distribution, cover type and structure, are used to describe current forest and stand conditions in comparison to the estimated natural forest characteristics for Montana prior to extensive influences from fire suppression, logging, and development. This analysis will compare the desired stand conditions that DNRC believes to be appropriate for the site with current stand conditions.

Forest/Timber Analysis Methods –

The DNRC site–specific model (ARM 36.11.405), was used to determine the characteristics of the desired future condition and to evaluate the potential direct, indirect, and cumulative effects. This model compares the 1930's forest inventory data used in *Losensky's* 1993 analysis and subsequent 1997 report of estimated proportions of forest stand structural stages by cover type historically represented throughout Montana, to the 2006 DNRC Stand Level Inventory database that estimates current forest conditions. More recent field observations and tree data were gathered to further refine specific forest stand characteristics within the project area. This data is available at the Kalispell Unit. The method used to analyze current and appropriate (desired future conditions; DFC) stand conditions, old-growth timber stands, and stand development follows:

- *Current & Appropriate Conditions:* Two filters were developed for the Kalispell Unit Landscape and applied to 2006 Stand Level Inventory (SLI). The filters were assigned cover types similar to those used in the 1930's inventory. The first filter followed the 1930's criteria exactly, or as closely as possible, representing current conditions. The second filter represents the department's DFC as defined in ARM 36.11.404 and 405. The second filter for appropriate conditions assigns cover types using criteria primarily designed to help address the situation where succession from one cover type to another is occurring. This successional filter was developed to indicate that those areas in the absence of fire suppression, introduced pathogens, and timber harvesting would likely have been assigned to a different cover type than the current cover type filter would suggest. The appropriate filter estimates, from the current stand conditions, what cover type representation might have looked like in 1900.
- *Old Growth Timber Stands:* the methods to identify old growth timber stands, as defined by ARM 36.11.403 (48), are based on the Kalispell SLI data. The process uses the SLI to identify stands that may meet the minimum criteria (number of trees per acre that have a minimum dbh and minimum age) for a given habitat type group as described in Green et al (1992), *Old Growth Forest Types of the Northern Region*. Field surveys were used to verify that the definition is met in the identified stands and to determine if additional stands meet the definition.
- *Stand Structure/Development:* the analysis on stand structure and development is qualitative, and discusses the conditions of timber stands, including how various natural and man-caused disturbances and site factors have affected and may continue to affect timber stand development.

Sensitive Plant Analysis Methods –

The Montana Natural Heritage Program (MNHP) database was consulted by DNRC for information regarding occurrence of plant species of special concern and the potential for sensitive plants and their habitats within the project area

Noxious Weed Analysis Methods –

During field reconnaissance, DNRC personnel assessed road conditions, road locations, various susceptible timber stands, stream conditions, and generally evaluated noxious weed occurrence, extent and location.

Analysis Area

Forest/Timber Analysis Area –

This analysis area includes 3 geographic scales for assessing potential direct, indirect and cumulative effects on forest cover type, species composition, the distribution of age classes, structural stages, and fragmentation.

- Climatic Section M333B - **Lower Flathead Valley (Losensky 1997) Scale** was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997*)*.

- The **DNRC Kalispell Landscape Scale** includes all scattered forested trust land parcels, administered by the Kalispell Unit for DNRC. This geographic area is a subset of the above Lower Flathead Valley Climatic Section and includes school trust lands in the vicinity of Whitefish, MT south to Arlee, MT and school trust lands in the vicinity of Bigfork, MT west to the Thompson Chain of Lakes. Current and appropriate conditions related to forest cover types and age class distribution were analyzed on this scale.

- The **Reid Divide/Logan Creek Project Area Level Scale** includes all trust lands within the project area and more specifically those stands proposed for harvesting under each alternative. This scale was used to analyze expected changes in current forest conditions of the project area.

Sensitive Plants/Noxious Weeds Analysis Area –

The analysis area for noxious weeds and sensitive plants species, are trust lands within the project area. Surveys identifying sensitive plant occurrences were compared to proposed harvest sites and road construction locations for assessing direct, indirect, and cumulative effects, and developing mitigation measures, if needed.

Existing Conditions

General Forest Vegetation Information –

The existing vegetative types, more specifically forest habitat types and cover types within the Kalispell Landscape and the Reid Divide/Logan Creek project area, reflect the varied influences of site factors, fire regimes or disturbance patterns, and past management activities.

Site conditions vary depending upon the physiographic and climatic factors associated with geographic locations. Soil types, slope aspect and position, length of growing season, and moisture availability influence the type, growth and development of forest vegetation. These site factors are considered in the forest habitat classifications (Pfister et al. 1977), used to generally describe forest vegetation, forest stand development, and relative forest productivity associated with the given site and climatic factors.

Stand History/Past Management –

Secton 16 – Logan Creek: This section was first harvested with some small permits in the in 1960's. The first major timber harvest occurred in 1978 and 1979. This harvest removed approximately 2.5 million board feet of sawtimber. A smaller permit took place in 1988 and removed approximately 30 MBF (thousand board feet). In 1991 and 1992, another sale removed approximately 1.6 million board feet of seed trees from the 1978/79 sale (this also included the Reid Divide parcel). Numerous Christmas tree permits have been issued in the section over the years. The first major timber sale used seed tree and shelterwood harvests that removed many of large diameter western larch and Douglas-fir as well as most of the white woods (lodgepole, spruce, sub-apline fir). Active fire suppression starting in the 1930's has limited the extent of wildfires to small acreages, generally less than ¼ acre in size.

Section 36 – Reid Divide: This section was first harvested in 1978 and 1979 with an estimated volume of 5.3 million board feet. This project used seed tree and shelterwood harvests that removed many of large diameter western larch and Douglas-fir as well as most of the white woods (lodgepole, spruce, sub-apline fir).In 1991 and 1992, another sale removed approximately 1.6 million board feet of seed trees from the 1978/79 sale (this also included the Logan Creek parcel). Numerous Christmas tree permits have been issued in the section over the years.

Forest Habitat Types –

In the Reid Divide/Logan Creek Project Area, the area is domintaed by forest habitat types in the lower elevation sub-alpine fir series (*abies lasiocarpa).* A few stands have habitat types in the Douglas-fir series (*pseudotsuga menziesee*). Western larch, spruce, sub-alpine fir, and lodgepole pine are the most prevalent trees species along with Douglas-fir. Fire scars were prevalent on older western larch in the project area. Some scattered western white pines are present in section 36.

Timber productivity in the lower sub-alpine fir types ranges from low to very high. The moister sites tend to be dominated by spruce with lodgepole pine and Douglas-fir on the drier sites.

Fire Regimes –

Fire regimes for the Kalispell Landscape are variable, given the broad and scattered nature of trust lands, but are predominantly within the moderate severity fire regime. As a whole, the forest exists as a mosaic of differing age and size classes that have developed from different human activities, fire frequencies and intensities in relation to other site factors such as aspect, elevation, weather, stand structure, and fuel loadings. Areas of frequent fire have produced WL/DF, PP, and DF cover types. In low severity fire regimes, fires occur frequently and create relatively smaller patches of open-grown forest. Historically, these low severity regimes maintained stand conditions that were resistant to stand replacement fires, by regularly consuming forest fuels, killing small trees, and

pruning boles of small trees. As fire intervals become longer and management activities occur less frequently, more shade tolerant tree species begin to develop in the understory and stands tend to be multi-storied, with varied patch sizes. These characteristics reflect a moderate to low severity fire regime. High severity fire regimes are characterized by large patch sizes and stand replacement fires, but often include low severity fires that act as a thinning agent, or create small openings where clumps of trees die where small crown fires erupt.

A mosaic of even and multi-aged patches is present in the project area. The even aged stands within the project area are the result of regeneration harvests that occurred in the late 1970's. The majority of the Reid Divide/Logan Creek project area would be classified in a mixed severity or stand replacement fire regime. Fire intervals are considered to be infrequent, 100 years or more. Most of the project area has evidence of past fire activity. Forest stands shaped by mixed severity fires typically have an abundance of seral species in the overstory.

As a result of fire suppression in last 100 years, fire return intervals have been lengthened and fire intensity has increased due to increased fuel loadings vertically and horizontally. It is fairly evident that the stands proposed for timber harvest are over mature and past a natural fire interval.

Forest Age Class & Cover Type Distribution –

Table 3–1 compares the DNRC Kalispell Landscape (current cover types) with historical data (appropriate cover types) from Losensky (1997) for the Lower Flathead Valley section, as an assessment of desired future conditions regarding cover types.

Table 3–1. 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.

The longer intervals between disturbances and commodity extraction generally explain the decrease in the WL/DF and PP cover types. The PP, WL/DF, and WWP cover types are not as well represented within the Kalispell Landscape as estimated for the early 1900's. Most notable, is the conversion of over 11,000 acres in the WL/DF, PP, and WWP cover types, over the last 100 years, to the present over abundance of the MC and SAF cover types by approximately 10,000 acres.

Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more of logging practices that favored the removal of commercially valuable western larch (*Larix occidentalis)*, ponderosa pine (*Pinus ponderosa)*,

western white pine (*Pinus monticola)* and Douglas-fir (*Pseudotsuga menziesii)* for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory. These stands often include a higher percentage of more shade tolerant trees such as, Douglas-fir, grand fir (*Abies grandis*), sub-alpine fir (*Abies lasiocarpa*), or spruce (*Picea spp*.), as a result of longer intervals between disturbances.

Table 3–2 makes the same comparison for determining desired future conditions for the Reid Divide/Logan Creek project area.

Table 3–2. Current and appropriate cover types & stand compositions for the Reid Divide/Logan Creek project area.

Cover Type	Current Cover Type (Acres)	Appropriate Cover Type (Acres)	Current Type Minus (-) Appropriate Type (Acres)
SAF	710	50	660
DF	24	0	24
HW	0	0	0
LP	71	30	41
MC	0	0	0
PP	0	0	0
Other	231	231	231
WL/DF	238	937	-699
WWP	0	26	-26
TOTAL	1274	1274	--

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.

The Reid Divide/Logan Creek project area reflects the same trend in forest cover type shifts as the Kalispell landscape, notably that WL/DF and WWP cover types represent a smaller proportion of the cover types, and SAF represents a much larger proportion, than likely occurred in the early 1900's.

Age class distributions in conjunction with other forest stand conditions or characteristics are useful in determining general historic conditions for inferring desired future conditions. Table 3– 3 displays age class distribution on the project area and landscape scales. Stands in the seedling-sapling age class (0-39 years) are under-represented compared to the historical condition for the Kalispell landscape. The 150+ age class is over represented for the Kalispell Unit and the project area. This deviation from historical conditions can partially be explained by successful fire suppression increasing the interval between large, stand replacement fires and logging practices that did not necessarily create a similar disturbance to a wildfire.

Table 3–3. Historic and current age class distribution.

Percent of Analysis Areas by Age Class Groups (years):				
Analysis Area	00 - 39	40- 99	100 - 149	150+
M33B (historic)	36	13	15	36

Kalispell (current)	10	21	30	39
Project area (current)	43	3	7	47

Distribution of Old-Growth Stands –

As per the Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by forest habitat type groups, based on minimum number and size of large trees per acre and age of those trees as noted in *Old-Growth Forest Types of the Northern Region (Green et al. 1992).* DNRC's SLI identified 139 acres of old-growth stands in the Reid Divide section (s. 36) and no acres in section 16 (Logan Creek). Field reconnaissance confirmed 132 acres of old growth in section 36 and identified 16 acres of old growth in section 16. A total of 148 acres of old growth were identified within the project area.

Recognizing that large trees are but one component of old-growth stands and that other forest stand attributes, such as the presence of snags, coarse woody debris, decadence, multi-layered overstory canopy structures, gross volume, and crown cover, are indicative of old-growth forests, DNRC developed a tool to consistently describe the attributes of old-growth stands relative to other old-growth stands on State lands. This tool, known as the Full Old-Growth Index, or FOGI, can be used to provide an indication of the level of development of old-growth stands. The FOGI describes old-growth stands with a score based on the amount or presence of the above-listed old-growth attributes. Stands with higher levels of those attributes will have high FOGI values, indicating a higher level of development of the attributes associated with old-growth stands relative to other old-growth stands, whereas stands with low FOGI values indicate a lower level of old-growth attribute development. FOGI values can be categorized into three classes— low, medium and high—indicating their relative level of development compared to other old growth stands. Stands with low FOGI values would have at least the minimum number of large trees required to be defined as old-growth, with lower amounts of snags and coarse wood debris, gross volume, crown cover, and decadence, and less complexity in the canopy structure. Stands with high FOGI values would have at least the minimum number of large live trees to be defined as old-growth, with higher amounts of the above listed attributes. Table 3.3-5 shows the acreage of old-growth according to FOGI class.

Table 3.3- 1. Old-growth acreage by FOGI class in the project area.

FOGI Class	***Low***	***Medium***	***High***	***Total***
Acres	*0*	*26*	*122*	*148*

Stand Structure and Development –

Stand structure and patch size indicates a characteristic of stand development and disturbance and how a stand may continue to develop. Stand structure is classified as single-storied, two-storied, or multi-storied. Patch size for this project is estimated from stand sizes and provides further insight into the severity of a disturbance as it relates to dominant tree canopies. Table 3-4 displays the

percent of area in the project area and Kalispell Landscape by stand structure class and estimates of stand size.

Table 3–4. Proportion (%) of analysis area by stand structure and estimated patch size.

Stand Structure	Kalispell Landscape	Kalispell Average Stand Size	Project Area	Project Area Average Stand Size
Single-storied	15%	24 acres	36%	33acres
Two-storied	3%	28 acres	0%	n/a
Multi-storied	82%	31 acres	46%	25 acres

Single-storied stands are most often associated with stand replacement events, such as severe fires or regeneration harvests including clearcutting or seedtree cutting. Stands are fairly simple in vertical structure and are often even aged. Regeneration harvests, such as a seedtree or shelterwood, that retain 10% or more of the upper crown canopy and has a seedling/sapling understory are considered 2-storied stands. Two-storied stands have simple vertical structure and are frequently even aged, although at least two age classes are generally present. The multi-storied condition arises when a stand has progressed through time and succession to the point that shade-tolerant species are encroaching into a shade-intolerant overstory. Three or more age classes may be present in these stands and vertical structure can be complex. These stands often experience a long interval between disturbances. Stand size refers to openings created by disturbances and provides insight regarding the severity of a disturbance event regarding tree mortality. Larger patch sizes are generally associated with moderate and high severity fire regimes or regeneration harvests. Smaller sizes are attributed to low or moderate severity fire regimes, and harvest treatments that retain larger proportions of the overstory.

Over 80 % of the Kalispell Landscape and 46% of the project area consists of stands with multi-storied structures. The various tree canopy levels may be patchy in nature or well distributed and several age classes are usually present. Single or two-storied, even aged structures occur in less than 36% of the project area acreage and are largely represented by the younger age classes resulting from regeneration harvest in the late 1970's.

Timber Productivity and Value –

Insects: Since the summer of 2000, various species of bark beetles have been responsible for increased tree mortality in the Flathead Valley. In the project area, fir engraver (*scolytus ventralis*) and Douglas-fir (*dendroctonus pseudotsugae*) bark beetles have been very active. A salvage sale occurred in section 36 in the summer/fall of 2009. This salvage sale removed most of the mature pockets of bug infested Douglas-fir. Any other factors that stress trees and cause a reduction in tree vigor will make them more susceptible to attack. Since the year 2000, western Montana has experienced some of the hottest and driest summers on record. This has lead to an increase in droughty conditions which further weakened and stressed large numbers of trees. Stand age for the proposed harvest areas are well over 150 years. These stands contain overmature trees that are declining in vigor making insect infestations more likely.

Tree Vigor: Radial growth rates are moderate in the younger (less than 150 years). Radial growth is static or declining in the 150 plus age class. Stand age and low vigor is also making many of the stands in the project area more susceptible to bark beetle attacks.

Sensitive Plants –

A review of the records from the MNHP for the project area identified no plant species of special concern. Field reconnaissance also indicated no unique or sensitive plants within the project area.

Noxious Weeds –

Invasions of noxious weeds are generally restricted to old logging roads and trails in less recently logged areas. Areas logged in the last few decades, however, have invasions spreading from the well established weed populations in the roads into adjacent openings. Native plant species may not re-colonize these areas. Several factors increase the likelihood of continued weed encroachment in the project area. They are: proposed timber harvest and associated log hauling, persistent and increasing usage of the area for recreation.

Environmental Effects

Forest Age Class & Cover Type Distribution –

No Action Alternative – Direct and Indirect Effects

Under the No Action Alternative, natural processes would continue to have a direct influence on these forest characteristics. In the absence of wildfires, the effects of current insect infestation-induced mortality will continue to influence both short and long term age class distribution and cover type representation.

Openings created in the canopy from bark beetle mortality are not expected to resemble natural fire effects. Openings are likely to be smaller and many may continue to be stocked with younger pole-sized, shade tolerant trees. Without duff reduction and soil exposure, the regeneration of openings is expected to favor shade tolerant species over seral species. The lack of regeneration under denser canopies or the predominance of Douglas-fir in numerous understories would perpetuate the trend of increasing DF and MC cover types over much of the project area. Without fire, the older age classes from 100 years up would continue to dominate the area and the 0-39 and 40 to 99 age classes would continue to decline, as younger stands move into the next age class without replacement.

No Action Alternative – Cumulative Effects

Under the No Action Alternative, there would likely be a decline in acreage in WL/DF cover types. WL composition will continue to decrease leading to a shift from WL/DF to DF or SAF cover types. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree. In the absence of stand replacement fires, variability of age class and cover type distribution would decline.

Action Alternative – Direct and Indirect Effects

As a result of harvesting, WL/DF cover types would persist within the harvest units. Dominant tree composition would begin to move toward historic conditions. By removing shade tolerant species (mostly sub-alpine fir, spruce, and Douglas-fir) and retaining seral species, WL/DF cover types would persist for a longer time. The average age of some treated stands would decrease, although some stands would remain in the same age class after harvest, depending on the extent of overstory tree removal.

This alternative would harvest 311 acres (290 acres in section 36 and 21 acres in section 16). Regeneration cutting in the form of a seed tree cut would occur on 178 acres in section 36. A modified commercial thin would occur on 112 acres in section 36 and 21 acres in section 16. In the modified commercial thin areas, harvest prescriptions would favor the retention of western larch and western white pine (trace). Healthy Douglas-fir would also be retained to help achieve desired stocking levels but larch and pine would be favored over Douglas-fir. The reduction in Douglas-fir would increase the proportion of other species in the overstory resulting in a change in composition. The seed tree harvested areas would leave approximately 10 to 12 trees per acre. Healthy western larch and western white pine would be retained. Healthy Douglas-fir would be

left if no larch or pine is available. Natural regeneration of western larch would be promoted in all harvested areas by mechanical site preparation and prescribed burning. Harvest units would be monitored for regeneration. If natural regeneration does not become established, then harvested areas would be evaluated for planting.

The Action Alternative would treat approximately 24% of the project area. Approximately 274 (16 acres in section 16 & 258 acres in section 36) acres of SAF (sub-alpine fir) cover types may be converted to a WL/DF cover type. Areas receiving a regeneration harvest would (178 acres) would be converted to a younger age class following site prep and subsequent regeneration.

Table 3.5 shows the changes and post-harvest distribution of cover types that would occur under the Action Alternative. Harvesting treatments would reduce the acreage in the subalpine fir cover types by converting 274 to the western larch/Douglas-fir type. The addition of acres from the subalpine fir cover types to the western larch-Douglas-fir cover types would result in a net increase of 274 acres in the western larch/Douglas-fir cover type. The overall result of harvesting activities would by reflected by a cover type distribution in the project area that is more closely aligned with the DFC for the project area (Table 3.5).

Table 3.5. Pre- and post-harvest cover type acreage in the Reid/Logan project area.

Cover Type	Current (Pre-harvest) Acres	Acres Treated	Post harvest Acres	Change in Acreage	Desired Future Condition Acres
SAF	710	274	436	-274	50
DF	24	0	24	0	0
LP	71	0	71	0	30
OTHER	231	0	231	0	231
WL/DF	238	37	512	+274	937
WWP	0	0	0		26
Total	1274	311	1274	--	1274

*numbers may not sum due to rounding
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.

Action Alternative – Cumulative Effects

The Action Alternative would result in a decrease in the acreage for the SAF cover type (274 acres) and an increase in acreage of the WL/DF cover type (274 acres). These effects would be cumulative to those of

the Spencer Lake Timber Sale project which will have an increase of 181 acres in the WL/DF cover type, an increase of 16 acres in the PP cover type, a decrease of 39 acres in the MC cover type, and a decrease of 158 acres in the DF cover type. This project would decrease the 150+ year age class by about 1% and increase the amount of acres in the 0 to 39 year age class by about 3%. Across the landscape, fire suppression, insect and disease occurrence, and increasing human use may influence cover type and age class distribution to an unknown degree.

Distribution of Old-Growth Stands –

No Action Alternative – Direct, Indirect, and Cumulative Effects

There are 5 old-growth stands accounting for 148 acres within the project area. Under the No Action Alternative, stands would continue to develop under the influence of suppressed wildfire activity and other natural disturbances such as windthrow and age associated mortality. Maintenance of old-growth characteristics and defining criteria will be dependent on the persistence and the rate of mortality.

Action Alternative – Direct, Indirect, and Cumulative Effects

Under the Action Alternative, timber harvesting would occur in 124.5 acres of old-growth (13 acres in section 16 and 111.5 acres in section 36). Due to the use of old-growth maintenance treatments, implementation of the Action Alternative would result in no loss of existing old-growth due to harvesting activities in both the project area and on the Kalispell Unit. At least the minimum number of large live trees necessary to meet DNRC's adopted old-growth definition would be retained in all existing old-growth stands in the project area. However, old-growth attribute levels in these stands would be reduced, as the number of large live trees, snags, coarse woody debris, crown cover, gross volume, and amount of decadence would be reduced from current levels. Canopy structure in these stands would be simplified due to tree removal in the lower- and mid-canopy levels. The reduction of old-growth attributes in treated old-growth stands would shift the FOGI class in those stands classified as "medium" or "high" prior to harvesting to the "low" class following harvesting.

Stand Structure and Development –

No Action Alternative – Direct and Indirect Effects

Stand structure and development could continue to change as a result of damaging agents. Older stands (150 years +) comprising almost 50% of the project area are experiencing noticeable reductions in live tree canopy closure due to insect and disease caused mortality. The mosaic pattern of multi-aged and multi-storied or small even-aged patches are likely to persist with this type of disturbance, resembling the unstable conditions and stand development often associated with late successional forests. More shade tolerant species would increase in all canopy levels continuing to replace or inhibit growth of seral species, as dense small diameter trees develop in the understory. Area coverage of forest in early successional stages, especially in larger patch sizes would continue to decrease. Forest fuels, both ground and vertical would continue to build up in stand areas where mortality is occurring, increasing the potential for severe, less controllable fires that may result in large scale stand replacement fires.

No Action Alternative – Cumulative Effects

Forest succession and fire suppression would continue. Conditions favoring the establishment of shade tolerant species in canopy gaps, the slow growth of seedlings and saplings under closed canopies or the hindrance of tree establishment under closed canopies, and increasing fuel loadings would continue.

Action Alternative – Direct and Indirect Effects

Under the Action Alternative, regeneration harvests are proposed for 178 acres and commercial thinning (entailing old growth maintenance treatments) are proposed for 133 acres. Current stand ages and structures would remain unchanged on the 133 acres scheduled for commercial thinning, although canopy closure and forest fuels would be reduced. Commercial thinning would maintain some of the mid- and lower-canopy, favoring seral species and vigorous trees. These treatments would resemble mixed severity fires and act as a thinning agent, killing the less fire resistant species and releasing the more fire resistant trees, such as western larch. Stand ages would be reduced on the 178 acres scheduled for regeneration cutting. Stand structure would also be changed on the 178 acres scheduled for regeneration harvest. Multi-storied stands would be converted to two-storied or single storied stands. After slash disposal treatments are completed more fire resistant stand conditions and structures would be maintained for several decades.

Action Alternative – Cumulative Effects

The area covered by single or two-storied stand structures across the Kalispell Landscape would increase by 164 acres or by .03%. The 0 to 39 age class acreage would also increase by 178 acres.

Timber Productivity and Value –

No Action Alternative – Direct and Indirect Effects

Due to the effects of insects and disease the commercial value of sawlogs would continue to decline. Non-sawlog or pulp values are generally less than that received for sawlogs, and the value of this timber trust asset would continue to decline. Growth rates of individual trees in denser, older stands would remain static or continue to decline and opportunities for establishment of replacement trees would be limited to small openings favoring shade tolerant trees. Development of larger diameter commercially valuable western larch as a persistent component in the overstory of older stands would be hindered. Loss of dead and dying trees along both open and closed roads would continue to occur from activities associated with firewood gathering. The request for small-scale salvage permits would likely increase.

No Action Alternative – Cumulative Effects

Without silvicultural treatments or wildfires to control tree densities, reduce losses to insects or disease, and recover mortality or initiate new stands, the trend towards increasing acreage on the Kalispell Unit covered by older, slower growing stands that are more susceptible to beetle infestations, stem decays, or wildfires would continue.

Action Alternative – Direct and Indirect Effects

Silvicultural treatments to be applied under the Action Alternative would remove many of the shade tolerant species (spruce, sub-alpine fir) as well as some of the mature overstory. Healthy and vigorous trees of all species would be favored for retention where they occur but would focus on leaving health western larch, western white pine, and Douglas-fir. Snags and snag recruits in quantities meeting DNRC requirements would be left. Larger diameter snags and cull trees, especially shade intolerant species, if not infected with dwarf mistletoe would be favored for potential snag recruits and snag retention. Due to the removal of low vigor or diseased trees stand health would improve. Between-tree competition would be reduced allowing residual trees to maintain or increase current growth rates. The bark beetle hazard for the treated stands will decrease due to a decrease in stocking, removal of a good number of the larger diameter, decadent trees, and by freeing up more available water, sunlight, and nutrients for residual trees.

Slash reduction will mainly include tree length skidding and burning of landing piles the ensuing fall. Some small diameter slash will be placed on skid trails for erosion control and nutrient cycling.

Silvicultural treatments would be applied to 311 acres, or 24% of the project area under the Action Alternative. The effects for the various types of cuts as described above would occur on the treated acres. Timber productivity on the treated acres would increase or be maintained at a level closer to the site potential, improving the future opportunities for generating revenue for the trust with the use of the timber resource.

Action Alternative – Cumulative Effects

The percentage of forested land that is producing timber closer to the site potential would increase by approximately 0.5% on the Kalispell Unit. The acres of forest stands that are less susceptible to beetle infestations, stem decays, or wildfires would increase. Higher potential for greater long-term revenue from the timber resource is expected.

Sensitive Plants –

No Action Alternative – Direct and Indirect Effects

A review of the records from the MNHP for the project indicated no plant species of special concern identified within the project area. Field reconnaissance also indicated no unique or sensitive plants within the project area.

No Action Alternative – Cumulative Effects

Cumulative effects to the distribution or viability of sensitive plants populations are not expected under No Action Alternative.

Action Alternative – Direct and Indirect Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any direct or indirect effects to sensitive plants.

Action Alternative – Cumulative Effects

Since no sensitive plants are present within the project area, the Action Alternative would not have any cumulative effects to sensitive plants.

Noxious Weeds –

No Action Alternative – Direct and Indirect Effects

Weed seed would continue to be spread or be introduced throughout the project area from recreational use, residential development and use adjacent to state land or within, and commercial and non-commercial use. Herbicide treatment along open, public roads and enhancement of road closures would continue as funding and unit priorities allow. Containment of weed infestation areas or a reduction of weed infested acres may be realized.

No Action Alternative – Cumulative Effects

Cumulatively the potential spread of weed seeds and increases in areas where weed populations could start is possible under the No Action Alternative, across the Kalispell Landscape, as well. With adoption of ARM 36.11.445 and implementation of Cooperative Noxious Weed Agreements with Flathead, Lake, and Lincoln counties, a more aggressive approach to identification and treatment of noxious weeds has occurred than in the past. This ongoing treatment of noxious weeds should limit large increases in noxious weed spread and may reduce the number of acres infested in the future.

Action Alternative – Direct and Indirect Effects

Logging disturbance would increase the potential for further establishment of noxious weeds with the exposure of mineral soil in skid trails, landings, existing roads, new road construction, and road improvement sites. Applying integrated weed management techniques within the sale design would reduce the occurrences and spread of weeds. Grass seeding new and disturbed roads and landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling slash in skid trails and closing additional roads would limit the potential for soil disturbance within these routes during or after logging, reducing the potential for weed establishment. Treating existing weed populations along or within roads with herbicide spray would reduce current weed populations, or contain the area of infestation. This project would also likely be winter logged which would limit the exposure of mineral soil and deter new weed infestations.

Under the Action Alternative, harvesting would occur approximately 311 acres, and involve road work on approximately 4 miles of state roads. Acreage within harvest units are at higher risk of incurring weed establishment within the units due to soil disturbances that may occur from skidding, landing, and heavy equipment use for scarifying or fuels reduction treatments. This risk would be limited by mitigation measures described above. Enhancement of existing road closures, trampling slash in road prisms, grass seeding sites disturbed during road construction or work, and additional road closures in combination with spot herbicide treatments would reduce current coverage of weed populations and limit the potential risk of further establishment.

Action Alternative – Cumulative Effects

In combination with other management activities and recreational use of the Kalispell Landscape, the action alterative would increase the risk of further encroachment of forested sites by noxious weeds. The potential risk would be limited with the use of prevention measures implemented under County Weed plans in addition to the site-specific mitigation measures for the Lion Mountain project. Actual treatments would likely be applied to a more extensive area under the Action Alternative, and have a greater potential for reducing current weed populations within the project area, thereby reducing the noxious weed affected area within the Kalispell Landscape.

References

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SOILS ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were identified by the internally and from the public regarding soil impacts. The following issue statements were expressed from comments regarding the effects of the proposed timber harvesting:

**Ground based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, structure and long-term productivity of the impacted area*

**Reduced infiltration capacity of an impacted soil can result in overland flow and off-site erosion, typically localized to main skid trails and log landing sites.*

**Removal of both coarse and fine woody material off-site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.*

ANALYSIS AREA

The project area for this proposal is approximately 1,280 acres on six individual landtypes; however, the proposal would only include approximately 311 acres on four landtypes. The analysis area for soil impacts will be the area within harvest units and where proposed road activities would take place. This analysis area will adequately allow for disclosure of existing conditions and direct, indirect, and cumulative impacts.

ANALYSIS METHODS

Methods for disclosing impacts include using general soil descriptions and the management limitations for soil. This analysis will qualitatively assess the risk of negative effects to soils from erosion, compaction, and displacement from each alternative, using insight from previously collected soils-monitoring data from over 90 DNRC postharvest monitoring projects.

Coarse woody debris will be evaluated by comparing pre-project conditions with recommended levels. Mitigation measures will be refined using these data.

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

EXISTING CONDITIONS

GENERAL CONDITIONS

The *Soil Survey of Flathead National Forest Area, Montana* (*Martinson and Basko, 1998*) combines landform and soil information with habitat types to inventory and map soils in the project area. Six landtypes were identified in the project area; the area of each landtype proposed for harvest is listed in *TABLE ST-1 - PROJECT AREA LANDTYPE DESCRIPTIONS* which provides a brief description of the landtypes within the project area. *FIGURE SF-1 – LANDTYPES IN THE PROJECT AREA* provides a visual depiction of the landtype locations.

Additional maps of the soils are in the project file and resource limitations can be accessed on the internet via the Natural Resources Conservation Service's Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx .

COURSE WOODY DEBRIS

Course woody debris was measured during field review on several transects in the parcels. A total of eleven transects were completed; seven within proposed units and four outside of proposed units. All woody debris greater than 3 inches in diameter was measured along the transects, each 100 feet in length, using methodology from the *Handbook for Inventorying Downed Woody Material* (Brown 1974). *TABLE ST2: COARSE WOODY DEBRIS AMOUNTS IN PARCELS* below displays the amount of coarse woody debris in tons per acre for all transects and also for the transects located in proposed harvest units.

TABLE ST2: COARSE WOODY DEBRIS AMOUNTS IN PARCELS (tons per acre)

	All Transects		Transects in Proposed units
Average	11.3		12.6
Minimum	4.4		4.9
Maximum	24.9		24.9
Median	7.1		7.9

These results are within the recommendations in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) on similar habitat types post timber harvest. Similar subalpine fir habitat types are recommended to have a level of coarse woody debris in the range of 12 to 25 tons per acre to maintain forest productivity. Currently, four of the seven transects located in proposed units were below the recommendations and three were within the recommended levels.

CUMULATIVE EFFECTS

DNRC strives to maintain soil productivity by limiting cumulative soil impacts to 15 percent or less of a harvest area, as noted in the State Forest Land Management Plan (*DNRC, 1996*). As a recommended goal, if existing detrimental soil effects exceed 15 percent of an area, proposed harvesting should minimize any additional impacts. Harvest proposals on areas with existing soil impacts in excess of 20 percent should avoid any additional impacts and include restoration treatments, as feasible, based on site-specific evaluation and plans. Past monitoring on DNRC timber sales from 1988 to 2010 has shown an average of 11.3 percent soil impacts across all parent materials. Stratifying the results by soil texture that are similar to the majority of the proposed harvesting shows an average of approximately 13.5 percent of the harvest areas impacted from erosion, displacement or severe compaction (*DNRC 2011*).

The DNRC soil monitoring report (DNRC 2005) noted that ground-based operations that used dozers for site preparation and piling had the largest areas of compaction. Of the 16 sites with similar soils (silt loam and gravelly-silt loam), 7 were dozer piled and had an average 23 percent moderate or higher impact from erosion, displacement or severe compaction. The 8 sites with similar soil but were not scarified or piled with a dozer showed moderate or higher impacts from erosion, displacement or severe compaction of 7.9 percent. This practice has substantially been changed as a result of the monitoring.

Within the proposed harvest units, cumulative effects to soil resources from past and current uses on the proposed harvest units are limited, although evidence of selective or salvage actions is present in some of the proposed harvest areas. Recent salvage activity has occurred in the section 36 within areas of the proposed unit 2. During field reconnaissance, it was noted that impacts in these areas are limited to a few skid trails and roads. Existing skid trail densities were estimated in the field and using geographic information systems. The area covered by existing skid trails is estimated to be less than five percent of the proposed harvest units. Additionally, the existing skid trails are generally vegetated with grasses and forbs and difficult to discern.

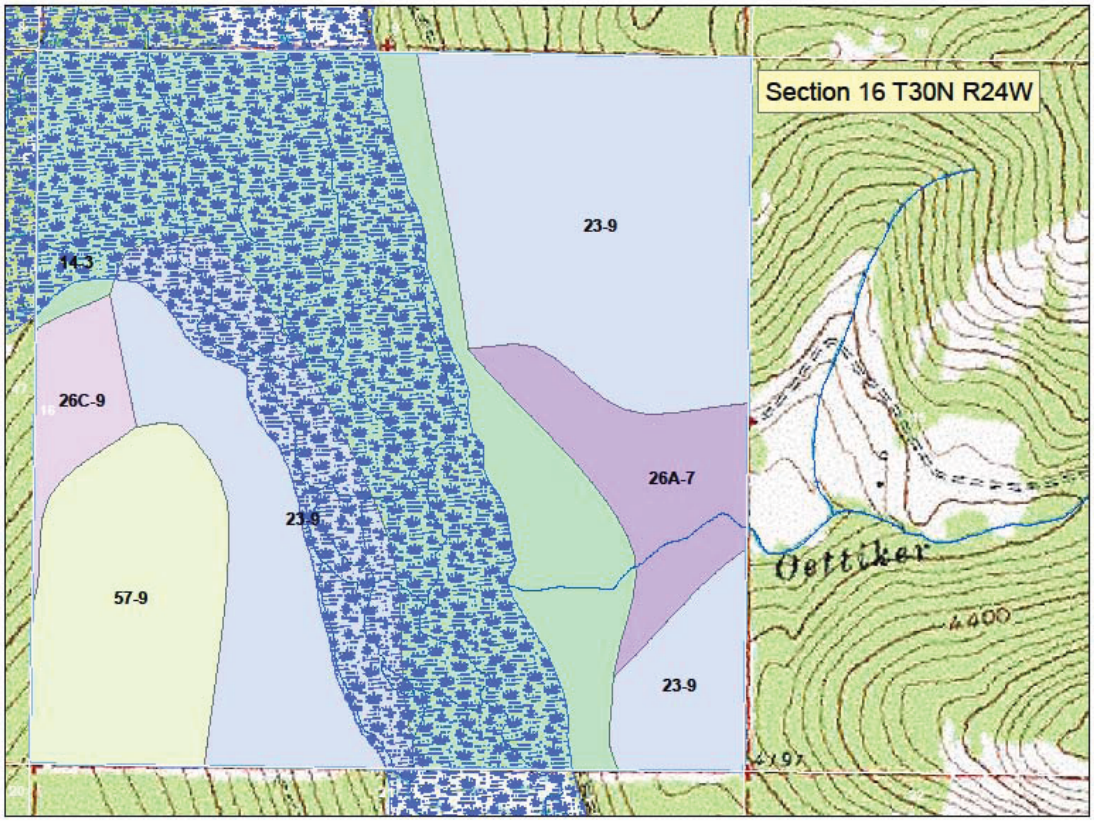
TABLE ST1: PROJECT AREA LANDTYPE DESCRIPTIONS

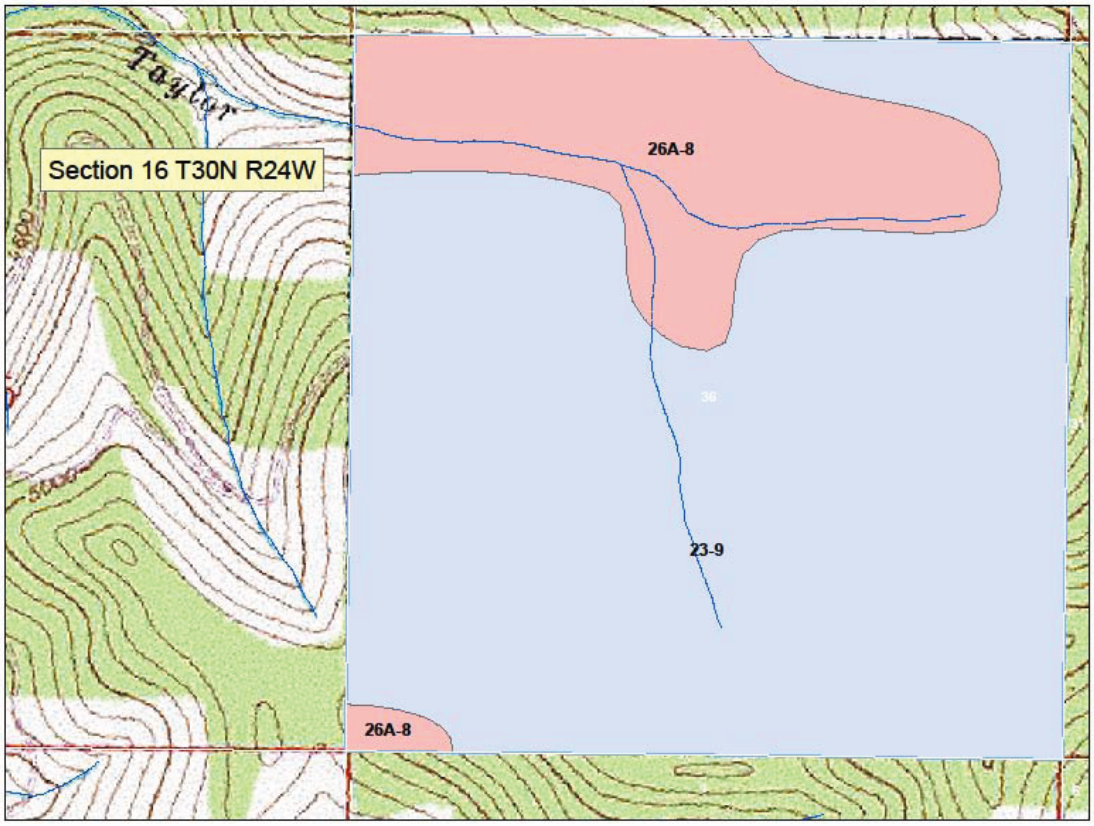
Landtype	Name	Soil & Vegetation Descriptions	Management Considerations			
			K factor**/ erosion potential	Timber	Roads	Comments
14-3	Stream bottoms & depressions 0 to 5 percent slopes	Soils of this landtype are formed in lacustrine deposits. Vegetation is a mixed, wet forest with trees species including subalpine fir, Engelmann spruce and lodgepole pine. The under story is dominated by forbs and low shrubs.	K=0.37 Sediment delivery efficiency is considered low due to the limited slope.	Potential Prod: Moderate Equipment: Tractor (may be limited due to wet soil) Regen: Can be limited by wet soil, frost pockets and competition	Wet soil may limit road location. Suitable subgrade material is required to prevent damage due to wetness and low soil strength.	9 acres of proposed harvest
23-9	Glaciated mountain slopes. 20 to 60 percent slopes 3,000 to 6,500 feet elevation	Soils of this landtype are formed in glacial till. Vegetation found ranges from a moist, mixed forest to a dry, mixed forest.	K=0.32 Erosion potential is low to moderate. Sediment delivery efficiency is moderate.	Potential Prod: Moderate/high Equipment: Tractor Regen: Can be limited by wet soil, frost pockets and competition	Roads perform well with standard location, construction and maintenance practices. Some cutslopes may be difficult to revegetate due to moisture stress.	278 acres of proposed harvest
26A-7 and 26A-8	Moraines and glaciated mountain slopes 10 to 40% slopes 3,000 to 5,500 feet elevation	Slopes range from 10 to 40%. Moraines are rolling glacial till deposits with a volcanic ash influence loess surface layer up to 12 inches thick. Drainage pattern is considered 'deranged' on the lower slopes (<20%)meaning it is a poorly integrated drainage system. This soil type contains quite calcareous soils.	K=0.32 Erosion potential is moderate. Sediment delivery efficiency is moderate.	Potential Prod: High Equipment: Tractor. Compaction /displacement is highly probable if season of operation is not properly managed. Regen: may be limited by frost pockets	Roads are well suited to this soil type. Erosion of tread is a source of fine material.	24 acres of proposed harvest Sediment delivery efficiency is moderate on skid trails and other exposed soils
26C-9	Glaciated Mountain slopes 40 to 60 percent slopes	These landtypes is found on glacial moraines with soils comprised of a volcanic ash influenced loess overlying silty glacial till. Vegetation is made up of Douglas-fir, lodgepole pine and western white pine although other species are included in places. The understory contains low shrubs and forbs.	K=0.32 Erosion potential is moderate to severe depending upon slope. Sediment delivery efficiency is high.	Potential Prod: high Equipment: cable Regen: Can be limited by frost pockets,	This landtype is well suited to road construction for properly located and maintained roads. Tread erosion will result in a rough driving surface. Steep cutbanks tend to slump.	No harvest proposed
57-9	Glaciated mountain slopes 40 to 60 percent slopes 4,000 to 7,500 feet elevation	Surface soils are medium textured gravelly and very gravely silt loam and consist of volcanic ash-influenced loess up to 22 inches thick. Subsoils contain 35 to 80 percent angular and rounded rock fragments. Vegetation is a mixed forest of subalpine fir, Douglas-fir, lodgepole pine, western larch and western white pine. The understory is mainly forbs and low shrubs.	K=0.17 Erosion potential is moderate on firelines and skid trails. Road tread has a slight erosion hazard. Sediment delivery efficiency is moderate.	Potential Prod: Moderate Equipment: cable Regen: Can be limited by droughtiness; especially on southerly aspects.	This landtype is well suited to road construction for properly located and maintained roads. Cutbanks tend to ravel if steep.	No harvest proposed

** Erosion Potential is based on slope and soil erosion factor K**. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 70 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight (low), moderate, severe, or very severe. A rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely and that erosion-control measures may be needed; severe indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and very severe indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion–control measures are costly and generally impractical. (NRCS, 1996)*

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

FIGURE SF 1: PROJECT AREA LANDTYPE MAPS





ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

- *No-Action Alternative*

  No timber harvesting or associated activities would occur under this alternative.

- *Action Alternative*

- Six units totaling approximately 311 acres would be managed with commercial harvest under this alternative. The harvest may be completed under summer or winter conditions. In addition the following road work would occur:

  - 13.0 miles would be maintained or have minor drainage improvements installed as necessary
  - Up to approximately 0.65 miles of temporary road construction that would be recontoured

ALTERNATIVE EFFECTS ON SOILS

- *Direct and Indirect Effects of the No-Action Alternative on Soils*

  No timber harvesting or associated activities would occur under this alternative. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases.

- *Direct and Indirect Effects of the Action Alternative on Soils*

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

  1) Limit equipment operations to periods when soils are relatively dry, (less than 20 percent), frozen, or snow-covered to minimize soil compaction and rutting and maintain drainage features. Units located on landtypes 26A-7 and 26A-8 would require soil moistures of $\leq$ 18 percent to minimize the risk of soil compaction. Check soil moisture conditions prior to equipment start-up.

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

  3) Tractor skidding should be limited to slopes of less than 40 percent unless the operation can be completed without causing excessive erosion. Steeper areas may require other methods such as adverse skidding to a ridge or winchline skidding from more moderate slopes of less than 40 percent.

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

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

6) Retain 12 to 25 tons of large woody debris and a majority of all fine litter feasible following harvesting operations. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Considering data from the *DNRC SOIL MONITORING REPORT (DNRC, 2005)*, the implementation of Forestry BMPs has resulted in less risk of detrimental soil impacts from erosion, displacement, and severe compaction. While the report noted that the impacts were more likely on the fine-textured soils and steep slopes, reduced soil productivity due to compaction and displacement may occur on coarser parent materials similar to those found in the state parcels. Also, the greatest impacts were noted where harvesting implementation departed from BMPs, such as limiting ground-based skidding to slopes of 40 percent or less or operating only on dry, frozen or snow-cover soils.

Comparing the soil type map, field reconnaissance notes, and topographic map features with the proposed harvest unit map indicates that ground-based skidding would occur on slopes of up to 40 percent under this alternative. The expected extent of moderate or higher impacts from compaction, displacement and erosion would likely be similar to those reported by *Collins (DNRC, 2005)*, or approximately 14.3 percent (44 acres) of the harvest area for summer harvesting and 1.5 acres for temporary road construction. This level of impacts would be within the recommendation of the SFLMP.

- *Cumulative Effects of the Action Alternative to Soils*

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15 percent of the harvest units (as recommended by the SFLMP) through implementation of BMPs, skid trail planning on tractor units, and limiting operations to dry or frozen conditions. Future harvesting opportunities would likely use the same road system, skid trails, and landing sites to reduce additional cumulative impacts. Large woody debris would be retained for nutrient cycling for long-term soil productivity although a reduction in fine material such as needles and smaller twigs would occur until conifer vegetation reestablishes on regeneration harvest units.

By designing the proposed harvesting operations with soil-moisture restrictions, season of use, and method of harvesting, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low. Because the existing impact is below the goals recommended by the SFLMP and the action alternative would be expected to result in impacts below the recommended level, cumulative effects would likely remain below the 15 percent target.

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WATER RESOURCES ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the hydrologic and fisheries resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were identified regarding water-quality, water-quantity, and fisheries resources. After reviewing the public and internal comments, DNRC developed the following issue statements regarding the potential effects of the proposed timber harvesting:

- *Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.*
- *Timber harvesting and road construction activities may increase sediment delivery into streams and affect water quality.*
- *Timber-harvesting activities may affect water quality and fisheries habitat by reducing shade, recruitable woody debris in the Riparian Management, increasing stream temperatures and affecting habitat connectivity at road-stream crossings.*

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area and also evaluate the potential effects of reducing forest canopy near streams.

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

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

- miles of new road construction and road improvements
- potential for sediment delivery to streams
- increases in the Equivalent Clearcut Acre (ECA) and annual water yield
- increases or decreases in woody debris and shade-providing riparian vegetation

ANALYSIS METHOD

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect, and cumulative effects include a field review of potential sediment sources from haul routes. Potential sediment delivery from harvest units will be evaluated from a risk assessment. This risk assessment will use the soil information provided in the *SOILS ANALYSIS* and the results from soil monitoring on past DNRC timber sales. The majority of stream crossings along the haul route have been improved to minimize sediment delivery by recent and ongoing USFS Flathead National Forest timber sales. Other roads were evaluated to identify existing sources of introduced sediment to streams.

Water Yield

Annual water yield will be disclosed as a cumulative effect in the *EXISTING CONDITIONS* portion of this report because the existing condition is a result of all past harvesting and associated activities. Annual water yield refers to the gross volume of water in a watershed that is contributed to a stream or other surface water feature. In the *ENVIRONMENTAL EFFECTS* portion of this report, water-yield increases as a result of this project will be disclosed as a direct effect. The cumulative water-yield increase as predicted to include each alternative will be disclosed as a cumulative effect.

The annual water-yield increase for watersheds in the project area was estimated using the ECA method as outlined in *Forest Hydrology, Part II (Haupt et al, 1976)* or by incorporating previous water yield analysis from other agencies.

In order to evaluate the potential effects of water-yield increases, a threshold of concern for each watershed was established per *ARM 36.11.423*. Thresholds were established based on evaluating the acceptable risk level, resources value, and watershed sensitivity. Increased annual water yields above the threshold of concern result in an increased risk of in-channel erosion and degradation of fisheries habitat.

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

Fish Habitat Parameters

Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline, disclosing the expected changes due to the alternatives proposed. The analysis method for woody debris recruitment will evaluate the potential reduction in available woody debris and shading due to timber-harvesting activities in the riparian management zone (RMZ) of the project area. Stream temperature will be addressed by evaluating the risk of stream temperature increases due to reduced shading from existing vegetation. Connectivity of habitat through stream-road crossings will be addressed by comparing the proposed actions with the current fish passage status.

ANALYSIS AREA

Sediment Delivery

The analysis area for sediment delivery is the proposed harvest units and roads used for hauling. This includes upland sources of sediment that could result from this project. In addition, in-channel sources of sediment such as mass-wasting locations or excessive scour/deposition will be disclosed if found in project area streams (Taylor, Oettiker and Logan creeks) within the state parcel.

Water Yield and Cumulative Effects

Two separate water-yield analysis areas will be included in this project: Taylor Creek and Oettiker Creek watersheds. This is selected as the appropriate scale of analysis due to the size of the project versus the watershed size and the potential for impacts.

Fisheries Habitat Parameters

The analysis area for fisheries habitat parameters is the RMZ along streams adjacent to proposed harvest units. Fish passage will be addressed by reviewing the current status of passage potential along the haul route and comparing it to the changes from each alternative.

WATER USES AND REGULATORY FRAMEWORK

WATER QUALITY STANDARDS

This portion of the Flathead River basin, including the Logan Creek and its tributaries, is classified as B-1 by the DEQ, as stated in the ARM 17.30.608. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602* (*19*), includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called Best Management Practices or BMPs) have been applied. The State of Montana has adopted BMPs through its non-point source management plan (MDEQ, 2007) as the principle means of meeting the Water Quality Standards. 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 nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that could create impacts.

Designated beneficial water uses within the project area include cold-water fisheries, aquatic life support, and recreational use in the streams, wetlands, and lakes in the surrounding area.

WATER QUALITY LIMITED WATERBODIES

The project area is within the Logan Creek watershed, which is a water quality limited water body in the 2010 303(d) list for not fully supporting aquatic life and cold water fisheries. Taylor and Oettiker creeks are not considered as impaired, however they are tributary to Logan Creek. For Logan Creek, the listed probable cause in 2010 was flow alteration, substrate habitat alteration and sedimentation. Silviculture, forest roads and stream bank modifications are listed as the probable sources.

STREAMSIDE MANAGEMENT ZONE LAW (SMZ)

All rules and regulations pertaining to the SMZ Law will be followed. An SMZ width of 100 feet is required on Class 1 and 2 streams when the slope is greater than 35 percent. An SMZ width of 50 feet is required when the slope is less than 35 percent.

*The **303(d)** list is compiled by DEQ as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, and/or where beneficial uses are threatened or impaired.*

FOREST MANAGEMENT RULES

In 2003, DNRC drafted Administrative Rules for Forest Management. The portion of those rules applicable to watershed and hydrology resources include ARM 36.11.422 through 426. In December 2011, DNRC received an Incidental Take Permit from the USFWS and approval of its accompanying Habitat Conservation Plan (HCP). The HCP identifies specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. All applicable Forest Management Rules and HCP Commitments will be

implemented if they are relevant to activities proposed with this project.

WATER RIGHTS AND BENEFICIAL USES

Surface water rights exist within three miles downstream of the project area in the Logan Creek watershed for stock watering. Additional water rights exist further downstream.

Designated beneficial water uses within the project area include cold-water fisheries, aquatic life support, and recreational use in the streams, wetlands, and lakes in the surrounding area.

FISHERIES—THREATENED, ENDANGERED AND SENSITIVE SPECIES

Westslope cutthroat trout are listed as a Class-A Montana Animal Species of Concern. A Class-A designation is defined as a species or subspecies that has limited numbers and/or habitats both in Montana and elsewhere in North America, and elimination from Montana would be a significant loss to the gene pool of the species or subspecies (*Montana Fish, Wildlife and Parks, Montana Natural Heritage Program,* and *Montana Chapter American Fisheries Society Rankings*). DNRC has also identified westslope cutthroat trout as a sensitive species (*Administrative Rule of Montana (ARM) 36.11.436*).

Bull trout are also listed as a Montana Animal Species of Concern, with the same ranking as westslope cutthroat trout; however bull trout are also listed as 'threatened' by the US Fish and Wildlife Service under the Endangered Species Act. DNRC is a signatory to the 2000 (interagency) Restoration Plan for Bull Trout in the Clark Fork River Basin and Kootenai River Basin, Montana.

Westslope cutthroat trout are presumed to occur in Taylor and Oettiker creeks; westslope cutthroat trout likely occur in Logan Creek; while bull trout have not been identified in Tally Lake or Logan Creek for over 25 years, the potential exists for their presence.

EXISTING CONDITION

GENERAL DESCRIPTION

- ***Taylor Creek***

  The Taylor Creek watershed is approximately 3,241 acres. The main channel flows in a general east-to-west direction from it headwaters in the state parcel (section 36, T30N 24W) to its confluence with Logan Creek. Annual precipitation within the watershed ranges from 24 to 30 inches per year, mostly in the form of snow. Elevation ranges from approximately 4,120 feet at the confluence with Logan Creek to approximately 5,928 on the watershed divide. Ownership within the watershed is comprised DNRC-managed lands (19 percent), and USFS-managed lands (76 percent) and private lands (5 percent).

  Taylor Creek is a B4/B5 channel type (Rosgen 1996) on the state parcel immediately above the USFS boundary. The stream has multiple channels in several locations. This condition is due to several springs flowing together to form the headwaters of the stream. The SMZ in these areas is increased for adjacent wetlands. Stream stability was rated as 'good' by USFS personnel in 1978, 1992 and 2001. In 2011, the stream channel stability on DNRC managed lands was also characterized as 'good' during field review.

- ***Oettiker Creek***

The Oettiker Creek watershed is approximately 3,189 acres. Precipitation ranges from 22 to 30 inches per year, mostly in the form of snow. Oettiker Creek flows in an east-to-west direction to its confluence with Logan Creek within the state parcel (section 16, T30N 24W). Elevations in this watershed range from 4,000 feet at its confluence with Logan Creek to approximately 5,928 feet on the watershed divide. Ownership within the watershed is comprised of DNRC-managed lands (3 percent), and USFS-managed lands (92 percent) and private lands (5 percent).

Oettiker Creek is an extensively braided channel immediately above Logan Creek due to a wide, flat riparian area coupled with abundant woody debris that has resulted in regular overbank flows. Much of the channel is weakly incised although some minor lengths of the channel on state land are well-confined. Stability in the approximately 1/3rd mile of channel on state land is fair/good due to depositional features characteristic of a low gradient reach located below steeper channel.

- ***Logan Creek***

The Logan Creek watershed above Star Meadows is approximately 26,660 acres with several named and unnamed tributaries. A detailed description of the watershed can be found in the Logan Creek Ecosystem Restoration Project Final Environmental Impact Statement developed by the US Department of Agriculture Forest Service, Flathead National Forest, Tally Lake Ranger District.

This proposed project is located adjacent to and immediately above Star Meadows which is a large flat riparian area with dense brush and other vegetation. Due to the topographic and vegetation characteristics of Star Meadows, this area serves as a filter to lower portions of Logan Creek. The gentle slope and dense vegetation serves to reduce erosive stream velocities and allows sediment to settle out.

SEDIMENT DELIVERY

- **Taylor, Oettiker and Logan creeks**

All of the existing roads proposed for use in this project have recently (within 3 years) been used or are currently being used for timber harvest removal by the Flathead National Forest Tally Lake Ranger District. Maintenance actions for the roads are being implemented to minimize sediment delivery to streams by addressing surface drainage. Timber harvests on Forest Service lands are currently active and the assumption of the water resources analysis in the Logan Creek Ecosystem Restoration Project Final Environmental Impact statement (USFS, 2004) was that all road would meet BMPs. During field reconnaissance in 2011, no direct sources of sediment from roads to stream channels were cataloged.

In-channel sediment sources on state managed lands are very limited in the project area streams. Natural sources of in-channel sediment are limited to outcurves and constrictions of channels that can produce slightly higher velocity flows that are more erosive. No large unstable banks that are prone to mass-wasting were detected in the streams during field review.

FISH HABITAT PARAMETERS

- **Woody Debris**

While no woody debris data is available for Taylor Creek, data was collected in the lowest reach of Oettiker Creek. A woody debris counts in Oettiker Creek showed 88 pieces per 1000 feet of channel. This amount of woody debris is within the range of variation for similar reference reach sites on 'B' (61-216/1000 ft) and 'C' (0 to 164/1000 ft)channels (Bower, 2009). Large woody debris recruitment to streams is important to maintain channel form and function and as a component of fish habitat. According to *ARM 36.11.425*, DNRC will establish a Riparian Management Zone (RMZ) *'…when forest management activities are proposed …on sites that are adjacent to fish bearing streams and lakes.'* One reason for the RMZs is to retain adequate levels of large woody debris recruitment to the stream channel. Site potential tree height (SPTH) is the method used to identify RMZ width according to *ARM 36.11.425 (5).* The SPTH for this project including areas along Taylor, Oettiker and Logan creeks will be 100 feet.

Evidence of past harvest in the RMZ can be found along Taylor, Oettiker and Logan creek within the state parcels; however, the stands along Taylor and Oettiker creeks are fully forested with sawtimber size trees. Timber in the parcel adjacent to Logan Creek has been more intensively managed; however this portion of Logan Creek has a very wide riparian area covered with predominantly shrubs.

Stream Temperature

No temperature data is available for any of the streams in the project area. However, because the majority of the stream is shaded with a fully-stocked stand, we assume the temperature regime is within the range of natural variation.

Fish Passage

As part of the Logan Creek Ecosystem Restoration Project, the USFS replaced culverts along the proposed haul route in Reid, Taylor and Oettiker creeks to meet fish passage. Assuming that these three structures meet fish passage, no additional fish passage barriers exist along the proposed haul route. Therefore, no further discussion of fish passage is necessary.

WATER YIELD AND CUMULATIVE EFFECTS

After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per *ARM 36.11.423*, the threshold of concern for Taylor and Oettiker creeks was set at 13.0 percent over a fully forested condition. These threshold values expect a low to moderate degree of risk of adverse impacts to beneficial uses due to water-yield increases as described in *ARM 36.11.423(f)(iv)*. The current annual water yield for Taylor Creek is estimated at 7.9 percent. Annual water yield increase for Oettiker Creek was estimated at 6 percent by the USFS in the Logan Creek Ecosystem Restoration Project (USFS 2004).

ENVIRONMENTAL EFFECTS

DESCRIPTION OF ALTERNATIVES

No-Action Alternative

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

Action Alternative

Six units totaling approximately 311 acres would be managed with commercial harvest under this alternative. The harvest may be completed under summer or winter conditions. In addition the following road work would occur:

- 13.0 miles would be maintained or have minor drainage improvements installed as necessary
- Up to approximately 0.65 miles of temporary road construction that would be recontoured

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Water Resources***

Sediment Delivery

Under this alternative, no timber harvesting or related activities would occur. The existing potential sediment sources would continue until repaired by another project or funding source. In-channel sources of sediment would continue to exist and erode as natural events dictate.

Fish Habitat Parameters

– ***Woody Debris Recruitment***

No reduction in recruitable large woody debris would result from the implementation of this alternative.

– ***Stream Temperature***

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

Water Yield

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

- ***Direct and Indirect Effects of the Action Alternative to Water Resources***

Sediment Delivery

Past monitoring of DNRC timber harvests has shown erosion on approximately 6 percent of the sites monitored, although no water-quality impacts from the erosion were found (*DNRC 2004*). These sites were harvested during the summer period, and the erosion was attributed to inadequate skid-trail drainage. Displacement was limited to main skid trails that occupy less than 2% of the harvest units." (*DNRC 2004*). By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (*Clayton 1987 in DNRC 2004*).

No harvesting is proposed within 50 feet of any stream. As per administrative rules (*ARM 36.11.304*), no equipment would be operated within the 50- or 100-foot SMZ.

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

No permanent new road construction would occur; temporary road construction and reconstruction would commence away from streams (greater than 200 feet) on soils that are suitable for road construction (*Kuennen and Nielsen–Gerhardt, 1995*). Because revegetation may be slow to establish on the road fill, erosion may occur, but due to the distance from streams, sediment delivery and subsequent water-quality impacts would not likely occur.

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative. Minor drainage improvements would include reshaping drain dips and cleaning ditch-relief culvert catchbasins.

Because postharvest water-yield levels under this alternative would remain below the 13 % threshold where adverse impacts would be expected, only a low risk of increased in-channel sediment would result from this alternative. In-channel sources of sediment would be expected to continue to contribute sediment at the current rate because the water-yield increase would remain below the recommended threshold.

Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a very low risk of sediment from timber-harvesting activities would result from the implementation of this alternative and no detrimental impacts due to sediment would be expected. Therefore, the risk of long-term adverse direct or indirect effects to water quality or beneficial uses would be very low.

Fish Habitat Parameters

Woody Debris Recruitment

No harvesting would occur within an 18 acre riparian area along 3,066 linear feet of Taylor Creek. The average width of no harvest would be approximately 256 feet in this area although the range varies from 100 feet to over 500 feet wide. No harvest would occur in the RMZ of Taylor Creek and therefore no reduction in woody debris recruitment would result from the implementation of this alternative.

Along Oettiker Creek, while no harvest would occur in the 50 feet nearest the stream, up to 50% of the merchantable trees in the outer 50 feet of the RMZ may be harvested. Approximately 0.6 acres of RMZ would have reduced recruitable woody debris.

Along Logan Creek, while no harvest would occur in the 50 feet nearest the stream, approximately 50 percent of the merchantable trees in the outer 50 feet of the RMZ would be harvested. Approximately 2.2 acres acres of RMZ would have reduced recruitable woody debris.

The level of retention at each stream should adequately provide for future recruitment into the channels to provide fisheries habitat complexity with a low degree of risk. A thorough discussion of riparian buffer effectiveness for providing recruitable woody debris can be found in the Montana DNRC Forested Trust Lands Habitat Conservation Plan Final EIS (DNRC 2010)

Stream Temperature

As discussed in the Montana DNRC Forested Trust Lands Habitat Conservation Plan Final EIS (DNRC 2010), a no-harvest buffer of at least 50 feet is effective in maintaining the existing stream shading that would adequately protect against stream temperature increases. Therefore, stream shading post project would be sufficient to maintain a low risk of a detectable stream temperature increase due to timber harvesting.

Water Yield

If this alternative were selected, approximately 311 acres would be harvested using conventional ground-based methods. Approximately 248 ECA would be generated in the in all watersheds from these activities. Most of the ECA would be generated in Taylor Creek watershed (237 ECA); with the remainder generated in Oettiker (4 ECA) and Logan Creek (7 ECA). The annual water yield in Taylor Creek would increase by approximately 3.0 percent; the annual water yield in Oettiker Creek and Logan Creek watersheds would not experience a detectable increase.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Water Resources***

Sediment Delivery

The potential for sediment delivery from roads on the proposed haul routes would remain as would the in-channel sediment sources described in *EXISTING CONDITION*. The existing direct sediment-delivery sources would continue until repaired by another project or funding source. In-channel sources of sediment would continue to exist and erode as natural events.

Fish Habitat Parameters

Woody Debris Recruitment

No reduction in recruitable large woody debris would result from the implementation of this alternative. Recruitable woody debris would be retained at an adequate level to maintain stream form and function. Past impacts to recruitable woody debris would continue to ameliorate as existing harvest units revegetate and grow.

Stream Temperature

No increases in stream temperature from a reduction in stream shading would be expected under this alternative because no harvesting would occur. Natural stream temperatures would be expected to continue to be within the range described in the *EXISTING CONDITION*.

Water Yield

No increase in water yield would be associated with this alternative. As vegetation continues toward preharvest conditions, annual water-yield increases would gradually reduce to preharvest levels.

Cumulative Effects Summary

Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the existing condition. Although some past harvesting in riparian zones is present, conditions would continue to provide adequate levels of woody debris recruitment and shade retention. Conditions would continue to provide adequate levels of large woody debris and shade to maintain a natural range of water temperatures. Under this alternative, fisheries habitat quality would be maintained at its current level.

Cumulative Effects of the Action Alternative to Water Resources

Sediment Delivery

The proposed timber-harvesting and road-construction activities would occur. A cumulative increase in sediment delivery as a result of timber harvesting would have a low risk of occurring because of the BMP application and adequate stream buffers to filter potential displaced soil. In-channel sources of sediment would continue to exist and erode as natural events dictate with a low risk of affecting beneficial uses.

Fish Habitat Parameters

– **Woody debris recruitment**

The cumulative percent of harvested RMZ would be approximately 1 percent. While a reduction in available woody debris would result from the implementation of this alternative, the scope of the reduction is very minor in relation to the watershed sizes. In Logan Creek, the cumulative acres of RMZ impacts would increase by approximately 2.2 acres. While a reduction in available woody debris would result from the implementation of this alternative, the scope of the reduction is very minor in relation to the watershed sizes. The risk of a measureable cumulative impact to fish habitat that differs from the existing condition would be low.

– **Stream temperature**

Due to the limited amount of canopy removed in the RMZ of Class 1 streams, a low risk of cumulative temperature increases above the current ranges would result from the implementation of this alternative.

Water Yield

The cumulative annual water-yield increase in Taylor Creek watersheds would remain below the recommended threshold of 13% if this alternative were selected. Taylor Creek cumulative annual water yield increase would be 10.9 percent. Due to the limited harvest in Logan and Oettiker creeks, no detectable water yield increases would result from the implementation of this alternative. Therefore, while the cumulative water yield would increase very slightly, because the levels would remain below the threshold set in accordance with *ARM 36.11.425(g)*, a low degree of risk to water quality would result from the implementation of this alternative.

Cumulative Effects Summary

Because all timber-harvesting activities would follow BMPs as required by *ARM 36.11.422* and the direct and indirect effects would have a very low to low risk of impacts, a low risk of additional adverse cumulative effects would be expected to occur under this alternative. This expectation includes the results of (1) a slight decrease in the recruitable large woody debris in the RMZ along Oettiker and Logan creeks and a minor increase in modeled annual water-yield estimates.

Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber-harvesting and road construction/reconstruction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

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WILDLIFE ANALYSIS

INTRODUCTION

The wildlife analysis is designed to disclose the existing condition of wildlife resources and the anticipated direct, indirect, and cumulative effects that may result from implementing the No-Action and Action alternatives. The following issue statements were developed from concerns raised by DNRC specialists and public comments received during scoping and will be addressed in the following analysis:

- **Mature forest cover and connectivity.** The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and suitability for wildlife species associated with mature forest.
- **Snags and coarse woody debris.** The proposed activities could reduce the availability of snags and coarse woody debris and increase human access for firewood harvesting, which could adversely affect the quality of wildlife habitat.
- **Old-growth forest.** The proposed activities could affect wildlife species associated with old-growth forests by reducing the acreage of available habitat and increasing fragmentation.
- **Canada lynx.** The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat (i.e., summer foraging, winter foraging, other suitable), reducing the capacity of the area to support Canada lynx.
- **Grizzly bears.** The proposed activities could alter grizzly bear cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats and/or increasing risk of human-caused bear mortality.
- **Fishers.** The proposed activities could reduce the availability and connectivity of preferred fisher habitats and increase human access, which could reduce fisher habitat suitability and increase trapping mortality.
- **Pileated woodpeckers.** The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.
- **Gray wolves.** The proposed activities could disturb gray wolves and reduce big game winter range habitat quality, which could displace gray wolves from denning and rendezvous sites and reduce prey availability.

ANALYSIS AREAS

Direct and Indirect Effects

The direct and indirect effects of the proposed activities on all species/issues were analyzed within the project area (FIGURE W-1 –ANALYSIS AREAS), which consists of 1,280 acres of DNRC-managed lands in T30N, R24W Sections 16 (Logan Creek Parcel) and 36 (Reid Divide Parcel).

Cumulative Effects

The cumulative effects of the proposed activities on all species/issues were analyzed at a broad surrounding landscape scale that varies according to the issue or wildlife species being discussed.

Cumulative effects analysis areas are named according to the size of the area and are summarized in TABLE W-1 –ANALYSIS AREAS and FIGURE W-1 –ANALYSIS AREAS. Cumulative effects analysis areas include the project area as well as lands managed by other agencies and private landowners. Detailed descriptions of each analysis area are located in the **Existing Condition** section for each issue or species evaluated (e.g., snags and coarse woody debris, grizzly bears etc.).

TABLE W-1. ANALYSIS AREAS. Descriptions of the direct and indirect effects analysis area and cumulative effects analysis areas.

ANALYSIS AREA NAME	DESCRIPTION	TOTAL ACRES	ISSUE(S)/SPECIES ANALYZED
Project Area	DNRC managed lands in Sections 16 and 36, T30N, R24W.	1,280	direct & indirect effects for all issues/species
Medium Cumulative Effects Analysis Area	Portions of the Middle Logan Creek, Upper Logan Creek, Squaw Meadows Creek, and Lost Creek Subwatersheds adjacent to the project area.	32,259	fishers, pileated woodpeckers
Large Cumulative Effects Analysis Area	The Middle Logan Creek, Upper Logan Creek, and Squaw Meadows Creek Subwatersheds and portions of the Lost Creek Subwatershed.	68,255	mature forested habitats and connectivity, snags and coarse woody debris, old-growth, Canada lynx, grizzly bears, gray wolves

ANALYSIS METHODS

Analysis methods are based on DNRC State Forest Land Management Rules. Biodiversity is promoted by taking a coarse-filter approach as well as a fine-filter approach. The coarse-filter approach favors an appropriate mix of stand structures and compositions on state lands (*ARM 36.11.404*) and assumes that if landscape patterns and processes are maintained, then a full complement of species would persist and biodiversity would be maintained. Because the coarse-filter approach may not adequately address the full range of biodiversity on DNRC lands, DNRC also employs an additional fine-filter approach which addresses the habitat requirements of threatened, endangered, and sensitive species (*ARM 36.11.406, DNRC HCP*).

The coarse-filter wildlife analysis section includes analyses of direct, indirect and cumulative effects of the proposed alternatives on: 1) mature forested habitats and landscape connectivity, 2) snags and coarse woody debris, and 3) old-growth habitats. Specific analysis methods are discussed in each section.

The fine-filter wildlife analysis section includes analyses of the direct, indirect, and cumulative effects of the proposed alternatives on: 1) species listed as threatened or endangered under the Endangered Species Act of 1973, 2) species listed as sensitive by DNRC, and 3) species managed

as big game by DFWP. Specific analysis methods are discussed in the sections pertaining to each species.

Existing conditions are described for each relevant species or issue and were assessed using information from the following sources: field visits, scientific literature consultation, Montana Natural Heritage Program (MNHP) data, DNRC Stand Level Inventory (SLI) data, aerial photographs, and consultation with professionals. GIS queries were used to estimate habitat conditions using various habitat filters and relevant data sets. Cumulative effects analyses account for known past and current activities, as well as planned future agency actions. Recent projects (≤15 years) that could contribute to cumulative effects include:

- USDA Forest Service Valley Face Fuels Reduction Project (2006, harvest ongoing) – Commercial and pre-commercial forest management activities are occurring on approximately 3,242 acres. The analysis area is located in T29N, R22W, Sec. 6; T29N, R23W, Sec. 1-10, 16-21, 29-30; T29N, R24W, Sec. 1, 12, 13, 24; T30N, R22W, Sec. 7, 18, 19, 30, 31; T30N, R23W, Sec. 1-4, 8-36; T30N, R24W, Sec. 24, 36; and T31N, R23W, Sec. 3, 4, 9-11, 14-16, 21-23, 25-28, 33-36. No permanent roads are proposed for construction. Activities would occur in the DNRC medium and large cumulative effects analysis areas.
- USDA Forest Service Logan Creek Ecosystem Restoration Project (2004, harvest ongoing) – Commercial harvest with differing levels of timber retention on 5,521 acres and pre-commercial thin on an additional 310 acres. Forest management activities are occurring in the entirety of the Logan Creek watershed except for the Sheppard and Griffin Creek sub-drainages. No permanent roads are proposed for construction. Activities would occur in the DNRC medium and large cumulative effects analysis areas.
- DNRC (2007) Shorts Meadows/Evers Creek Timber Sale – Commercial harvest consisting of seed tree prescriptions and pre-commercial thinning occurring in 448 acres located in Section 13, 14, and 24 T31N, R24W. Approximately 97 acres of seed tree harvest occurred in the large cumulative effects analysis area. No permanent roads were constructed.
- DNRC (1997) Reid Divide Thinning – Pre-commercial thinning was implemented on 410 acres within the project area (Sections 16 and 36, T30N, R24W).

RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

Various legal documents dictate management criteria for the management of wildlife and their habitat on state lands. The documents most pertinent to this project include: *DNRC Forest Management Rule*s, *DNRC Forested Trust Lands Final Environmental Impact Statement and Habitat Conservation Plan*, the *Endangered Species Act*, the *Migratory Bird Treaty Act*, and the *Bald and Golden Eagle Protection Act*.

COARSE-FILTER WILDLIFE ANALYSIS

MATURE FORESTED HABITATS AND CONNECTIVITY

Issue: *The proposed activities could decrease mature forested cover, which could reduce habitat connectivity and habitat suitability for wildlife species associated with mature forest.*

Introduction

Mature forests characterized by large diameter trees and dense canopy cover provide many wildlife species with food, shelter, breeding sites, and travel corridors. Historically, the spatial configuration of mature forested habitats in the western United States was shaped by natural disturbance events, primarily wildfire, blowdown, and pest outbreaks. Natural disturbance events resulted in a mosaic-like spatial configuration of forest patches varying in age, species composition and development. Spatial configuration, including patch size and connectivity of forested habitats, is important for many wildlife species. Patch size may affect the distribution of wildlife species that are attracted to, or avoid forest edges. Additionally, connectivity of mature forested habitats may facilitate movements of wildlife species that avoid openings in canopy cover, or inhibit movements of species that are attracted to openings in canopy cover. For example, discontinuous mature forested habitat would negatively affect movements of fisher, which avoid large openings in overhead canopy cover.

Timber harvest, like wildfire and blowdown, is a disturbance event that often creates open patches of young, early-successional habitats. Consequently, timber harvest may negatively affect wildlife species dependent on mature forests by reducing the amount and connectivity of these habitats. Conversely, wildlife species adapted to early-successional habitats may benefit from timber harvests and similar natural disturbance events. The following analysis discloses existing conditions and the anticipated direct, indirect, and cumulative effects of the proposed activities on mature forested habitats and connectivity.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the large, 68,255-acre cumulative effects area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 – ANALYSIS AREAS. The large cumulative effects analysis area is centered on the project area and represents an area large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

Analysis methods for mature forested habitats and landscape connectivity include field evaluations and Geographical Information System (GIS) analysis of aerial-photographs, DNRC stand level inventory data (SLI), and USDA Forest Service canopy cover data (VMap 9.1.1). Mature forested habitat is defined here and in the remainder of the document as forest stands with ≥40% canopy cover comprised primarily of trees that are on average >9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of many wildlife species that benefit from well-connected mature forest conditions across the landscape. Factors considered in

the analysis include: 1) the degree of timber harvesting, 2) availability of mature forested habitats (≥40% canopy cover, >9 inches dbh average), 3) open and restricted road density, and 4) the availability of potential travel corridors.

Existing Conditions

Mature Forested Habitats and Connectivity

The project area currently contains approximately 504 acres of mature stands composed primarily of western larch, Douglas-fir, lodgepole pine, and subalpine fir (48.0% of project area) (TABLE W-2 –MATURE FOREST). Average patch size is 42 acres (range: 2-191 acres) and the majority of mature forested habitat is continuous (FIGURE W-1 –ANALYSIS AREAS). Mature canopy cover ranges from low (40%) to high (100%) throughout the project area and the project area likely provides suitable habitat for species requiring connected and/or mature habitats, particularly in the Reid Divide Parcel, which contains 379 acres of mature forest habitat (FIGURE W-1 –ANALYSIS AREAS). The Logan Creek Parcel contains 125 acres of mature forest, and patches are bisected by a large riparian meadow associated with Logan Creek. Thus this area has lower habitat suitability for wildlife species that require mature forested habitat. The project area does not occur in any particular area of documented importance for habitat connectivity; however, riparian habitat in the project area associated with class 1 (8.8 miles) and class 2 (0.3 miles) streams, (*ARM 36.11.403(15)(16)(17)*) likely facilitates wildlife movements between the project area and adjacent stands of mature forested habitat. Additionally, ridgelines in the Reid Divide Parcel may provide some connectivity (FIGURE W-1 –ANALYSIS AREAS). A network of open and restricted roads in the project area has reduced some landscape connectivity. Open road density and total road density in the project area are moderate (open road density: 1.0 mile/square mile, open and restricted road density: 3.1 miles/square mile).

Approximately 26,034 acres (38.1% of analysis area) of mature stands with ≥40% canopy cover occur in the large cumulative effects analysis area (TABLE W-2 –MATURE FOREST). An additional 41,092 acres (60.2% of analysis area) in the large cumulative effects analysis area consist of young regenerating stands, which have established primarily as a result of natural disturbances and timber harvesting in the area during the last several decades. The remaining 1,129 acres (1.7% of analysis area) consist of non-forested habitat including lakes and open meadows associated with riparian habitat. Across the large cumulative effects analysis area, landscape connectivity has largely been retained. Mature forested habitat exists in moderate-sized patches that are fairly continuous (FIGURE W-1 –ANALYSIS AREAS). Across the analysis area, mature forested riparian areas associated with Logan Creek, Lost Creek, Griffin Creek, and additional smaller streams provide wildlife travel corridors. A network of open roads has reduced some landscape connectivity. Open road density in the large cumulative effects analysis area is 1.4 miles/square mile and the density of open and restricted roads is 3.0 miles/square mile.

TABLE W-2 -MATURE FOREST. Patch size and amounts (in acres) of existing mature forested habitat (≥40% canopy cover, >9 inches dbh) by analysis area for the DNRC Reid Divide Timber Sale. Percent of the total analysis area is in parentheses.

ANALYSIS AREA	EXISTING AVERAGE PATCH SIZE	EXISTING MATURE FOREST
Project Area (% of area)	42	504 (39.3%)

Large Cumulative Effects (% of area)	152	26,034 (38.1%)

Environmental Effects

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

None of the proposed forest management activities would occur. Forests would continue to age, and dense stands of shade-tolerant trees would continue to develop. Patch size and the availability of mature forested habitat could increase over time, increasing connectivity. Thus, since: 1) no appreciable change in the availability of mature forested habitat would occur, 2) no changes in open or restricted road density would occur, and 3) no changes in the availability of travel corridors would occur, no direct or indirect effects to mature forested habitat availability and connectivity would be anticipated as a result of the No-Action Alternative.

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

The proposed activities would occur in 311 (61.7%) of the 504 acres of mature stands available in the project area. The seed tree treatment proposed for 133 acres of mature forest would reduce canopy cover to <40%. An additional 178 acres of mature forest, including 121 acres of old-growth forest, would receive an old-growth maintenance treatment (modified commercial thin), which would reduce canopy cover; however, these stands may continue providing some habitat for species that require mature forested habitat, although the habitat would be lower quality post-harvest for species that prefer dense, old-growth forest conditions. No additional roads are proposed for construction. Some harvesting is proposed within the riparian habitat associated with streams in the project area, but vegetation retention measures would apply (*DNRC HCP FEIS Vol. II, pp. 2-62 to 2-84*). Connectivity of upland mature forest within the proposed project area would be slightly altered, but overall connectivity would persist. Thus, since: 1) the availability and quality of mature forested habitat would decrease on 311 acres (61.7% of existing mature forested habitat); 2) no open or restricted roads are proposed for construction; and 3) some harvest would occur in riparian habitats that provide wildlife travel corridors, but retention measures would apply; moderate direct or indirect effects to mature forested habitat availability and connectivity would be anticipated as a result of the Action Alternative.

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

None of the proposed forest management activities would occur. Forests in the project area would continue to age, and dense stands of shade-tolerant trees would continue to develop. Connectivity would not be affected under this alternative. Any proposed or ongoing activities within the large cumulative effects analysis area could affect the availability and connectivity of mature forested habitats. Thus, since: 1) no appreciable change in the availability of mature forested habitat would occur, 2) no changes in open or restricted road density would occur, and 3) no changes in the availability of travel corridors would occur, no cumulative effects to mature forested habitat availability and connectivity would be anticipated as a result of the No-Action Alternative.

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

The proposed activities would affect 311 acres (1.2%) of the 26,034 acres of mature forested habitat available in the large cumulative effects analysis area. The proposed activities would open the timber stands in many areas to <40% canopy cover, although mature forested stands receiving old-growth maintenance treatments may provide wildlife with lower quality mature forested habitat post-harvest for species that prefer dense, old-growth forest conditions. Reductions in the availability of suitable mature forested habitat would be additive to harvest activities that are proposed or ongoing in the large cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). No permanent roads are proposed for construction in the project area, but some harvesting is proposed within the riparian habitat in the project area, which may reduce connectivity. However, vegetation retention measures would apply (*DNRC HCP FEIS Vol. II, pp. 2-62 to 2-84*) and connectivity of upland mature canopy forest within the cumulative effects analysis area would not be appreciably altered. Thus, since: 1) the availability or suitability of mature forested habitat in the large cumulative effects analysis area would decrease by 1.2%; 2) no additional open or restricted roads are proposed for construction; and 3) some harvest would occur in riparian habitats that may be providing wildlife travel corridors, but vegetation retention measures would apply; minor adverse cumulative effects to mature forested habitat availability and connectivity would be anticipated as a result of the Action Alternative.

SNAGS AND COARSE WOODY DEBRIS

***Issue**: The proposed activities could reduce the availability of snags and coarse woody debris and increase human access for firewood harvesting, which could adversely affect the quality of wildlife habitat.*

Introduction

Snags and coarse woody debris are important components of forest ecosystems that provide the following functions: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide important habitat substrates for wildlife, and 5) act as storehouses for nutrient and organic matter recycling agents (*Parks and Shaw 1996*). Snags and defective trees (i.e., partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, roosting, and cover. Primary cavity users (i.e., woodpeckers) excavate nesting and roosting cavities in snags. These cavities are used as nesting, roosting, and resting sites by a variety of secondary cavity users, such as small mammals and birds, which are unable to excavate their own cavities. Snags also provide foraging opportunities for insectivorous wildlife species. Habitat value of snags for wildlife varies according to tree species, diameter, and snag density. Thick-barked species (e.g., western larch and ponderosa pine) tend to provide high quality snag habitat. Snag diameter is important because many species that nest in smaller diameter snags will also use large snags; however, the opposite is not true.

Coarse woody debris is used by a variety of wildlife species for foraging, shelter, lookout sites, and food storage. Additionally, coarse woody debris provides forest-dwelling amphibians and reptiles with a stable environment (i.e., moisture and temperature). Coarse woody debris habitat value varies according to size, length, decay, and distribution. Single, scattered downed trees may provide access under the snow for small mammals and weasels, while log piles may provide

secure areas for snowshoe hares. Timber harvest may affect the abundance and spatial distribution of snags and coarse woody debris by direct removal for commercial value or for human safety purposes, or indirectly by increasing human access for firewood harvesting.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the large, 68,255-acre cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large cumulative effects analysis area represents an area large enough to support a diversity of species that use coarse woody debris and snags.

Analysis Methods

The abundance of snags was quantitatively estimated in the project area using 11 systematically-placed fixed plots (each 66 ft x 100 ft) to estimate coarse woody debris amounts. Factors considered in the analysis include: 1) the level of harvesting, 2) availability of snags and coarse woody debris, and 3) risk of firewood harvesting.

Existing Conditions

Snags and Coarse Woody Debris

During field assessments, 14.4 snags/acre ≥8 inches dbh were observed (range: 0-52.8 snags/acre) and wildlife use of snags was observed throughout the project area. The majority of these snags were subalpine fir with some lodgepole pine, Douglas-fir, and Engelmann spruce snags. Coarse woody debris levels varied across the project area (range: 4.1-24.9 tons/acre), but on average was moderate to low at 11.3 tons/acre. Firewood harvesting has likely reduced the availability of coarse woody debris and snags along open roads in the project area. Overall firewood cutting risk is currently moderate due to accessibility of the project area (open road density: 1.0 miles/square mile, open and restricted road density: 3.1 miles/square mile).

In the large cumulative effects analysis area, snag and coarse woody debris levels on surrounding parcels vary widely depending on ownership, motorized access, harvest history, and natural disturbance history. Snags and coarse woody debris are collected for firewood in the large cumulative effects analysis area, especially near open roads. Open road density in the large cumulative effects analysis area is 1.4 miles/square mile and the density of open and restricted roads is 3.0 miles/square mile, and provides limited accessibility for firewood cutting.

Environmental Effects

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

None of the proposed forest management activities would occur. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. Thus, since: 1) no timber harvesting would alter present or future snag or coarse woody debris abundance, and 2) no changes to human access for firewood harvesting would occur, no direct or indirect effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the No-Action Alternative.

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

Some existing snags and snag recruits would be removed from 311 acres within project area due to timber felling operations. Additional recruitment trees and snags may also be lost following timber harvest due to wind throw. Given operability and human safety constraints, existing non-merchantable snags would be left standing where possible on DNRC lands. Across the project area, at least 2 large snags and 2 large recruitment tree (>21 inches dbh) per acre would be retained on DNRC harvest units (*ARM 36.11.411*). If such large trees and snags are absent, the largest available snags and/or recruitment trees would be retained. Additionally, coarse woody debris would be retained according to DNRC Forest Management Rules (*ARM 26.11.414*). Firewood cutting risk in the project area would not change following the proposed harvest. No additional permanent roads are proposed for construction and accessibility to the area for firewood cutting would not change. Thus, since: 1) the proposed actions would remove some snags and coarse woody debris, 2) accessibility for firewood harvesting would not change, and 3) snags and coarse woody debris would be retained in amounts required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*), minor adverse direct and indirect effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

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

None of the proposed forest management activities would occur. No changes in the availability of snags and coarse woody debris would be expected. Existing snags would continue to provide habitat attributes, and new snags would be recruited as trees die. Any proposed and ongoing activities on other ownerships may affect the availability of snags and coarse woody debris. Thus, since: 1) no timber harvesting on DNRC lands would alter present or future snag or coarse woody debris abundance, and 2) no changes to human access for firewood harvesting would occur on DNRC lands, no cumulative effects to snags and coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the No-Action Alternative.

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

Some existing snags and snag recruits would be removed from the 311 acres (0.4%) proposed for harvest within 68,255-acre cumulative effects analysis area, but retention measures would apply (*ARM 36.11.411, ARM 26.11.414*). Reductions in the availability of coarse woody debris and snags would be additive to any proposed or ongoing actions in the cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of recent projects). Firewood cutting risk in the large cumulative effects analysis area would not change due to DNRC activities under the Action Alternative because no additional permanent roads are proposed for construction. Thus, since: 1) proposed actions would be additive to any ongoing and proposed activities that would remove some snags, snag recruits, and coarse woody debris; 2) accessibility for firewood harvesting would not change; and 3) snags and coarse woody debris would be reduced, but would be retained in amounts required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*); minor cumulative effects to snags and

coarse woody debris availability associated with wildlife habitat quality would be anticipated as a result of the Action Alternative.

OLD-GROWTH FORESTS

Issue: *The proposed activities could affect wildlife species associated with old-growth forests by reducing the acreage of available habitat and increasing fragmentation.*

Introduction

Old-growth forests are an important component of biological diversity. They are old forest stands that typically contain various combinations of large old trees, abundant snags and downed logs, and multiple canopy layers, which are not typically found in young forests. These attributes provide structures used by a diversity of wildlife species. The diversity of species and the complexity of interactions between them can be different than in earlier successional stages (*Warren 1990*).

When considering the effects of forest management on species associated with old-growth forests, evaluating changes in the amount of old-growth habitats is important, as well as the size and spatial juxtaposition of these habitats. Smaller patches may be unsuitable for wildlife species with large home ranges. Additionally, small, less-mobile species may be at greater risk of local extinction in small patches/habitat islands. Of the 48 old-growth associated species occurring in the Northern Rockies, about 60% may require stands larger than 80 acres (*Harger 1978*).

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 68,255-acre large cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large cumulative effects analysis area represents an area large enough to support a diversity of species that use old-growth forest habitats.

Analysis Methods

Old-growth forest patches were identified as described in the ***VEGETATION ANALYSIS***. Patch sizes and shapes were assessed using *ArcGIS 9.3*. Changes in the total acres of old-growth, as well as the number of patches greater than 80 acres, were assessed. Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of old-growth, and 3) the availability of patches >80 acres.

Existing Environment

The project area contains approximately 149 acres (11.6% of project area) of stands meeting the definition of old-growth. Old-growth stands in the project area average 30 acres, and none of the 4 patches were >80 acres. However, all of the old-growth patches in the project area share some, if not all, of their boundaries with mature, dense forests (≥40% canopy cover, >9 inches dbh). Thus, the effective patch size for old-growth associated species is likely larger, given that nearby mature stands provide very similar habitat conditions. Across the project area, periodic reductions of some structural attributes, such as large trees, snags, and downed logs, occurred during past timber sales and salvage logging (see VEGETATION ANALYSIS for additional

information). Thus, habitat quality has been reduced in some areas for some wildlife species associated with structurally diverse forest conditions.

The large cumulative effects analysis area contains 149 acres of old-growth stands on DNRC-managed lands in addition to 14,255 acres of mature forested habitat, some of which are likely old-growth stands. At least 6,500 acres of these mature forested stands located on FOREST SERVICE lands are likely old-growth (*USDA Forest Service 2004*). Thus, at least 6,649 acres (9.7%) of old growth occur in the 68,255-acre large cumulative effects analysis area. Stands in the mature and old-growth categories in the large cumulative effects analysis area currently represent 38.8% of the forested acres. Decreases in the acreage of old-growth, reductions in average patch size, simplification of patch shapes, and loss of connectivity between stands of old-growth have occurred due to past timber management within the large cumulative effects analysis area.

Environmental Effects

Direct and Indirect Effects of No-Action on Old-growth Forests

No changes to the amounts, quality, or spatial arrangement of old-growth would occur under this Alternative. Thus, no direct and indirect effects associated with availability or fragmentation of old-growth forest would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative to Old-growth Forests

Approximately 121 acres (81.3%) of the 149 acres old-growth forest in the project area would receive an old-growth maintenance treatment. Overall, 50-60% of the volume would be removed, but old-growth structural attributes would be maintained and the old-growth status of these stands would not change post-harvest (see VEGETATION ANLYSIS, *Green et al. 1992*). Logging would alter some structural attributes on all of the acres of old-growth proposed for treatment and could adversely affect some old-growth-associated species using those stands, particularly those preferring dense forest stands. Patch size of old-growth forest would not be affected by the proposed treatment. Thus, since: 1) the availability of old-growth would not change; 2) stand density would decrease on 81.3% of existing old-growth stands, which may affect wildlife species that prefer dense old-growth stands; and 3) the availability of patches >80 acres would not change; minor direct and indirect effects to associated with availability or fragmentation of old-growth forest would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative to Old-growth Forests

No changes to the amounts, quality, or spatial arrangement of old-growth on DNRC-managed lands would occur under this alternative. Ongoing and proposed forest management projects on other ownerships within the large cumulative effects analysis area could affect old-growth availability and connectivity. Thus, no cumulative effects associated with availability or fragmentation of old-growth forest would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative to Old-growth Forests

Approximately 121 acres (1.8%) of the 6,649 acres of estimated old-growth habitat in the large cumulative effects analysis area would receive an old-growth maintenance treatment. Overall, 50-60% of the volume in these stands would be removed; however, some old-growth structural attributes would be retained (e.g., large trees, coarse woody debris) and the old-growth status of these stands would not change post-harvest (See VEGETATION ANALYSIS). The proposed treatment would reduce stand density, potentially adversely affecting wildlife species that prefer dense old-growth stands. Patch size would not be affected by the proposed treatment. Changes in structural attributes of old-growth would be additive to proposed and ongoing forest management activities in the large cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of recent projects). The USDA Forest Service Logan Creek Ecosystem Restoration Project is the largest ongoing project in the large cumulative effects analysis area, and is expected to reduce old-growth habitat by 1.1 acres. Thus, since: 1) the availability of old-growth would not change; 2) stand density would decrease on 121 acres, which may affect wildlife species that prefer dense old-growth stands; and 3) the availability of patches >80 acres would not change; minor cumulative effects associated with availability or fragmentation of old-growth forest would be anticipated as a result of the Action Alternative.

FINE-FILTER WILDLIFE ANALYSIS

The fine-filter wildlife analysis discloses the existing conditions of wildlife resources and the anticipated direct, indirect, and cumulative effects that may result from the No-Action and Action alternatives. Wildlife species considered include: 1) species listed as threatened or endangered under the Endangered Species Act of 1973, 2) species listed as sensitive by DNRC, and 3) species managed as big game by DFWP. TABLE W-3 –FINE-FILTER describes how each species was either included in the following analysis, or removed for further analysis. Species were not analyzed further if suitable habitat was not present in or near the project area, or if proposed activities would not affect their required habitat components.

TABLE W-3 –FINE-FILTER. Status of species considered in the fine-filter wildlife analysis and basis for inclusion or exclusion from further analysis for the DNRC Reid Divide/Logan Creek Timber Sale.

	SPECIES/HABITAT	DETERMINATION – BASIS
Threatened and Endangered Species	Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Included*** – The project area contains 1,004 acres of suitable lynx habitat.
	Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	***Included*** – The project area occurs within grizzly bear non-recovery occupied habitat (*Wittinger 2002*) associated with the Northern Continental Divide Ecosystem (*USFWS, 1993*).

Sensitive Species	Bald eagles (*Haliaeetus leucocephalus*) Habitat: Late-successional forest less than 1 mile from open water	*No further analysis conducted* – No bald eagle nests occur in the vicinity of the project area and no large water bodies occur within 1 mile of the project area. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed woodpeckers (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	*No further analysis conducted* – No recently (<5 years) burned areas occur 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 salamanders (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	*No further analysis conducted* – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	*No further analysis conducted* – No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loons (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	*No further analysis conducted* – 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.
	Fishers (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	***Included*** – Approximately 466 acres of suitable fisher habitat occur within the project area.

	Flammulated owls (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	*No further analysis conducted* – Approximately 24 acres of flammulated owl preferred habitat types occur within the project area. However, the structural condition of these acres is not suitable for flammulated owls and the size of preferred habitat patches are too small to provide viable habitat conditions for this species. Additionally, no harvesting would occur in flammulated owl preferred habitat types. Thus, negligible direct, indirect, or cumulative effects to flammulated owls would be expected to occur as a result of either alternative.
	Gray wolves (*Canis lupus*) Habitat: Ample big game populations, security from human activities	***Included*** – The 2010 home range of the Ashley Pack and Good Pack are located within 5 miles of the project area.
	Harlequin ducks (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	*No further analysis conducted* – No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern bog lemmings (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	*No further analysis conducted* – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine falcons (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	*No further analysis conducted* – No suitable cliffs/rock outcrops for nest sites occur in the project area or within 0.5 miles of the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated woodpeckers (*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	***Included*** – Approximately 311 acres of suitable pileated woodpecker habitat occur in the project area.

	Townsend's big-eared bats (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	*No further analysis conducted* – No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be expected to occur as a result of either alternative.
Big Game Species	Elk (*Cervus canadensis*)	*No further analysis conducted* – The project area does not contain big game winter range habitat identified by DFWP (*DFWP, 2008*). The quality of hiding cover would be reduced on 311 acres proposed for harvest; however, patches of advanced regenerating conifers would be retained where feasible and suitable hiding cover would be expected to develop over time. Thus, negligible direct, indirect or cumulative effects to big game would be expected to occur as a result of either alternative.
	Mule Deer (*Odocoileus hemionus*)	
	White-tailed Deer (*Odocoileus virginianus*)	

THREATENED AND ENDANGERED SPECIES

CANADA LYNX

***Issue**: The proposed activities could reduce landscape connectivity and the availability of suitable Canada lynx habitat (i.e., summer foraging, winter foraging, other suitable, temporary non-suitable), reducing the capacity of the area to support Canada lynx.*

Introduction

Canada lynx are listed as threatened under the *Endangered Species Act*. Canada lynx are medium-size cats that prey primarily on snowshoe hares and occupy a mosaic of young and mature forests that provide hunting and denning habitats (*Ruediger et al. 2000*). Lynx foraging habitat in western Montana consist of young coniferous stands, and mature forested stands with high levels of horizontal cover, which provide snowshoe hare habitat (*Squires et al. 2010*). Additionally, lynx typically avoid large openings in overhead canopy cover in the winter; hence, densely forested cover that is well connected is important for travel and security (*Squires et al. 2010*). Forest management considerations for lynx include providing a mosaic of young and mature lynx habitats and well-connected large patches of mature forested cover occurring in vegetation types preferred by lynx.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the large, 68,255-acre cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large cumulative effects analysis area was defined using watershed

boundaries and geographic features (i.e., ridgelines), in the vicinity of the project area that provided logical boundaries for analyzing impacts associated with project-related activities on lynx. Because the parcels proposed for harvest are located approximately 3 miles apart, a large analysis area was chosen to encompass the area most likely to affect lynx, should they be present in the analysis area.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and Geographical Information System (GIS) analysis of SLI data and suitable lynx habitats. Suitable lynx habitat was subdivided into the following lynx habitat classes: 1) winter foraging, 2) summer foraging, 3) other suitable, and 4) temporary non-habitat. Habitat classes were classified according to DNRC's lynx habitat mapping protocols (*DNRC HCP FEIS Vol. II, Appendix B, pp. B-5 to B-19*) based upon a variety of vegetation characteristics important to lynx and snowshoe hares (i.e., forest habitat type, canopy cover, stand age class, stems/acre, coarse woody debris, etc.). Other suitable lynx habitat is habitat that has the potential to provide connectivity and lower quality foraging habitat, but does not contain the necessary attributes to be classified as winter or summer foraging habitat classes. The temporary non-habitat category consists of non-forest and open forested stands that are not expected to be used by lynx until suitable horizontal cover develops. On Forest Service land in the large cumulative effects analysis area, Forest Service data was used to identify suitable lynx habitat (*USDA Forest Service 2005*). On ownerships other than DNRC and Forest Service, data identifying the lynx suitable habitat are not readily available. Therefore, for the purpose of this analysis, the stands considered most likely to provide suitable habitat for lynx were mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,000 feet elevation. Based on proximity of these stands to stands considered suitable for lynx use on Forest Service lands, these stands are likely to contain habitat types preferred by lynx as well as matrix habitat suitable for use by dispersing lynx. Factors considered in the analysis include: 1) the level of harvesting, 2) the availability of suitable lynx habitat classes, and 3) landscape connectivity.

Existing Conditions

Canada Lynx

The project area contains 1,004 acres of suitable lynx habitat (TABLE W-3 –LYNX HABITAT). The remaining 276 acres consists primarily of stands that are not preferred lynx cover types and open meadow habitat associated with Logan Creek. Riparian habitat associated with Oettiker Creek, Taylor Creek and additional streams in the project area likely provide some habitat connectivity for lynx (see **MATURE FORESTED COVER AND CONNECTIVITY** in the coarse filter analysis section for further information). Additionally, some ridge tops occur in the Reid Divide Parcel (Section 16) that would facilitate landscape connectivity. However, a motorized trail located on the ridge top in the southeastern corner of the Reid Divide Parcel may limit lynx use of this area.

The large cumulative effects analysis area contains 55,081 acres (39.1% of the large cumulative effects analysis area) of potentially suitable lynx habitat including 1,405 acres of suitable lynx habitats on DNRC-managed lands, 52,398 acres of suitable lynx habitat on Forest Service lands, and an additional 1,278acres of mature forested habitat (>40% crown closure, >9 in. dbh, below 6,000 feet elevation) on other ownerships. The large cumulative effects analysis area is managed

by primarily by the Forest Service and within the DNRC large cumulative effects analysis area, there are 3 Forest Service Lynx Analysis Units (LAUs) that were analyzed for the Forest Service Logan Creek Restoration Project (Evers Reid, Lost Tally, Upper Logan). These 3 LAUs were considered to be in moderate functioning condition at the time of that analysis (*USDA Forest Service 2004*). The LAUs possessed varying amounts of lynx types, but contained relatively low percentages (range: 6.9 – 14.9%) of temporary non-suitable habitat (*USDA Forest Service 2004*). In the vicinity of the project area, lynx habitat is well-connected, likely enabling lynx travel throughout the large cumulative effects analysis area if they are present (see **MATURE FORESTED COVER AND CONNECTIVITY** in the coarse filter analysis section for further information).

TABLE W-3 –LYNX HABITAT. Acreage estimates of existing lynx habitat, and habitat that would remain post-harvest on DNRC lands in the project area for the Reid Divide Timber Sale. Values in parentheses reflect the percentage each habitat class represents of the total acreage of potential lynx habitat in the project area. Total potential lynx habitat is defined as the sum of summer foraging, winter, foraging, and other suitable lynx habitat and the value in parentheses reflects the percentage of the total potential lynx habitat (includes temporary non-habitat) that is expected to be suitable for lynx use.

LYNX HABITAT CATEGORY	ACRES OF LYNX HABITAT (percent of total potential lynx habitat)			
	Existing	Acres Affected by Proposed Harvest	Anticipated Change in Habitat	Post-Harvest
Summer Foraging	72 (7.1%)	0	0 (0%)	72 (7.1%)
Winter Foraging	553 (43.2%)	294	-116 (11.4%)	437 (42.8%)
Other Suitable	379 (37.1%)	15	-10 (0.1%)	369 (36.2%)
Temporary Non-habitat	16 (1.5%)	2	+126 (12.4%)	142 (13.9%)
Total Acres Suitable Lynx Habitat	**1,004 (98.4%)**	**311**	**-126 (12.4%)**	**878 (86.1%)**

Environmental Effects

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

None of the proposed forest management activities would occur. Lynx habitat availability and habitat connectivity would not change. Thus, since: 1) no changes to lynx habitat availability

would occur, and 2) no changes to landscape connectivity would occur, no adverse direct or indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

The proposed activities would affect 311 acres (30.9%) of the 1,004 acres of suitable lynx habitats available in the project area (TABLE W-3 –LYNX HABITAT). After harvest, 126 acres of suitable lynx habitat would be reclassified as temporary non-suitable habitat due to lack of canopy cover in the understory and overstory. The remaining 184 acres of suitable lynx habitat proposed for harvest would be expected to retain adequate understory and overstory canopy cover, allowing these acres to continue to meet the structural conditions suitable for lynx use. To ensure that forest structural attributes preferred by snowshoe hares remain following harvest, dense patches of advanced regeneration would be retained where possible, especially within lynx winter forage habitat. Additionally, coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced due to the transition of 142 acres of suitable lynx habitat to temporary non-suitable habitat. However, suitable lynx habitat would remain continuous in both the Reid Divide Parcel and the Logan Creek Parcel. Existing lynx suitable habitat patches would remain connected, and the narrowest corridor of suitable lynx habitat after logging would be 500 feet wide; thus connectivity would be retained at a reduced level. Riparian harvest would occur in potential lynx travel corridors, but vegetation retention measures would apply. Along 8.8 miles of class 1 streams, no trees would be harvested within 50 feet of the stream and >40% canopy cover would be retained within approximately 100 feet of the stream within the RMZ, including retention of all saplings and shrubs. Within 50 feet of all class 2 streams in the project area at least 50% of the existing mature trees would be retained, and all shrubs and saplings would be maintained (*USFWS and DNRC 2010: Vol. II, pp. 2-75 and 2-84*). See the WATER RESOURCES section in this document for additional information. If present in the vicinity of the project area, lynx could be temporarily displaced by forest management activities for up to 3.5 years due to disturbance caused by motorized activities. Thus, since: 1) lynx suitable habitat availability would be reduced by 12.4%; 2) habitat quality would be reduced within 184 acres of lynx suitable habitat; 3) patches of advanced regeneration would be retained where feasible, especially in winter forage habitat; and 4) landscape connectivity would be reduced, but vegetation retention measures would apply within riparian lynx travel corridors; minor adverse direct and indirect effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Canada Lynx

None of the proposed forest management activities would occur. Ongoing and proposed forest management activities may change the availability of suitable lynx habitats and landscape connectivity in the cumulative effects analysis area; however, no additional cumulative effects that would influence the availability of suitable lynx habitats and landscape connectivity are expected under the No-Action alternative. Thus, since: 1) no changes to lynx habitat type availability would occur, and 2) no changes to landscape connectivity would occur on DNRC lands, no cumulative effects to Canada lynx associated with landscape connectivity and availability of suitable habitat would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Canada Lynx

The proposed activities would affect 311 acres (1.2%) of the 26,716 acres of potentially suitable lynx habitat available in the large cumulative effects analysis area. After harvest, 126 acres (0.2%) of suitable lynx habitat would be considered temporary non-habitat due to lack of canopy cover in the understory and overstory. The remaining 184 acres of suitable lynx habitat would be expected to retain adequate understory and overstory canopy cover, allowing these acres to continue to meet the structural conditions suitable for use by lynx. Additionally, dense patches of advanced regeneration would be retained where possible, especially within lynx winter foraging habitat. Coarse woody debris would be retained in accordance with DNRC Forest Management Rules (*ARM 36.11.414)* and retention of downed logs ≥15 inch diameter would be emphasized. Lynx habitat connectivity would be reduced due to the transition of 142 acres of suitable lynx habitat to temporary non-suitable habitat. However, lynx habitat would remain continuous in both the Reid Divide Parcel and the Logan Creek Parcel. Existing lynx suitable habitat patches would remain connected, and the narrowest corridor of suitable lynx after logging would be 500 feet wide; thus connectivity would be retained at a reduced level. Riparian harvest would occur, but measures that would retain riparian vegetation would be applied, which would maintain threshold levels of cover suitable to facilitate travel and daily movements of lynx. Additionally, some harvest would occur along forested ridgelines, but mature forest on adjacent forest service lands would continue providing connectivity. Changes to lynx habitat type availability and habitat connectivity would be additive to any proposed or ongoing projects (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). The Forest Service Logan Creek Ecosystem Restoration Project is the largest ongoing project in the large cumulative effects analysis area, and it is expected to increase temporary non-lynx habitat (unsuitable habitat) by 1,843 acres across 3 LAUs common to the Logan Creek Ecosystem Restoration Project and the proposed DNRC Reid Divide/Logan Creek Timber Project (*USDA Forest Service 2004*). Lynx could be temporarily displaced by forest management activities associated with the proposed Reid Divide/Logan Creek timber sale for up to 3.5 years. Thus, since: 1) lynx suitable habitat availability would be reduced by 126 acres (0.2% of potentially suitable lynx habitat in the large cumulative effects analysis area); 2) habitat quality would be reduced within 184 acres of lynx suitable habitat; 3) patches of advanced regeneration and shade-tolerant understory trees would be retained where feasible, especially in winter forage habitat; and 4) landscape connectivity would be reduced, but vegetation retention measures would apply within riparian lynx travel corridors; minor adverse cumulative effects to Canada lynx associated with landscape connectivity and suitable habitat type availability would be anticipated as a result of the Action Alternative.

GRIZZLY BEAR

***Issue**: The proposed activities could alter grizzly bear cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats, and/or by increasing risk of human-caused bear mortality.*

Introduction

Grizzly bears are opportunistic omnivores that inhabit a variety of habitats in Montana. Preferred grizzly bear habitats include avalanche chutes, fire-mediated shrub fields, and riparian areas, all of which provide seasonal food sources (*Servheen 1983, McLellan and Hovey 2001*). Grizzly bears are currently listed as "Threatened" under the *Endangered Species Act of 1973* and

primary threats are related to human-bear conflicts and long-term habitat loss associated with human development (*Mace and Waller 1997*). Forest management considerations for grizzly bears include providing visual screening along open roads, minimizing access and the construction of new roads, and reducing disturbance levels during the non-denning season, especially in the spring period when grizzly bears are nutritionally stressed.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 68,255-acre large cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The large cumulative effects analysis area is centered on the project area and is defined according to geographic features (i.e., ridgelines), which bound a reasonable analysis area for grizzly bears. This area is approximately the size of a female grizzly bear home range (Mace and Roberts 2011).

Analysis Methods

Analysis methods included field evaluations, Geographical Information System (GIS) analysis of SLI data, and aerial photograph interpretation. These methods were used to identify potential visual screening cover, identify spring habitat, and estimate open and restricted road densities. Visual screening was estimated by evaluating forest stand size class and the total crown density of all trees in the stand using GIS and SLI data. Grizzly bear visual screening is defined as vegetation that could hide 90% of a grizzly bear at a distance of 200 feet. On DNRC lands, seedling/sapling stands were included in estimates of visual screening cover if they were >4 feet tall and contained ≥350 trees/acre. On non-DNRC lands the acreage of stands with ≥40% canopy cover provided by trees >9 inches dbh on average was queried to estimate the availability of visual screening cover. Spring habitat was defined as areas located below 4,900 feet (*DNRC HCP FEIS Vol. II*) within grizzly bear non-recovery occupied habitat (*Wittinger 2002*). Factors considered in the analysis included: 1) the degree of harvesting, 2) the availability of visual screening cover, 3) the location of spring habitat, and 4) open and restricted road densities.

Existing Conditions

Grizzly Bears

The project area is located within grizzly bear non-recovery occupied habitat (NROH) associated with the Northern Continental Divide Ecosystem (hereafter NCDE, *Wittinger 2002*). NROH consists of occupied areas near grizzly bear recovery zones in Montana that were mapped by grizzly bear researchers and managers to account for increased sightings of grizzly bears outside of recovery zones. A single grizzly bear observation was recorded 1.2 miles from the Reid Divide Parcel in 1996 (MNHP), however more recent data (*Mace and Roberts 2011*) and observations have shown an increase in grizzly bear occurrences in areas west of the Flathead Valley. In fall 2011, DFWP captured an adult grizzly bear approximately 8 miles east of the proposed project area and relocated it to Elk Mountain, approximately 12 miles northwest of the project area. Elk Mountain is a Forest Service approved release site for relocated grizzly bears and more bears would be expected in the vicinity of the project and cumulative effects analysis areas as bear populations continue to expand outside of the NCDE in the future. The project area contains habitat that grizzly bears could potentially use during the non-denning season. Additionally, 760 acres of the project area are located below 4,900 ft and are considered spring habitat. The entire

Logan Creek Parcel (Section 16) is considered spring habitat and 120 acres in the northwest portion of the Reid Divide Parcel are spring habitat (Section 36). Approximately 935 acres (73.1% project area) of visual screening cover is present in the project area. The proposed project area contains secure habitat, primarily in the Reid Divide parcel. Riparian habitat can provide important foraging areas for bears, especially in the spring (*Servheen 1983*). Riparian habitat associated with class 1 (8.8 miles) and class 2 (0.3 miles) streams (as defined in *ARM 36.11.403(16)(17)*) is present in the project area. Other important grizzly bear habitats, including fire-mediated shrub fields and avalanche chutes, are not present within the project area. Open and seasonally open road density in the project area is 1.0 miles/square mile and total road density is 3.1 miles/square mile. Additionally, approximately 0.25 miles of trail permitting non-motorized and motorized travel (2-wheel only), runs through the southeast corner of the Logan Creek parcel.

The large cumulative effects analysis area is also located within grizzly bear NROH associated with the NCDE (*Wittinger 2002*). This area consists of forested habitats relatively uninfluenced by human developments and contains a variety of preferred grizzly bear habitats (berry fields, riparian areas). Forest habitats across the large cumulative effects analysis area consist of a combination of age classes, ranging from young, recently harvested stands <5 years old, to mature stands >100 years old. Approximately 26,522 acres of visual screening are available in the large cumulative effects analysis area including 1,211 acres on DNRC-managed lands, and at least 25,311 acres of mature forested habitat providing visual screening on other ownerships. The cumulative effects analysis area contains areas of secure habitat. Open road density in the large cumulative effects analysis area is 1.4 miles/square mile and total road density is 3.0 miles/square mile.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Grizzly Bears

None of the proposed forest management activities would occur. No changes to grizzly bear habitat would be expected. Visual screening, existing secure areas, and open and restricted road density would remain the same. Thus, since: 1) no timber harvesting would alter existing visual screening cover, 2) no existing secure areas or important habitats would be affected, and 3) no changes to open or restricted road density would occur, no direct or indirect effects associated with grizzly bear displacement or human-caused bear mortality risk would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

The project area currently contains 935 acres of visual screening. Of these acres, 308 (33.0%) would be affected by the proposed activities. The proposed harvest would reduce canopy cover in these areas to <40% and logging equipment could temporarily remove some shrubs and conifer thickets currently providing visual screening. However, existing dense patches of regenerating conifers, combined with visual screening in the form of topographic breaks would be maintained in such a manner that no point in any harvest unit would be greater than 600 feet to screening cover. Riparian harvest would occur, but measures that would retain riparian

vegetation would be applied to maintain threshold levels of visual screening cover for grizzly bears. The proposed motorized activities could temporarily (1-3.5 years) displace bears from secure areas, should any be present in the vicinity of the project area. No permanent roads are proposed for construction, and the proposed activities would occur for up to 3.5 years. Approximately 2.8 miles of restricted road in the Reid Divide parcel would be opened to commercial forest management activities for up to 3.5 years. General public motorized use on these 2.8 miles would remain restricted by gates and signage during harvesting. To provide additional protection for grizzly bears in the spring period, motorized activities on restricted roads and commercial harvest would be restricted within grizzly bear spring habitat from April 1- June 15. Thus, since: 1) canopy cover and shrubs providing visual screening would be removed, but visual screening would be retained, secure areas?2) disturbance levels would increase temporarily, as open road density within the project area would increase from 1.0 mi/sq. mile to 2.7 mi/sq. mile3) long-term open road density would not change, and 4) motorized activities on restricted roads and commercial harvest would be restricted from April 1-June 15 within grizzly bear spring habitat, minor adverse direct or indirect effects associated with grizzly bear displacement or human-caused bear mortality risk would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

None of the proposed forest management activities would occur. Ongoing and proposed forest management projects within the cumulative effects analysis area could affect visual screening, secure areas, important habitats and open road density. No additional cumulative effects to visual screening, secure areas, important habitats and open road density are expected to result from the No-Action Alternative. Thus, since: 1) no timber harvesting would alter present visual screening, 2) no existing secure areas would be affected, and 3) no changes to restricted or open road density would occur, no cumulative effects associated with grizzly bear displacement or human-caused bear mortality risk would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Grizzly Bears

The proposed activities would affect 308 acres (1.1%) of the 25,311 acres of existing visual screening available in the large cumulative effects analysis area. Existing dense patches of regenerating conifers, combined with visual screening in the form of topographic breaks would be maintained in such a manner that no point in any harvest unit would be greater than 600 feet to screening cover. Riparian harvest would occur, but measures that would retain riparian vegetation would be applied to maintain threshold levels of visual screening cover for grizzly bears. No additional permanent roads are planned for construction. Reductions in visual screening would be additive to proposed and ongoing projects on other ownerships, (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). The Forest Service Logan Creek Ecosystem Restoration Project, the largest ongoing project in the large cumulative effects analysis area, is expected to temporarily increase disturbance levels and reduce the availability of grizzly bear visual screening on at least 2,000 acres (*USDA Forest Service 2004*). Thus, considering both this project and the proposed DNRC project, up to 2,308 acres of visual screening cover could be altered or removed. If present in the vicinity of the project area, grizzly bears could be displaced for up to 3.5 years from areas of visual screening and/or secure habitat. Approximately 2.8 miles of restricted road in the Reid Divide parcel would be opened to commercial forest management activities for up to 3.5 years. General public motorized use on these 2.8 miles would remain restricted by gates and signage

during harvesting. To provide additional protection for grizzly bears in the spring period motorized activities on restricted roads and commercial harvest would be restricted within grizzly bear spring habitat from April 1- June 15. Thus, since: 1) canopy cover and shrubs providing visual screening would be removed, but visual screening would be retained, 2) disturbance levels would increase temporarily, as open road density within the cumulative effects analysis area would increase from 1.37 mi/sq. mile to 1.43 mi/sq. mile, 3) total and long-term open road density would not change, and 4) motorized activities on restricted roads and commercial harvest would be restricted from April 1-June 15 within grizzly bear spring habitat, minor adverse cumulative effects associated with grizzly bear displacement or human-caused bear mortality risk would be anticipated as a result of the Action Alternative.

SENSITIVE SPECIES

FISHERS

Issue: *The proposed activities could reduce the availability and connectivity of preferred fisher habitats and increase human access, which could reduce habitat suitability and increase trapping mortality.*

Introduction

In the Rocky Mountains, fishers prefer late-successional moist coniferous forests (*Jones 1991*). Preferred fisher habitat typically contains large live trees, snags, and logs, which are used for resting and denning sites, and dense canopy cover, which is important for snow intercept (*Jones 1991*). Fishers generally avoid large openings in canopy cover, non-forested habitats, and shrub-seedling stands. The diet of fishers in Montana consists primarily of snowshoe hares, ungulate carrion, and small mammals (*Roy 1991*). Forest-management considerations for fisher involve providing upland and riparian resting and denning habitats, maintaining a network of travel corridors, and reducing trapping risk associated with motorized access.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 –ANALYSIS AREAS). The analysis area for cumulative effects is the 32,259-acre medium cumulative effects analysis area described in TABLE W-I –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The cumulative effects analysis area is centered on the project area and is defined according to geographic features (i.e., ridgelines), which are likely to influence movements of fishers in the vicinity of the project area, providing a reasonable analysis area for fishers that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and Geographical Information System (GIS) analysis of travel corridors, preferred fisher cover type availability (*ARM 36.11.403(60)*), and fisher habitat structure. Preferred fisher cover type classifications considered in the analysis include: 1) upland fisher habitat, and 2) riparian fisher habitat. Classification of these two habitat classes depends upon proximity to streams. DNRC's measures addressing fisher habitat associated with riparian zones consider habitat located within 100 feet of Class 1 streams or within 50 feet of Class 2 streams (*ARM 36.11.440(b)*). Remaining stands in preferred fisher cover types situated away from riparian areas are considered upland fisher

habitat. Habitat structure considered suitable for fisher use includes stands of sawtimber (trees ≥9 inches dbh) with 40-100% crown density. Potential fisher habitat (riparian and upland) on other ownerships was identified by examining mature forested habitat below 6,000 feet elevation and the proximity of mature forested habitat (≥40% cover, >9 inches dbh average) to perennial and intermittent streams. Factors considered in the analysis include: 1) the degree of harvesting, 2) availability and structure of preferred fisher habitats (upland, riparian), 3) landscape connectivity, and 4) human access.

Existing Conditions

Fishers

The project area contains 706 acres of preferred fisher cover types including 34 acres of riparian fisher habitat associated with Class 1 and 2 streams. Approximately 466 acres (36.4%) of these preferred fisher habitats in the project area contain structure necessary for fisher use (i.e., sawtimber size class ≥9 inches dbh, 40-70+% crown density) and are considered suitable fisher habitat. Mature forested habitat present on 39.3% of the project area is fairly continuous and thus connectivity within the project area is high. Riparian habitat associated with Class 1 and 2 streams likely provide suitable travel corridors. Open road density in the project area is 1.0 miles/square mile and total road density is 3.1 miles/square mile, thus there is moderate level of access that could facilitate trapping.

The medium cumulative effects analysis area contains approximately 14,721 acres of fisher habitat (45.6% of analysis area), including 466 acres of suitable fisher habitat on DNRC-managed lands and an additional 14,255 acres of mature forested habitat on other ownerships located below 6,000 feet elevation, which are likely to provide suitable fisher habitat. Of these acres of potential fisher habitat, approximately 1,394 acres are riparian fisher habitat. The remaining 17,538 acres in the medium cumulative effects analysis area consist primarily of young stands that are unsuitable for fisher use and non-forested areas composed primarily of open meadows associated with riparian habitat. In the vicinity of the project area, mature forested habitat is continuous and the average patch size of mature forested habitat is 170 acres. The width of some patches is small (180 feet), but the matrix of young stands may provide some connectivity for fisher travel and thus landscape connectivity is moderate overall. Open and seasonally restricted road density in the medium cumulative effects analysis area is 1.9 miles/square mile and the density of open and all restricted roads is 3.5 miles/square mile, thus there is a moderate level of access that could facilitate trapping.

Environmental Effects

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

None of the proposed forest management activities would occur. No changes to fisher habitat amounts or habitat connectivity would occur in the project area and no additional risk associated with trapping would be expected. Thus, since: 1) no change in the amounts or structure of preferred fisher habitats would occur, 2) no change in landscape connectivity would occur, and 3) no changes to human access would occur that would facilitate trapping, no direct or indirect effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Fishers

The proposed activities would affect 250 acres (53.7%) of the 466 acres of suitable fisher habitat present in the project area. In the 128 acres (27.5%) of fisher habitat proposed for seed tree harvest, canopy cover would be reduced to 5-10%, thus the structure of current fisher habitat would be expected to become unsuitable for fishers. However, 122 acres (26.2%) of fisher habitats located in areas proposed for old-growth maintenance treatments would retain 20-30% canopy cover post-harvest retaining some habitat attributes important for fisher use, although canopy cover and habitat quality would be reduced. Approximately 2.4 acres of riparian fisher habitat are proposed for harvest. However, measures would be applied to retain riparian vegetation in a manner that would maintain threshold levels of cover and structure that would maintain habitat suitability for fishers in these areas. Within riparian fisher habitat, 75% of the stand would be retained in sawtimber size class in moderate to well-stocked density (*ARM 36.11.440(b)*). The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of dead material and live snag recruitment trees would meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). No permanent roads are planned for construction, thus trapping risk associated with human access is not likely to increase as a result of this project. Connectivity of mature forested habitats suitable for fisher use would be expected to decrease under the Action Alternative, although travel corridors associated with riparian habitat would remain, albeit with lowered cover and tree density. If present in the vicinity of the project area, fishers could disturbed and be temporarily displaced by forest management activities for up 3.5 years. Thus, since: 1) structural changes to fisher habitat would occur on 250 acres and habitat availability would be reduced, but some snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414)*; 2) riparian harvest would occur, but 75% of the stand would be retained in sawtimber size class in moderate to well-stocked density; 3) landscape connectivity would be reduced; and 4) no permanent road construction and no long-term change in open roads would occur, minor adverse direct and indirect effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Fishers

None of the proposed forest management activities would occur. Ongoing and proposed forest management projects within the cumulative effects analysis area that would influence fisher habitat availability, habitat structure, and landscape connectivity. Thus, since: 1) no change in the amount or structure of preferred fisher habitats would occur, 2) no change in landscape connectivity would occur, and 3) no changes to human access would occur that would facilitate trapping, no cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Fishers

The proposed activities would affect 250 acres (1.7%) of the 14,721 acres of potential fisher habitat available in the medium cumulative effects analysis area. The proposed activities would change the structure of these habitats, reducing canopy cover to 5-10% in areas proposed for seed tree treatments (128 acres) and to 20-30% in areas proposed for old-growth maintenance treatments (122 acres), thus the structure of these current fisher habitats proposed for harvest would be expected to become unsuitable for fishers. Additionally, 2 acres (0.5%) of the 1,394 acres of potential riparian fisher habitats available in the medium cumulative effects analysis area are proposed for harvest. However, measures would be applied to retain riparian vegetation in a

manner that would maintain threshold levels of cover and structure that would maintain habitat suitability for fishers in these areas. At least 75% of the existing stands considered fisher riparian habitat would be retained in sawtimber size class in moderate to well-stocked density following logging and would remain suitable for use by fishers (*ARM 36.11.440(b)*). The availability of some important habitat characteristics (i.e., snags, coarse woody debris) could be reduced by harvest activities; although retention of some dead material and live snag recruitment trees would be required to meet DNRC Forest Management Rules (*ARM 36.11.411, ARM 26.11.414*). Connectivity of fisher habitats would be reduced, but travel corridors associated with riparian habitat would be maintained. Any adverse affects to fisher would be additive to any proposed or ongoing sales in the large cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). The Forest Service Logan Creek Ecosystem Restoration Project is the largest ongoing project in the large cumulative effects analysis area, and is expected to reduce the availability of fisher habitat by 2.7% across a 61,266 acre portion of the Logan Creek Watershed (*USDA Forest Service 2004*). Fishers could be temporarily displaced by forest management activities associated with the proposed Reid Divide/Logan Creek timber sale for up to 3.5 years. Thus, since: 1) structural changes to fisher habitat would occur on 250 acres and habitat availability would decrease, but snags and coarse woody debris would be retained (*ARM 36.11.411, ARM 26.11.414);* 2) riparian harvest would occur, but 75% of the stand would be retained in sawtimber size class in moderate to well-stocked density; 3) landscape connectivity would be reduced; and 4) no road construction or long-term changes in open road density would occur, minor adverse cumulative effects to fisher associated with habitat suitability and trapping risk would be anticipated as a result of the Action Alternative.

GRAY WOLVES

Issue: *The proposed activities could disturb gray wolves and reduce winter range habitat quality for big game, which could displace gray wolves from denning and rendezvous sites and reduce prey availability.*

Introduction

Wolves are wide-ranging opportunistic carnivores that prey on ungulates. In general, wolf densities are positively correlated to prey densities (*Fuller et al. 1992*). Wolves prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (*Kunkel et al. 1999*). However, some studies have shown that wolves may prey upon elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher (*Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006*). Thus, reductions in big game numbers and/or winter range productivity could be indirectly detrimental to wolf populations. Forest management considerations for wolves include restricting disturbance near den and rendezvous sites and promoting habitat characteristics necessary for healthy big game populations.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 68,255-acre large cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The cumulative effects analysis area is centered on the project area, defined

according to geographic features (i.e., ridgelines), and provides a reasonable analysis area for wolves that could be influenced by project-related activities.

Analysis Methods

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. Factors considered in the analysis include: 1) the degree of harvesting, 2) the location of any known den or rendezvous sites, and 3) big game winter range habitat characteristics.

Existing Conditions

Gray Wolves

The project area is located within 5 miles of 2 wolf packs. The Reid Divide Parcel (Section 36) is located 3.5 miles from the estimated 2010 annual home range of the Ashley Pack, and the Logan Creek Parcel (Section 16) is located 2.5 miles from the estimated 2010 annual home range of the Good Pack. No wolf rendezvous sites, den sites, or wolf use of the project area have been documented (*K. Laudon, DFWP, wolf management specialist, pers. comm., 2012*); however, wolf use of the area could occur at any time. The project area contains moose winter range as described by DFWP (TABLE W-4 BIG GAME, *DFWP 2008*) and a moose was observed on multiple occasions by DNRC foresters on the Reid Divide Parcel. Signs of summer and fall use by deer and elk were observed. The project area likely provides habitat for prey species in summer and fall, should wolves use the area.

The large cumulative effects analysis area contains 4,820 acres of the estimated 2010 home range of the Ashley Pack (24.8% of home range) and 1,577 acres of the estimated 2010 home range of the Good Pack (8.1% of home range). Portions of the cumulative effects analysis area are identified as elk, mule deer, moose, and white-tailed deer winter range by DFWP (TABLE W-4 BIG GAME, DFWP 2008).

TABLE W-4 –BIG GAME. Acreages (and percentages) of big game winter range for 4 species in the DNRC Reid Divide Timber Sale Project Area and the large cumulative effects analysis area. Estimates derived from DFWP winter range distribution maps (*DFWP 2008*).

BIG GAME SPECIES	ANALYSIS AREA	
	Project Area	Large Cumulative Effects Analysis Area
Elk (% of area)	0 (0%)	342 (0.5%)
Mule Deer (% of area)	0 (0%)	342 (0.5%)
Moose (% of area)	1,280 (100%)	67,047 (98.2%)
White-tailed Deer (% of area)	0 (0%)	824 (1.2%)

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Gray Wolves

None of the proposed forest management activities would occur. Wolves would not be disturbed by forest management activities and big game winter range in the project area would remain intact. Thus, since: 1) no disturbance to wolf den or rendezvous sites would occur, and 2) no change in big game winter range habitat characteristics would occur, no direct or indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

The proposed activities would affect 311 acres (24.5%) of moose winter range. However, overall, moose are fairly tolerant of winter conditions due to their large body size and the proposed activities are not expected to adversely affect moose. Additional big game winter range does not occur in the project area, but the proposed activities could lead to a shift in big game use of the area and could cause a shift in wolf use of the project area, should they be present. There are no known wolf rendezvous or den sites in the project area. However, if documented in the vicinity of the project area, mechanized activities would be restricted within 1 mile of wolf dens (*ARM 33.11.430(1)(a)*) and 0.5 miles of wolf rendezvous sites (*ARM 33.11.430(1)(b)*). Wolf use of the area is possible, and if present in the vicinity of the project area, wolves could be displaced by forest management activities for up to 3.5 years. Thus, since: 1) known wolf den or rendezvous sites do not occur in the vicinity of the project area, but restrictions would apply if one or both are encountered during operations (*ARM 33.11.430(1)(a)(b)*); and 2) some canopy cover would be removed, but the proposed activities are not expected to appreciably affect prey availability for wolves; minor adverse direct and indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the Action Alternative.

Cumulative Effects of the No-Action Alternative on Gray Wolves

None of the proposed forest management activities would occur. Wolves would not be disturbed by forest management activities on DNRC lands. Big game winter range availability in the project area would not change, but may change on other ownerships outside the project area due to other potential proposed and ongoing projects. Thus, since: 1) no disturbance to wolf den or rendezvous sites would occur and 2) no change in big game winter range habitat characteristics would occur, no direct or indirect effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Gray Wolves

The proposed harvest would affect 311 (0.5%) of the 67,047 acres of moose winter range in the large cumulative effects analysis area. However, moose are tolerant of winter conditions and the proposed activities are not expected to adversely affect moose or prey availability for wolves. Additional big game winter range does not occur in the project area, but the proposed activities could lead to a shift in big game use of the area and could cause a shift in wolf use of the project

area, should they be present. There are no known rendezvous or den sites on DNRC lands in the large cumulative effects area. However, if documented in the vicinity of the project areas, mechanized activities would be restricted within 1 mile of wolf dens (*ARM 33.11.430(1)(a)*) and 0.5 miles of wolf rendezvous sites (*ARM 33.11.430(1)(b)*). The alteration of canopy cover and disturbance to wolves would be additive to any proposed and ongoing activities occurring in the large cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). The Forest Service Logan Creek Ecosystem Restoration Project is the largest ongoing project in the large cumulative effects analysis area, and although ungulate species' movements or habitat use patterns may change, the project is not expected to change ungulate population numbers in the Logan Creek watershed (96 square mile subsection) (*USDA Forest Service 2004*). If present in the vicinity of the project area, wolves could be displaced by forest management activities associated with the Reid Divide/Logan Creek timber sale for up to 3.5 years. Thus, since: 1) wolf den or rendezvous sites do not occur in the vicinity of the project area, but restrictions would apply if one or both are encountered during operations(*ARM 33.11.430(1)(a)(b)*); and 2) some canopy cover would be removed, but the proposed activities are not expected to adversely affect prey availability for wolves; minor adverse cumulative effects to wolves associated with displacement or changes in prey availability would be anticipated as a result of the Action Alternative.

PILEATED WOODPECKER

Issue: *The proposed activities could reduce tree density and alter the structure of mature forest stands, which could reduce habitat suitability for pileated woodpeckers.*

Introduction

Pileated woodpeckers require mature forest stands with large dead or defective trees for nesting and foraging. Cavities created by pileated woodpeckers are ecologically important and are often used in subsequent years by a variety of wildlife species for nesting and roosting. Pileated woodpeckers prefer to nest in ≥20 inch dbh western larch, ponderosa pine, cottonwood, or quaking aspen. The diet of the pileated woodpecker consists primarily of carpenter ants, which inhabit large downed logs, stumps, and snags. Additionally, the density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*). Forest management considerations for pileated woodpeckers include retaining dense patches of old and mature coniferous forest with abundant large snags and coarse-woody debris.

Analysis Area

The analysis area for direct and indirect effects is the 1,280-acre project area (FIGURE W-1 – ANALYSIS AREAS). The analysis area for cumulative effects is the 32,259-acre medium cumulative effects analysis area described in TABLE W-1 –ANALYSIS AREAS and depicted in FIGURE W-1 –ANALYSIS AREAS. The medium cumulative effects analysis area is centered on the project area and defined according to geographic features (i.e., ridgelines) and provides a reasonable analysis area for pileated woodpeckers that could be influenced by project-related activities. This scale provides a sufficient area to support multiple pairs of pileated woodpeckers (*Bull and Jackson 1995*).

Analysis Methods

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. SLI data were used to identify preferred pileated woodpecker habitat (*ARM 36.11.403(58*)). To assess potential pileated woodpecker habitat on DNRC-managed lands, sawtimber stands ≥100 years old within preferred pileated cover types (*ARM 36.11.403(58)*) with ≥40% or greater canopy closure were considered potential pileated woodpecker habitat. On non-DNRC lands, the stands considered most likely to provide suitable habitat for pileated woodpeckers were mature forest stands (≥40% canopy cover, >9 inches dbh average) below 6,000 feet elevation. Factors considered in the analysis include: 1) the degree of harvesting and 2) the structure of pileated woodpecker preferred habitat types.

Existing Conditions

Pileated Woodpeckers

The project area contains 311 acres (24.3% of project area) of suitable pileated woodpecker habitat. This habitat is composed primarily of western larch and Douglas-fir stands. The majority of suitable pileated woodpecker habitat (296 acres) is located in the Reid Divide Parcel (Section 36). The Logan Creek Parcel (Section 16) contains 15 acres of suitable pileated woodpecker habitat. The majority of the remaining acres consist primarily of young stands <100 years in age (298 acres, 46.5% Logan Creek Parcel) as well as non-forest open meadow associated with Logan Creek (232 acres, 36.2% Logan Creek Parcel). During a field visit, a pileated woodpecker was observed within the Logan Creek parcel. Snag and coarse woody debris availability in the project is moderate at 14.4 snags/acre ≥8 inches dbh and 11.3 tons/acre (see **SNAGS AND COARSE WOODY DEBRIS** in the coarse-filter analysis section for additional information). These existing attributes likely facilitate use of existing habitat in the project area for nesting and foraging

The medium cumulative effects analysis area contains 14,566 acres (45.2% of medium cumulative effects area) of potential pileated woodpecker habitat, which includes 311 acres of DNRC-managed pileated woodpecker habitats and an additional 14,255 acres of mature forested habitat (≥40% canopy cover, >9 inches dbh average, <6,000 feet elevation) on other ownerships. Open and seasonally restricted road density is moderate at 1.9 miles/square mile and the density of open and all restricted roads is 3.5 miles/square mile, thus there is a moderate risk of firewood harvest. Additionally, the Forest Service retains coarse woody debris and snags according to agency policies, and the majority of the medium cumulative effects analysis area (85.7%) is managed by the Forest Service. Considering the moderate open road density and forest management practices conducted by the Forest Service, there is likely appreciable amounts of snags and coarse-woody debris available in the medium cumulative effects analysis area.

Environmental Effects

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

None of the proposed forest management activities would occur. Timber harvest would not occur in DNRC-managed pileated woodpecker habitats that occur in the project area. Thus, since no change in the structure of pileated woodpecker habitat would occur, no direct or indirect

effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

The proposed activities would occur in 240 acres (77.3%) of the 311 acres of pileated woodpecker habitat available in the project area. The proposed activities would open stands to 5-10% canopy cover in 128 acres and to 20-30% canopy cover in 112 acres of current pileated woodpecker habitat. Thus, the structure of these stands would be expected to become unsuitable for appreciable use by pileated woodpeckers, although some limited use could occur in areas retaining 20-30% canopy cover. Some snags could be removed by the proposed harvest, but at least 2 large snags and 2 large snags recruitment tree per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Disturbance associated with harvesting could adversely affect pileated woodpeckers for up to 3.5 years, should they be present in the project area. Thus, since: 1) forest structural changes would occur, but mitigation would include retention of snags and coarse woody debris (*ARM 36.11.411, ARM 36.11.414*); and 2) harvesting would affect 77.3% of suitable pileated habitat within the project area; moderate adverse direct and indirect effects to pileated woodpecker habitat suitability in the project area would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

None of the proposed forest management activities would occur. Ongoing and proposed forest management projects within the cumulative effects analysis area could change pileated woodpecker habitat availability. No additional cumulative effects to pileated woodpecker habitat availability are expected to result from the No-Action Alternative. Thus, since no change in the structure of pileated woodpecker habitat would occur, no cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the No-Action Alternative.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

The proposed activities would occur in 240 acres (1.7%) of the 14,566 acres of potential pileated woodpecker habitat in the medium cumulative effects analysis area. The proposed activities would open stands to 5-10% canopy cover in 128 acres and to 20-30% canopy cover in 112 acres of current pileated woodpecker habitat, causing habitat structure to become unsuitable for pileated woodpecker use, although these acres would retain some habitat attributes important to pileated woodpeckers including snags and coarse woody debris. Some snags could be removed by the proposed harvest, but at least 2 large snags and 2 large snags recruitment tree per acre (>21 inches dbh) would be retained (*ARM 36.11.411*). Changes in pileated woodpecker habitat suitability would be additive to proposed and ongoing activities occurring in the medium cumulative effects analysis area (see **ANALYSIS METHODS** section of the Introduction for a detailed description of projects). Disturbance associated with the proposed activities could adversely affect pileated woodpeckers for up to 3.5 years, should any be in the vicinity of the project area. Thus, since: 1) structural changes would occur, but mitigation would include retention of snags and coarse woody debris; and 2) harvesting would affect 1.7% of suitable pileated habitat within the medium cumulative effects analysis area; minor adverse

cumulative effects to pileated woodpecker habitat suitability would be anticipated as a result of the Action Alternative.

LIST OF MITIGATIONS

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the Forest Management Rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per ARM 36.11.444(2) and *GB-PR2* (*USFWS and DNRC 2010 -- HCP Vol. II p. 2-5*).
- Contractors will adhere to food storage and sanitation requirements as per GB-PR3 (*DNRC HCP FEIS Vol. II p. 2-6*).
- Restrict commercial harvest and motorized activities on restricted roads to reduce disturbance to grizzly bears from April 1-June 15 within Section 16 T30N, R24W (Logan Creek Parcel) and portions of Section 36 T30N, R24W (Reid Divide Parcel, applies to Units 36-3 and 36-4) located in grizzly bear spring habitat as per *GB-NR3* (*USFWS and DNRC 2010 -- HCP Vol. II pp. 2-11, 2-12*).
- Design seed tree units to provide topographic breaks in view or to retain visual screening for bears by ensuring that vegetation or topographic breaks be no greater than 600 feet in at least one direction from any point in the unit as per *GB-NR4 (USFWS and DNRC 2010 – HCP Vol. II pp. 2-13, 2-14*).
- Within Canada lynx winter foraging habitat, retain up to 10% of the stand area in patches of advanced regeneration of shade-tolerant trees (grand fir, subalpine fir, and spruce) as per LY-HB4 (*USFWS and DNRC 2010 -- HCP Vol. II pp. 2-50, 2-51*).
- Manage for snags, snag recruits, and coarse woody debris, particularly favoring ponderosa pine, western larch and Douglas-fir. Emphasize the retention of downed logs ≥15 inches diameter where they occur as per LY-HB2 (*USFWS and DNRC 2010 -- HCP Vol. II p. 2-48).*

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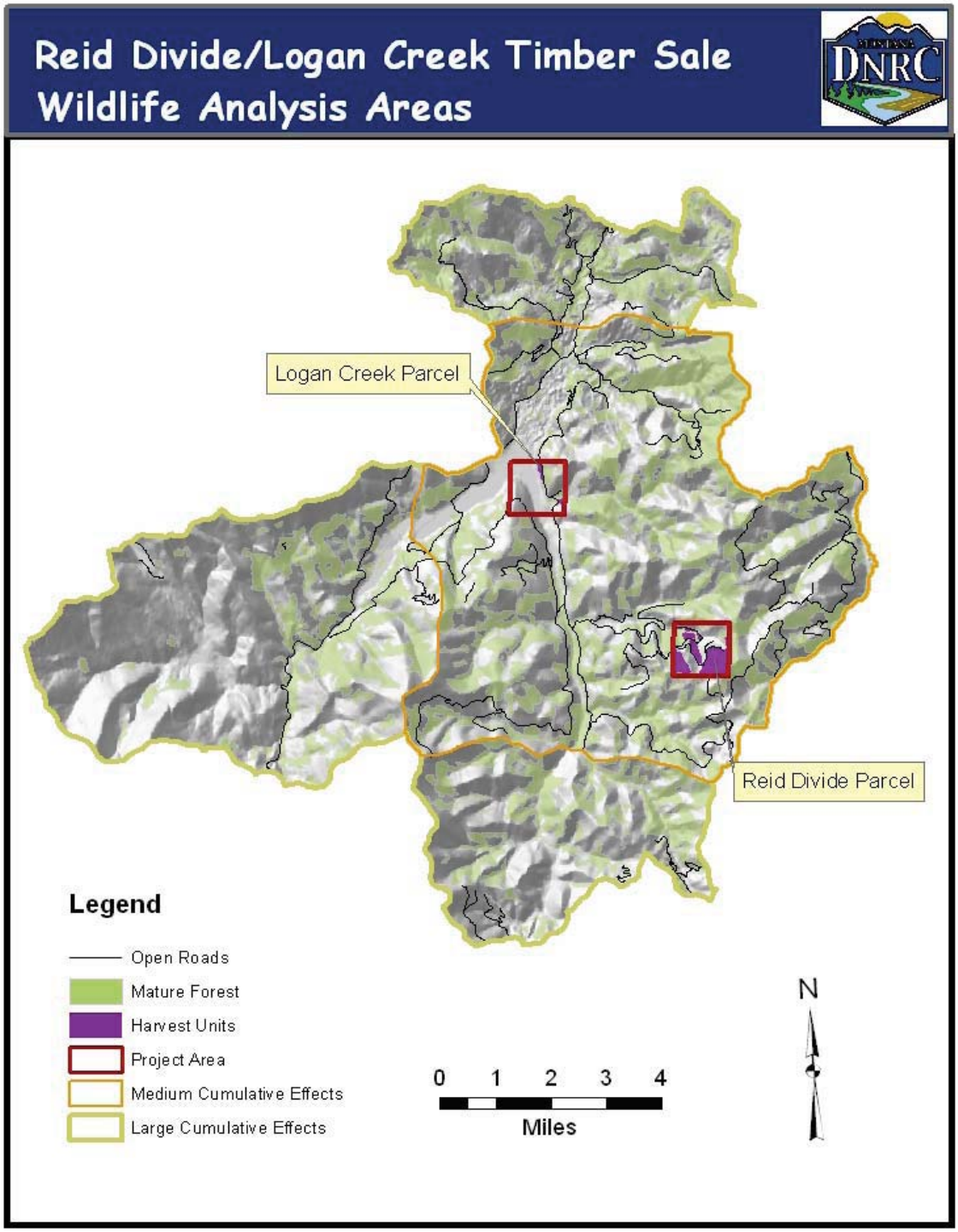
FIGURE W-1 –ANALYSIS AREAS. Wildlife analysis areas for the proposed DNRC Reid Divide Timber Sale.



Attachment 4
Mitigations

Mitigation Measures for Action Alternative

The following mitigations would be required under the action alternative:

Vegetation

- Grass seed new and disturbed roads and landings; spot spray new weed infestations
- Washing logging equipment prior to use.
- Trample slash in skid trails
- Treating existing weed populations along or within roads with herbicide spray.

Water Resources and Soils

- Upgrade roads to incorporate Forestry Best Management Practices (BMPs)
- Limit timber harvest activities to time when ground is frozen or soil moisture is below 20% except on Landtypes 26A-7 and 26A-8 which require soil moistures of <18%. Check soil moisture conditions prior to equipment start-up.
- Apply all applicable Forestry Best Management Practices (including Streamside Management Zone Law and Rules).
- Retain 12 to 25 tons of large woody debris (>3" diameter) and a majority of all fine litter for nutrient cycling. On units where whole tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute within the harvest area; or 3) cut tops from every third bundle of logs so that tops are dispersed as skidding progresses.

Wildlife

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the Forest Management Rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435).
- Maintain a minimum of 2 snags and 2 snag recruitment trees over 21 inches dbh per acre, on average, for all harvest units favoring ponderosa pine, western larch and Douglas-fir. If unavailable, retain the next largest size class. Additional snag resources could be retained within the harvest units.
- Retain 10-15 tons CWD post harvest. Emphasize the retention of downed logs ≥15 inches diameter.
- Prohibit contractors from carrying firearms while on duty
- During the harvest activities, restrict public motorized access along restricted routes through signing when operations are active and closure devices when operations are inactive (nights, weekends, shutdown periods).
- No timber sale activities may occur between April 1 and June 15 in spring grizzly bear habitat areas (Logan Creek Parcel, and Units 36-3 and 36-4 within the Reid Divide Parcel).
- Design seed tree units to provide topographic breaks in view or to retain visual screening for bears by ensuring that vegetation or topographic breaks be no greater than 600 feet in at least one direction from any point in the unit.
- Within Canada lynx winter foraging habitat, retain up to 10% of the stand area in patches of advanced regeneration of shade-tolerant trees (grand fir, subalpine fir, and spruce).

Attachment 5
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