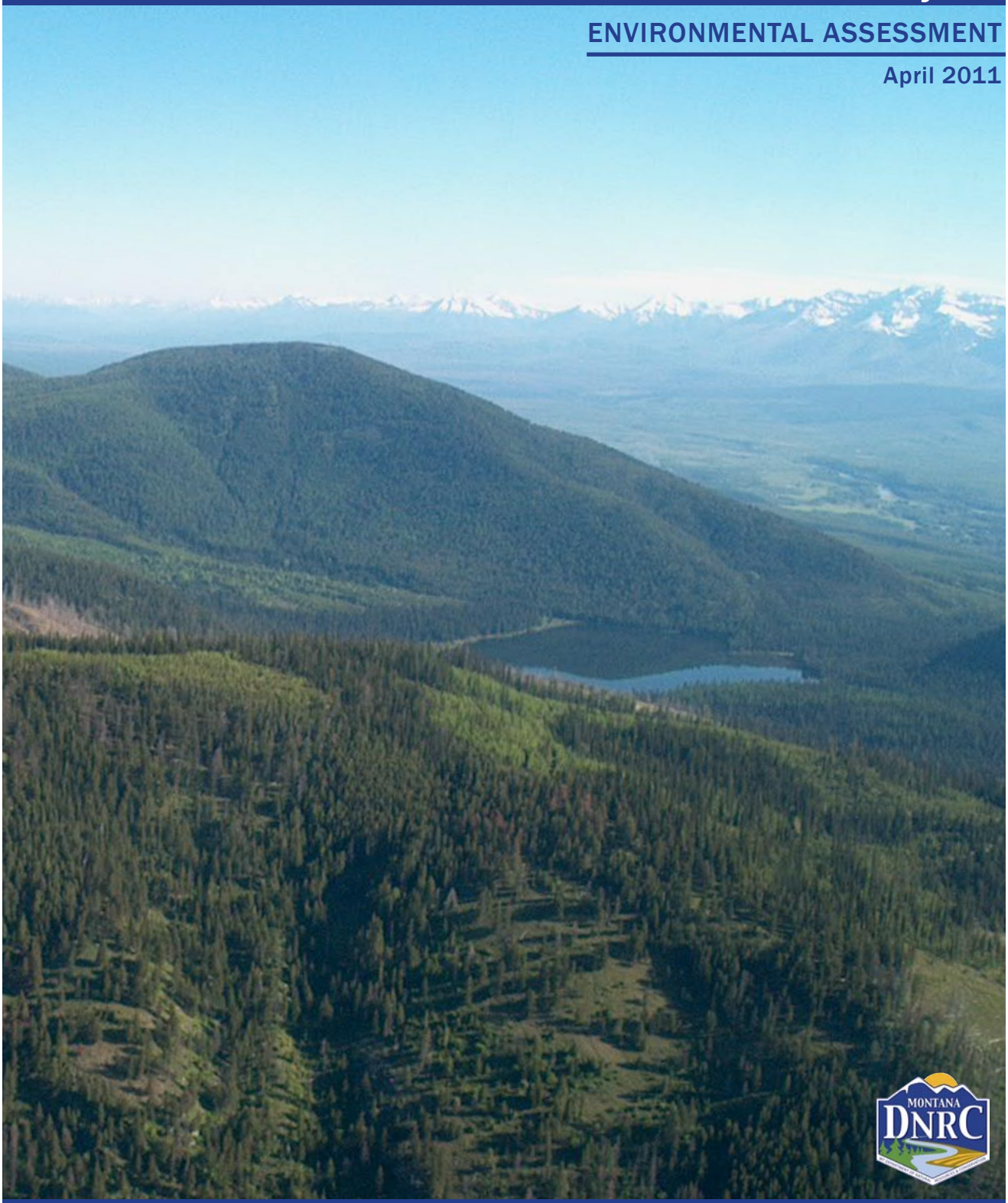
Coal Ridge

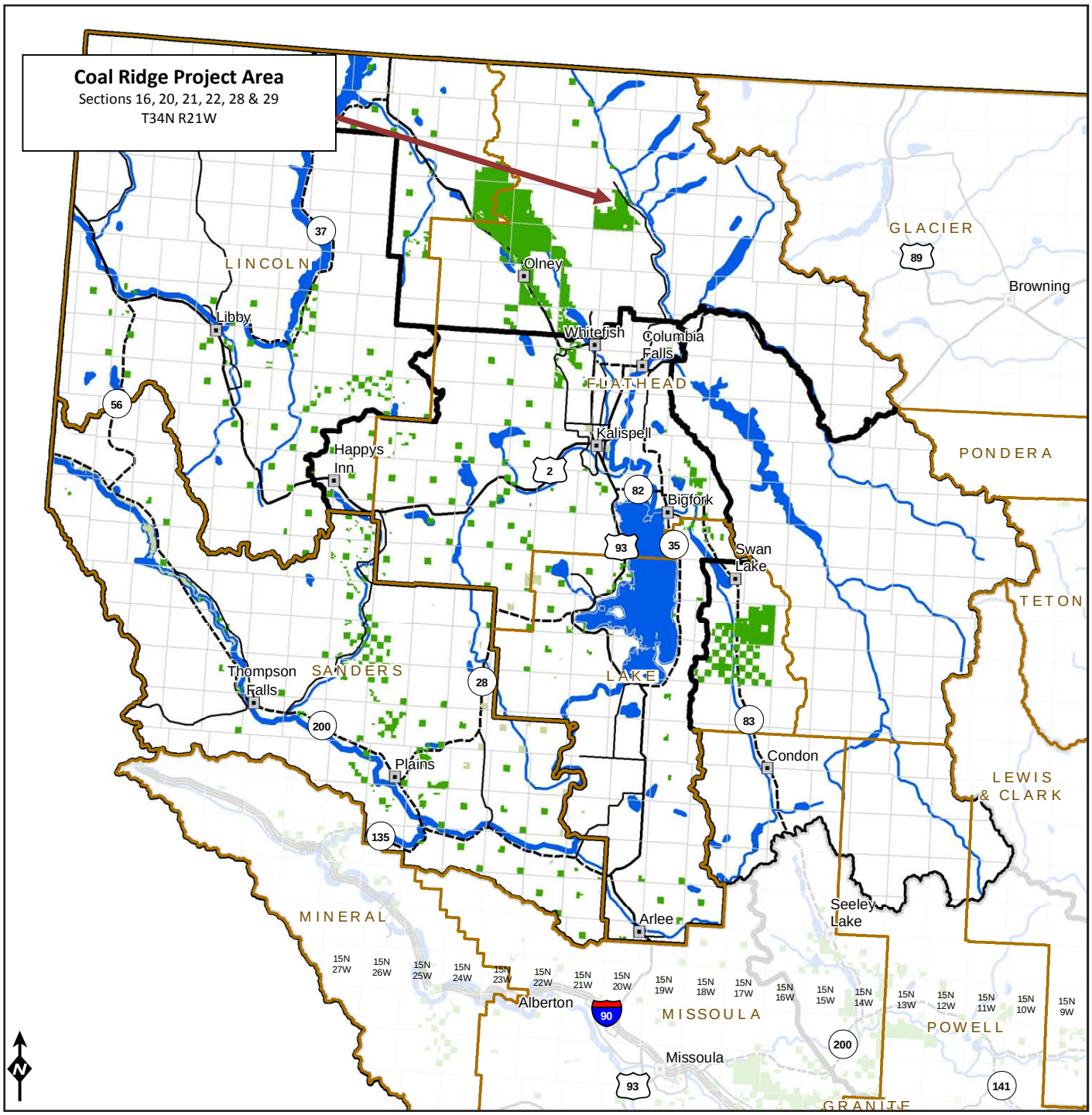
Timber Sale Project

ENVIRONMENTAL ASSESSMENT

April 2011



Montana Department of Natural Resources & Conservation
Northwestern Land Office - Stillwater Unit



Interstate Highway
U.S. Route
State Highway
Secondary Roads
County
DNRC other
DNRC managed for timber
City
Township/Range
Management Unit

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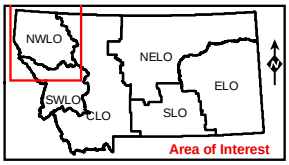

6 December 2010
Montana DNRC
Technical Services Section/dr

Contents

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Environmental Assessment

FINDING

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Finding

Proposed Coal Ridge Timber Sale Project
Montana DNRC

A Department of Natural Resources and Conservation (DNRC) Interdisciplinary Team (ID Team) has completed an Environmental Assessment (EA) for the proposed Coal Ridge Timber Sale Project. The project is located approximately 22 miles north of Columbia Falls in Sections 16, 20, 21, 22, 28 and 29, all in T34N, R21W. *(See Vicinity Map on inside front cover)*. This timber sale project would provide income to the School of Mines, State Industrial School, Public Buildings, and School for the Deaf and Blind trusts.

The Forest staff and the ID Team conducted extensive data collection and reconnaissance of the project area over a 2-year period. In addition, DNRC initiated the public scoping process for this project by placing notices in the Whitefish Pilot and sending the Initial Proposal Letter and maps to; individuals, agencies, industry representatives, and other organizations that expressed interest in Stillwater State Forest's management activities. The information provided to the public allowed interested parties to become familiar with the proposed project and provide input and recommendations *(Pages I-4, II-3,4)*.

The scoping period for public comment was open for 30 days. Public input received by the DNRC consisted of 3 emails and 2 letters. Using this collected information, an Action Alternative was developed that utilized the comments received during the public-scoping period and the recommendations from members of the ID Team.

After a thorough review of the EA, project file, public correspondence, Montana Statutes, State Forest Land Management Plan (SFLMP), and adopted rules, the following three decisions have been reached:

1. Alternative Selected

Two alternatives are presented and both were thoroughly analyzed in the EA:

- The No-Action Alternative includes existing activities, but does not include a timber harvest.

- The Action Alternative involves harvesting 1.4 million board feet (MMbf) of timber from approximately 150 acres. Several types of harvest treatments would be used to meet the described management objectives. A combination of the following harvest treatments are prescribed in the harvest units designed for this project: seed tree with reserves (63 acres); old-growth maintenance (28 acres); and clear cut with reserves (59 acres). A variation of silvicultural prescriptions across the landscape would emulate the effects of mixed-severity fires *(page II-10)*.

Maintenance and minor drainage improvements would occur on approximately 15.4 miles of existing roads. In addition, approximately 0.5 miles of new temporary road would be utilized and reclaimed after the project is completed.

The Action Alternative has been selected.

Rationale for Decision

The Action Alternative has been selected with considerations to the following rationale:

- The Action Alternative meets the *PURPOSE OF PROPOSED ACTION* and *OBJECTIVES OF PROPOSED ACTION (page I-3 and I-4)*; as stated in the EA.

- The lands involved in this project are held by the State of Montana in trust for the support of specific beneficiary institutions. DNRC is required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run *(Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11; and 77-1-202, Montana Codes Annotated [MCA])*. The SFLMP and associated rules provide the management philosophy and framework used to evaluate which alternative would maximize real income, while sustaining the production of long-term income.

- This project was designed to provide revenue to the trust beneficiaries. An estimated $83,146 in revenue would be earned for the trusts by the Action Alternative. In addition, approximately $54,740 would be deposited in the Forest Improvement account, and improvements to the transportation system worth an estimated $42,042 will be completed *(page III-40).*

- On March 13, 2003, DNRC adopted Administrative Rules for Forest Management *(Forest Management Rules ARM 36.11.401 through 456)*. The proposed Coal Ridge Timber Sale Project is designed in accordance with these rules.

- The proposed timber sale project contributes to harvest levels mandated by state statute *(MCA 77-5-222)*.

- DNRC is required to salvage timber damaged by insects, diseases, fires, or wind before it loses value to decay, provided such harvesting is economically warranted *(MCA 77-5-207).*

- The analyses of identified issues did not reveal information to persuade DNRC to choose the No-Action Alternative.

How the Chosen Alternative Addresses Concerns and Issues

The Action Alternative includes activities to address the concerns expressed by the public and DNRC specialists, which include, but are not limited to, the following:

- The effects to water quality, fisheries, and soil would be reduced by:
  - meeting or exceeding all applicable Streamside Management Zone (SMZ) rules and following the Forest Management Rules;
  - not harvesting timber in riparian areas;
  - adding erosion-control measures that would reduce sediment delivery to streams over the long-term *(pages II-9, III-26)*;
  - minimizing the area of adverse soil impacts through the implementation of BMPs that include planning skid-trail systems, and limiting the landing size;
  - retaining woody debris for nutrient cycling and long-term soil productivity *(page III-33)*.
  - limiting the construction of new road to 0.5 miles of temporary road which will be reclaimed following harvest activities.

This selected alternative was designed to retain important wildlife habitat components such as snags, coarse woody debris, visual screens, and seasonal security *(pages II-9, A-5,6)*.

Forested corridors would be retained to maintain landscape connectivity and patches of dense vegetation, when possible, to provide security cover for wildlife.

In consideration of grizzly bear habitat, where feasible, hiding cover and visual screening in the form of brush, shrubs, and trees would be retained along open roads. Additionally, hiding cover throughout the harvested areas would be expected to regenerate 5 to 15 years after proposed treatment. To reduce potential impact on grizzly bears, seasonal use and timing of activities were considered when designing

the project. No changes to motorized access for the general public would occur. Contractors and purchasers conducting contract operations would be prohibited from carrying firearms while operating on restricted roads.

This alternative is designed to perpetuate tree species that are considered appropriate for the sites being harvested, and to address concerns regarding the effects to forest revegetation.

- The preferred tree species for retention would be disease-free western white pine, western larch, and Douglas-fir. Western larch and blister rust-resistant white pine seedlings would be planted in most units after harvesting has been completed *(page II-10*).

- The spread of noxious weeds would be limited by washing equipment prior to being allowed on site, grass-seeding roads and disturbed areas, and applying herbicides along roadsides and on site-specific weed infestations *(page II-7)*.

- A total of 28 acres of timber stands that meet the DNRC definition of old growth *(ARM 36-11-403 [48]*) would be entered with timber harvesting. A maintenance harvest that retains most of the large trees would take place on these 28 acres. Following this harvest, approximately 12,646 acres of old growth will remain on the Stillwater Unit. This amounts to 10.8 percent of the total forested acres on the Unit.

2. Significance of Impacts

For the following reasons, I find the Action Alternative will not have significant impacts on the human environment:

I find that no impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, and I find no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to the extent that the impacts are not significant.

Locally-adopted Environmental Plans and Goals

In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP establishes the Department's philosophy for the management of forested trust land. In May 2003, DNRC adopted rules concerning the SFLMP. The SFLMP philosophy and associated rules are incorporated into the design of the proposed project.

Precedent-setting and Cumulative Impacts

The project area is located on state-owned lands that are "principally valuable for the timber that is on them or for growing timber or for watershed protection" *(MCA 77-1-402)*.

Taken individually and cumulatively, the proposed activities are common practices and no project activities are being conducted on fragile or unique sites.

The proposed project conforms to the management philosophies of DNRC and is in compliance with existing laws, rules, policies, and standards applicable to this type of proposed action.

3. Should DNRC Prepare an EIS?

Based on the following considerations, I find that an Environmental Impact Statement (EIS) does not need to be prepared:

The EA adequately addresses the issues identified during project development and displays the information needed to make the decisions.

Evaluation of the potential impacts of the proposed Coal Ridge Timber Sale Project indicates that no significant impacts would occur.

The ID Team provided adequate opportunities for public review and comment. Public concerns were incorporated into the project design and analysis of impacts.

/s/ Brian Manning
Unit Manager, Montana DNRC – Stillwater Unit
Date: April 26th, 2011

Environmental Assessment

CHAPTER I
Purpose and Need

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Chapter I – Purpose and Need

Proposed Action

The Montana Department of Natural Resources and Conservation (DNRC), Stillwater Unit, is proposing the Coal Ridge Timber Sale Project in Coal Creek State Forest. The project area encompasses 2,207 acres and is located approximately 22 miles north of Columbia Falls in Sections 16, 20, 21, 22, 28 and 29, all in T34N, R21W. *(See Vicinity Map on inside front cover).* School of Mines, State Reform School, Public Buildings, and School for the Deaf and Blind are the trusts that would receive money generated from this project if the Action Alternative is selected.

Two alternatives, Action and No-Action, are being analyzed. If the Action Alternative is selected, 1.4 million board feet (MMbf) of timber would be harvested from approximately 150 acres. A combination of regeneration, intermediate, commercial-thin and old-growth maintenance harvest treatments would be applied. All haul roads would receive the necessary maintenance and improvements to ensure compliance with Best Management Practices (BMPs). Approximately 0.5 miles of temporary road would be constructed to access the harvest areas.

Purpose of Proposed Action

The lands involved in the proposed action are held in trust by the State of Montana for the support of specific beneficiary institutions, such as public schools, State colleges and universities, and other specific State institutions, such as the School for the Deaf and Blind *(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 these beneficiary institutions *(Section 77—1-202, Montana Codes Annotated [MCA])*.

DNRC began implementing the State Forest Land Management Plan (SFLMP) on June 17, 1996. On March 13, 2003, the Department adopted Administrative Rules for Forest Management (Forest Management Rules) *(Administrative Rules of Montana [ARM] 36.11.401 through 456)*. The SFLMP outlines the Department's management philosophy, and the Forest Management Rules contain specific management requirements. The SFLMP philosophy is:

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

Objectives of Proposed Action

In alignment with the management philosophy of the SFLMP and in compliance with the Forest Management Rules, DNRC has set the following specific project objectives:

- Harvest 1 to 2 MMbf of sawtimber to generate income for the School of Mines, State Reform School, Public Buildings, and School for the Deaf

and Blind, and to contribute to the sustainable yield for the DNRC timber-management program as mandated by *State Statute 77-5-222, MCA.*

- Regenerate new stands of healthy trees, improve the growth and vigor of retained trees, and reduce fire hazards.

- Promote biodiversity by managing for appropriate stand structures and species compositions.

- Complete site improvements on existing roads to improve drainage, water quality, and safety.

- Promote long-term water quality and soil conservation during logging and road construction operations by applying BMPs.

Environmental Assessment Process

This Environmental Assessment (EA) was prepared in compliance with the Montana Environmental Policy Act (MEPA) of 1971. The intent of MEPA is to foster better decisions and wise actions by ensuring that relevant environmental information is available to public officials and citizens before decisions are made and actions are taken. MEPA requires the State government to use interdisciplinary planning and to consider environmental effects in its decisionmaking process.

Public Scoping and Public Involvement

The public scoping process, which begins during the initial stage of an EA, is used to inform the public that a state agency is proposing an action. The public has the opportunity to express their comments or concerns about the possible effects of the project.

In June 2010, DNRC initiated the public scoping process for this project by placing notices in the Whitefish Pilot and sending the Initial Proposal Letter with maps to individuals, agencies, industry representatives, and other organizations that have expressed interest in Stillwater State Forest's management activities.

The scoping period was open for 30 days. Input received from the public consisted of 3 e-mails and 2 letters. The issues and concerns identified through public scoping were summarized and used to further refine the project.

Interdisciplinary Team

As required by MEPA, DNRC assembled an Interdisciplinary Team (ID Team) to plan this project and analyze the potential environmental effects. This team is comprised of a wildlife biologist, a hydrologist, and several foresters. In July of 2010, the team began compiling issues and gathering information related to the existing environmental conditions.

Decisions to be Made

The following decisions are to be made as a result of this EA and will be incorporated into the *FINDING.*

- Do the alternatives presented for this project meet the objectives?

- Would implementing the selected alternative cause significant effects on the human environment?

- Should an Environmental Impact Statement (EIS) be prepared?

Relevant EAs, EISs, or Plans

Beaver/Swift/Skyles Timber Sale Project EA.
DNRC. April 2009.

Chicken-Antice Timber Sale EA.
DNRC. December 2008.

Final HCP EIS.
DNRC. September 2010.

Lupfer III Timber Sale Project Checklist EA.
DNRC. April 2010.

Olney Urban Interface Project Checklist EA.
DNRC. March 2009.

SE Stryker Timber Sale Project EA.
DNRC. March 2010.

Other Agencies with Jurisdiction/Permit Requirements

Montana Airshed Group

DNRC is a member of the Montana/Idaho Airshed Group, which aims to minimize impacts from smoke generated by burning activities related to forest management. This is achieved by coordination between the group's members. As a member of the Airshed Group, the DNRC agrees only to burn on days that are approved for good smoke dispersion as determined by the Smoke Management Unit in Missoula, Montana.

Montana Department of Environmental Quality

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

United States Forest Services (USFS)

Commercial use of roads under Cost-share Agreements or covered by the Federal Roads and Trails Act (FRTA) require annual meetings to coordinate road maintenance.

Issues

During the scoping process, DNRC resource specialists and members of the public raised issues and/or requested information about the project's potential impacts on the environment. The ID Team studied the comments received and completed detailed analyses on relevant environmental issues. Some comments either did not relate to the proposed action, or did not require a detailed analysis. The next two sections will address the *ISSUES STUDIED IN DETAIL and ISSUES, REQUESTS, AND QUESTIONS ELIMINATED FROM FURTHER ANALYSIS.*

Issues Studied in Detail

These issues were considered by DNRC in the development of project alternatives *(see CHAPTER II)*. A summary of the comments that were incorporated in the alternatives is presented by resource in *TABLE I-1 – SUMMARY AND TRACKING OF ISSUES STUDIED IN DETAIL.*

TABLE I-1 – SUMMARY AND TRACKING OF ISSUES STUDIED IN DETAIL

RESOURCE AREA	ISSUE	WHERE ADDRESSED IN EA PACKAGE
VEGETATION	Cover types and age-class distributions may be affected by timber harvesting related to this project and other timber-harvesting projects.	Chapter II, pages 4, 14 Chapter III, pages 6–9
	Timber harvesting and road building in old-growth timber stands may affect the amount and distribution of old growth remaining on the Stillwater Unit, including Coal Creek State Forest.	Chapter II, pages 5, 8, 14 Chapter III, pages 11, 12
	The timber sale design should promote a healthy and vigorous forest, reduce the risks of wildfires, and improve the species composition to levels and types that were historically present.	Chapter II, pages 5, 14, 15 Chapter III, pages 12–14
FOREST FUELS	Forest fuel loadings are at a high level, causing many areas to be susceptible to intense fires.	Chapter II, page 15 Chapter III, pages 15, 16
NOXIOUS WEEDS	Soil disturbances and logging equipment could increase the amount and distribution of noxious weeds in the project area.	Chapter II, pages 7, 16 Chapter III, pages 17, 18
SOILS AND GEOLOGY	Ground based harvesting can cause displacement of topsoil leading to a decrease in vegetative growth, and leading to soil compaction which may reduce the ability of the soil to absorb and retain water, as well as increasing runoff and overland flow.	Chapter II, page 18 Chapter III, pages 32, 33
	Reduced infiltration capacity of impacted soils can result in overland flow and off-site erosion, typically localized to main skid trails and log landing sites.	Chapter III, pages 32, 33
	Slope stability can be affected by timber management activities by removing stabilizing vegetation, concentrating runoff, or by increasing the soil moisture.	Chapter III, pages 32, 33
	Removal of both coarse and fine woody material off-site during timber-harvesting operations can reduce nutrient pools required for future forest stands, and can affect the long-term productivity of the site.	Chapter III, pages 32, 33
WATERSHED AND HYDROLOGY	Timber harvesting and related activities, such as road construction, can lead to water-quality impacts by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer sediment due to the removal of vegetation and exposure of bare soil.	Chapter II, page 17 Chapter III, pages 19–28

RESOURCE AREA	ISSUE	WHERE ADDRESSED IN EA PACKAGE
WATERSHED AND HYDROLOGY *(Continued from previous page)*	Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields can increase due to canopy removal because removal of live trees reduces the amount of water transpired, thereby leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow, and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt.	Chapter II, page 17 Chapter III, pages 19–28
FISHERIES	Fisheries resources, such as habitat complexity and stream temperature, may be affected by changes in water yield and sediment delivery as a result of proposed harvest and road construction activities.	Chapter II, page 18 Chapter III, pages 19, 20, 25 and 29
ECONOMICS	The proposed action may affect revenue generated for several school trusts, funding for Forest Improvement (FI) projects, timber-related employment, and the regional economy.	Chapter II, page 19 Chapter III, pages 37–41
WILDLIFE	Timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependent upon these resources, which could alter their survival and/or reproductive ability.	Chapter II, page 19 Chapter III, pages 45–48
	Timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely on these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.	Chapter II, page 20 Chapter III, pages 48–51
	Timber harvesting and associated activities could alter cover, increase access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing the risk of human-caused mortality to bears.	Chapter II, pages 20, 21 Chapter III, pages 54–57

RESOURCE AREA	ISSUE	WHERE ADDRESSED IN EA PACKAGE
WILDLIFE *(Continued from previous page)*	The proposed activities could reduce the amount and/or quality of fisher habitats, which could alter the use of the area by fisher.	Chapter II, page 20 Chapter III, pages 67–69
	Timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.	Chapter II, page 20 Chapter III, pages 63–65
	Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.	Chapter II, page 23 Chapter III, pages 70–73
	Timber harvesting and associated activities could remove thermal cover on big game winter range, which could reduce the carrying capacity of the winter range.	Chapter III, pages 73–75
	The proposed activities could change stand conditions, which could reduce or modify lynx foraging, denning habitat, and other suitable habitats, rendering it unsuitable for supporting lynx.	Chapter II, page 21 Chapter III, pages 57 through 62

Canada lynx by Michael Zahra

Issues, Requests, and Questions Eliminated from Further Analysis

Issue/Request

DNRC should identify and permanently remove all lands unsuitable for timber production from the timber base in order to provide certainty for wildlife security and identify the forest's economic potential in the future.

Response or rationale for eliminating the issue/request from further analysis

The method by which DNRC calculates the annual harvest (annual sustainable yield) from forested state trust lands takes these concerns into consideration without permanently removing lands from the forested land base. Forest land areas that are both unsuitable for timber production and unsuitable for timber harvest are identified and omitted from the area on which DNRC runs its sustainable yield calculation. Other areas are also omitted, such as roads and areas that are intended to support wildlife, watershed, and biodiversity commitments. Therefore, the annual sustainable yield is not based upon an inflated timber base, but upon a land area that can support both timber production and harvesting at a sustainable rate over time, while abiding by constraints and considerations set forth in the Forest Management Rules and the SFLMP.

Although wildlife species may inhabit areas that are unsuitable for timber production, DNRC understands that many more wildlife species in fact depend upon areas that are suitable for timber production. The incorporation of important ecological commitments from the Forest Management Rules and SFLMP into the annual sustainable yield calculation is acknowledgement of this fact, thus providing for certain levels of wildlife security and habitat on lands that may be harvested in the future, and have been harvested in the past.

Calculating the annual sustainable yield under the constraints detailed above also ensures there will be a significant amount of commercial timber on forested lands which can be used to generate a sustainable rate of return for the trust beneficiaries over the long term.

Additionally, *MCA 77-5-116* prohibits the designation of forested state trust land as a wildlife management area, natural area, open space, or for old-growth preserves for the purposes of preservation or non-use of land, unless full market value is obtained and secured for the respective trust beneficiary.

Issue/Request:

MEPA alternatives must fully examine other viable economic options.

Rationale for eliminating the issue/request from further analysis:

According to the SFLMP, DNRC has determined that the best way to produce long-term income for the trust beneficiaries from forested state trust lands is to manage those lands intensively for healthy and biologically diverse forests through the use of timber management activities. However, the SFLMP also states that DNRC would "pursue" other income opportunities as guided by changing markets for new and traditional uses. These uses may replace timber production when their revenue exceeds long-term timber production revenue potential" *(ROD 1996)*. It is in the best interest of the trust beneficiaries for DNRC to consider other profitable revenue generating opportunities, and DNRC has a long history of exploring and implementing a diversity of revenue generating uses and project types. At this time, DNRC has determined that forest management continues to be the best use of these project area lands in producing revenue over the long-term for the trust beneficiaries.

MEPA requires that agencies consider a reasonable range of alternatives given the complexity of the project and issues that are raised during project scoping. Each agency has considerable discretion in determining the appropriateness and viability of economic options that are brought forward, and whether or not to elevate them for consideration within the environmental analysis. Through public scoping, the public has the opportunity to suggest other options that exceed the value of long-term

timber production on forested state trust lands.

During the scoping process for the Coal Ridge Timber Sale project, an initial proposal was released to the public that initiated a 30-day comment period. This provided the public with an opportunity to become involved with the project. Within that proposal we asked the public to suggest other opportunities that would produce long-term revenue to the state trusts other than timber management. The DNRC received no fully-developed proposals.

Issue/Request:

When will the DNRC develop conservation strategies for sensitive species: wolves, and bald eagles?

Response or rationale for eliminating the issue/request from further analysis:

DNRC currently addresses habitat for these species under the fine-filter approach and has Forest Management Rules *(ARMs 36.11.427 through 36.11.442)* that address various endangered, threatened, and sensitive species, such as, wolves, grizzly bears, and bald eagles.

Issue/Request:

This [EA] should disclose the net economic gain or loss of logging lands unsuitable for timber management for biological or economic reasons.

Response or rationale for eliminating the issue/request from further analysis:

This issue is beyond the scope of the project. The analysis within an EA is required to analyze the impacts on the human environment associated with the alternatives being considered, in this case, the "No-Action" and "Action" alternatives. An analysis of the economic suitability of various DNRC lands for various types of management would not provide a necessary and adequate assessment for meeting requirements of MEPA for the type of project that is being proposed. Additionally, within this project area, no biologically unsuitable lands for timber management were identified, although the area does contain some brushed-in areas, creeks, and springs. Foresters have also considered the whole project area, with scrutiny applied to the economics of harvesting and reforestation. The proposed Action Alternative utilizes conventional, cost-effective ground-based harvesting systems and a minor amount of skyline harvesting systems. Helicopter harvesting systems were considered during reconnaissance of the project, but were dropped from further consideration based upon costs associated with those systems. The proposed reforestation activities are also common practice and are economically feasible on the areas proposed for harvesting.

Issue/Request:

Will climate change affect growth and yield of these forests and habitat for species?

Response or rationale for eliminating the issue/request from further analysis:

Evidence of widespread climate change has been well-documented and reported *(Intergovernmental Panel on Climate Change 2001 and 2007)*. Over time, changes in tree species, their geographic distribution, and a decline in health and productivity may be expected within Montana forests *(EPA 1997)*. Given possible changes in the amounts and types of trees and other plants observed in forests, unique vegetation community associations and new climax community types may also begin to appear in the future *(Fox 2007)*.

DNRC Staff are discussing the ramifications of climate change in relation to the management of forested trust lands. Understanding changes in tree species composition in forests and the ability of various tree species to thrive under changing climate conditions may take decades. Predicting possible effects of climate change in forests at local levels is also difficult due to large-scale variables at play, such as possible increases in global evaporation rates, and possible changes in global ocean currents and the jet stream. Such outcomes could influence locally observed precipitation amounts, possible changes in seasons when local precipitation accumulates, and possible influences on natural disturbance regimes (such as changing the average intensity,

frequency, and scale of fire events). Normal year-to-year variation in weather also confounds the ability to identify, understand, predict, and respond to influences of climate change.

Given the many variables and difficulty in understanding the ramifications of changing climate, detailed assessment of possible direct, indirect, or cumulative effects of climate change in association with project activities described in this EA is beyond the scope of this analysis. In the face of current uncertainty associated with climate change, DNRC is continuing to manage for biodiversity as guided under the SFLMP. Under the management philosophy of the SFLMP, DNRC will continue to manage for biodiversity using a coarse-filter approach that favors an appropriate mix of stand structures and compositions on state lands as described by *ARM 36.11.404*, while also working to understand relevant ecosystem changes as research findings and changes in climate evolve.

Issue/Request:

DNRC must use the Green et. al. old-growth definition in its entirety instead of only the minimum number of large trees. Manipulating old growth using the assumption that it will still be old growth after logging is untested and not supported by science.

Response or rationale for eliminating the issue/request from further analysis:

Under *ARM 36.11.403* the DNRC definition of old growth is a forest stand that meets or exceeds not only the minimum number, but also the size and age of those large trees, as noted in *"Old Growth Forest Types of the Northern Region," by Green et al*. *ARM 36.11.403* further directs that "Old-growth maintenance" as meaning silvicultural treatments in old-growth stands would be designed to retain old-growth attributes, including large live trees, snags and coarse woody debris (CWD), but that would also remove encroaching shade-tolerant species, create small canopy gaps generally less than one acre in size, and encourage regeneration of shade-intolerant species. This type of treatment is applicable on sites that historically would be characterized by mixed-severity fire regimes. DNRC acknowledges that when treatments in old-growth stands occur, habitat attributes are altered and habitat quality for some associated species of wildlife may be reduced *(Jobes et al. 2004)*. As such, because a logged old-growth stand may meet the *Green et al*. definition after treatment, does not indicate that it will provide high quality habitat for all old-growth associated species. Such stands following logging, however, will possess a definable threshold of very large, old trees that would otherwise take centuries to develop, and which provide important raw materials for other attributes found in most old-growth stands for years into the future (eg. large snags, large downed logs etc.).

Issue/Request:

DNRC should put existing old-growth stands on longer rotations, and place other stands on long rotations so that they develop old-growth characteristics.

Response or rationale for eliminating the issue/request from further analysis:

DNRC management decisions regarding old growth at the project level follow *ARM 36.11.418(a)* and *(c)*. When considering old-growth management at the project level, careful attention is given to many variables including, but not limited to: cover types, stand locations, patch sizes, habitat connectivity, insect/disease risk, etc. This approach has allowed the DNRC to evaluate conservation biology principles and trade-offs at the landscape scale, and has provided improved flexibility to address stand changes and economic losses caused by natural disturbance agents, such as insects, diseases, and wildfire. DNRC must also consider the requirements of *MCA 77-5-116*, which is a law that prohibits the Department from establishing old-growth deferrals and set-asides without compensation to trust beneficiaries. Environmental effects on old growth are described under *OLD GROWTH in VEGETATION ANALYSIS in CHAPTER III – EXISTING CONDITIONS AND ENVIRONMENTAL EFFECTS.*

Issue/Request:

Disclose the basis for the growth and yield calculation on the SSF. Show the differences between past project yield and current project yield. Are there additional actions being taken to improve yield?

Response or rationale for eliminating the issue/request from further analysis:

This request is beyond the scope of this project. It pertains to the sustainable yield calculation which is a complex statewide project. The sustainable yield calculation for the Stillwater Unit and for all of DNRC's forest land is determined using the best available forest inventory data, modeling current and future growth, the ability of each site to grow trees (site index), standing board foot volume, manageable forest acres, logging systems, forest management rules, forest management policy, and expected levels of forest management activities.

Multiple organizations and individuals were shown the process by which the sustained yield calculation was determined and were asked to submit comments during the scoping process. Public input and comments were accepted between July 2003 and September 2004.

Data does not exist to directly compare past project yield to current project yield. Measuring forest yield or growth takes decades if it is to be done for an individual site and intended to compare a past project to the results of the next project. Tracking forest growth and yield is done by large scale forest inventories. DNRC uses growth and volume estimates provided by the United States Forest Service, Forest Inventory and Analysis group (FIA) to monitor changes in yield over time. In addition to FIA data, DNRC is continuously collecting new stand level inventory data and plot data which provides the ability to monitor forest condition, stand size, and stocking. The information provided by these inventories provides a means by which to observe forest-wide changes in yield over time.

Many factors can increase yield rates including replacing older, slower growing stands with younger, faster growing stands; planting harvest units with superior seed stock; and thinning younger stands for the purpose of reducing resource competition and increasing the growth-rate for residual trees. For more information, please refer to the 2004 Sustained Yield Calculation Report online at: *http://dnrc.mt.gov/trust/pdfs/2004_MT_SYC_Report_20041120.pdf*

Issue/Request:

What methodology and data collection is used to calculate the next sustained yield?

Response or rationale for eliminating the issue/request from further analysis:

Stand Level Inventory (SLI) data are being collected for the Montana DNRC Northwest and Southwest Land Offices on a ten to fifteen year cycle. SLI data is collected on a twenty year cycle for the other Land Offices. Wildfires and timber sales are updated in the SLI on an annual basis. DNRC inventory crews are collecting forest inventory plot data every field season. The next sustainable yield calculation will utilize all of this forest inventory data. As required by *MCA 77-5-222*, a qualified independent third party will conduct the next sustainable yield calculation. Contractors that conduct this type of work use complex computer models specifically designed for this purpose. For more information, please refer to the 2004 Sustained Yield Calculation Report online at: *http://dnrc.mt.gov/trust/pdfs/2004_MT_SYC_Report_20041120.pdf*

Environmental Assessment

CHAPTER II
Alternatives

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Chapter II – Alternatives

Introduction

This chapter includes a description of the No-Action and Action alternatives, the history of alternative development, mitigation measures developed for the Action Alternative, and a summary of the predicted effects of implementing each alternative. Detailed environmental analyses are in *CHAPTER III – EXISTING CONDITIONS AND ENVIRONMENTAL EFFECTS.*

Alternative Development

Introduction

The Coal Ridge Project Area was initially listed on the 2007 List of Upcoming Timber Sales for the Northwestern Land Office. The project area was identified for timber harvesting for several reasons, which include reducing the stocking densities of shade-tolerant trees in a historically shade-intolerant area, promoting seral tree species such as western larch and western white pine, and fulfilling revenue and sustained yield requirements.

This proposed action has been designed to provide revenue to the School Mines, State Reform School, Public Buildings, and School for the Deaf and Blind trusts while maintaining a healthy, productive forest. As noted in *CHAPTER 1- PURPOSE AND NEED*, timber sales are designed under the management philosophy of the SFLMP, which includes managing for biodiversity at the landscape level. The Forest Management Rules *(ARM 36.11.401 through 36.11.456)* provide direction for conducting the analyses and designing and implementing the project.

For several years, DNRC has been developing a Habitat Conservation Plan (HCP) under Section 10 of the Endangered Species Act. If successful, the process will culminate with issuance of an Incidental Take Permit (Permit) by the USFWS. The Draft HCP/EIS was distributed for public review in June of 2009. The Final HCP/EIS was distributed for public review in September of 2010. 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. As part of a phased-in approach to prepare for HCP compliance, DNRC planned this project to be in compliance with; (1) the current rules (Forest Management Rules) that govern the forest management program, and, (2) all applicable conservation commitments contained in the Preferred Alternative in the Final EIS/HCP. Should a different alternative be selected, revisions to the project may be made to comply with the selected alternative.

The project area, comprised of 2,207 acres, is expected to produce a portion of the forest products for the State's Sustainable Yield Requirements *(MCA 77-5-223)*. While managing these lands, foresters must also consider the requirements of the Salvage Timber Program *(MCA 77-5-207)*. This law directs DNRC to harvest dead and dying timber before wood decay is substantial and value is lost.

Preparation, Data Collection, and Public Involvement

After identifying the project area, this project was included in the NWLO 5-year listing of upcoming timber sale proposals. The listing was sent to interested parties. The ID Team members began work on the project in the spring/summer of 2010. The role of an ID Team is to summarize issues and concerns, develop and define management options, and, in reference to issues, analyze predicted and potential impacts of a proposal on the human and natural environment.

Throughout 2010, ID Team members and other DNRC personnel were involved in field reconnaissance and data collection in the project area. Information was collected on:

– existing roads, to determine the needs for improvements to surface drainage, ditch relief, stream crossings, and safety features;

– timber-stand characteristics, old-growth stands, and noxious weeds;

– the type, size, and location of insect and disease problems;

– specific and general geology and watershed characteristics, and;

– wildlife and fisheries habitat.

Field data was used in defining the project and analyzing alternatives for their potential effects. Using this information within the framework of the SFLMP and Forest Management Rules, an initial proposal was developed.

Public scoping consisted of an announcement in the Whitefish Pilot. Additionally, an Initial Proposal letter was sent to interested parties in June 2010 with a 30-day comment period. 3 e-mails and 2 letters were received. The issues and concerns received are summarized in *TABLE I-1 – SUMMARY AND TRACKING OF ISSUES STUDIED IN DETAIL*.

Within the context of public comments, additional field reconnaissance, and additional resource concerns, the ID Team considered the need or benefit of additional alternative development. The ID Team determined that the issues directly related to proposed actions could be addressed through minor changes in the project design and/or mitigation measures. Based on determinations reached by the ID Team, issues and concerns did not drive further alternative development, although substantial adjustments were subsequently made to the Initial Proposal that had been distributed in June 2010. The ID team decided to drop 4 units from the Initial Proposal. Two of these units (3 and 4) were dropped to meet the DNRC's Forest Management Rules for Grizzly Bear Security Core *(ARM 36.11.432.1.d.i)* and Open Road Density *(ARM 36.11.432.1.c.ii and ARM 36.11.449)*. Unit 1 was dropped because the overall good health of the stand would make it unnecessary to perform an old-growth maintenance treatment. Unit 5 was dropped due to operability and economic concerns.

Project Design Concepts

Several key concepts used in developing this timber sale included the prioritization of timber stands for harvesting, transportation planning, and the development of mitigation measures intended to reduce some resource impacts. These concepts are discussed in detail below.

Stand Prioritization

Stands were prioritized for treatment based on:

- **Cover Type:**

ARM 36.11.407 directs the DNRC to manage forest cover types to meet desired future conditions as specified in *ARM 36.11.405*.

Desired future conditions for the project area would be comprised of the following cover types and percentages: 36 percent Douglas-fir/western larch, 8 percent Douglas-fir cover type, 21 percent western white pine, 15 percent subalpine fir, 9 percent mixed conifer, 10 percent lodgepole pine, and 1 percent non-forest.

Currently, the project area is comprised of the following cover types and percentages: 4 percent Douglas fir/western larch, 13 percent Douglas-fir, 5 percent western white pine, 30 percent subalpine fir, 24 percent mixed conifer, 10 percent lodgepole pine, 13 percent non-stocked, and 1 percent non-forest.

The conversion of these stands to desired future condition cover types can be accomplished by harvesting the shade-tolerant species and practicing proper site preparation in conjunction with the planting of western larch and rust-resistant western white pine seedlings.

- **Insect and Disease Issues:**

Mountain pine beetle infestation and white pine blister rust have reduced the presence of western white pine to scattered individuals; and Douglas-fir beetle is attacking and killing Douglas-fir trees in some areas. The project area has experienced a

severe western spruce budworm outbreak over the last few years. All coniferous species found within the project area, with the exception of lodgepole pine, have experienced some defoliation due to budworm. However, it is the subalpine fir that has been the most severely attacked. Stress from defoliation has lead to pockets of mortality and this effect is likely to continue for several years.

- **Accessibility and Cost:**

The project area has many areas that are difficult and expensive to harvest. Some of these areas have steep slopes and are far from existing roads. As noted in the next section titled, *TRANSPORTATION DEVELOPMENT*, planning efforts were required to look at ways of reducing both current and future logging costs.

- **Old Growth:**

During the course of field reconnaissance, 22 acres of old growth were verified that had not previously been confirmed, and 125 acres that had been classified potential old growth by SLI were found to not meet the minimum requirements for old-growth classification under *Green et.al*.

- **Connectivity of Old Growth and Mature Forest:**

Three wildlife connectivity corridors were identified in the project area. Proposed harvesting activities would reduce the width of the southernmost corridor to approximately 200 feet at its narrowest point and would not alter the other two. The locations of old growth and mature timber stands *(FIGURE II-1 – COAL RIDGE PROJECT AREA OLD-GROWTH AND MATURE STAND CONNECTIVITY)* within the project area was analyzed in order to help assess connectivity for wildlife.

Transportation Development

The development of a transportation plan for the Coal Ridge Timber Sale Project is an objective of forest management in this area. Transportation planning for this project includes:

- **Assessment of Existing Road Locations and Standards**

Roads have been reviewed to see if BMPs are met, whether or not the standard is suitable for this proposal and future uses, and what improvements or road abandonments would be required in order to meet safety standards and BMPs. The ID Team utilized the Forest Management Rules associated with Road Management *(ARM 36.11.421)*.

- **Open-road Density**

The project area is located within Coal Cyclone grizzly bear management sub-unit of the Northern Continental Divide Ecosystem Recovery Area. The DNRC is committed to designing projects that result in no net increase in open road densities over the 1996 baseline *(ARM 36.11.432.1.c.ii)*.

- **Grizzly Bear Security Core**

Proposed use of the Coal Ridge Road and the Unit 6 Road has the potential to reduce identified security core habitat for grizzly bears. DNRC is committed to designing projects that result in no net decrease in security core based on the 1996 baseline *(ARM 36.11.432.1.d.i)*.

- **Road Improvement and Development Costs**

Roadwork and maintenance can be expensive. The ID Team reviewed various components related to roads, including the sediment delivery assessment, BMP effectiveness, depreciation of infrastructure such as life expectancy of culverts, and future needs for roads as described above.

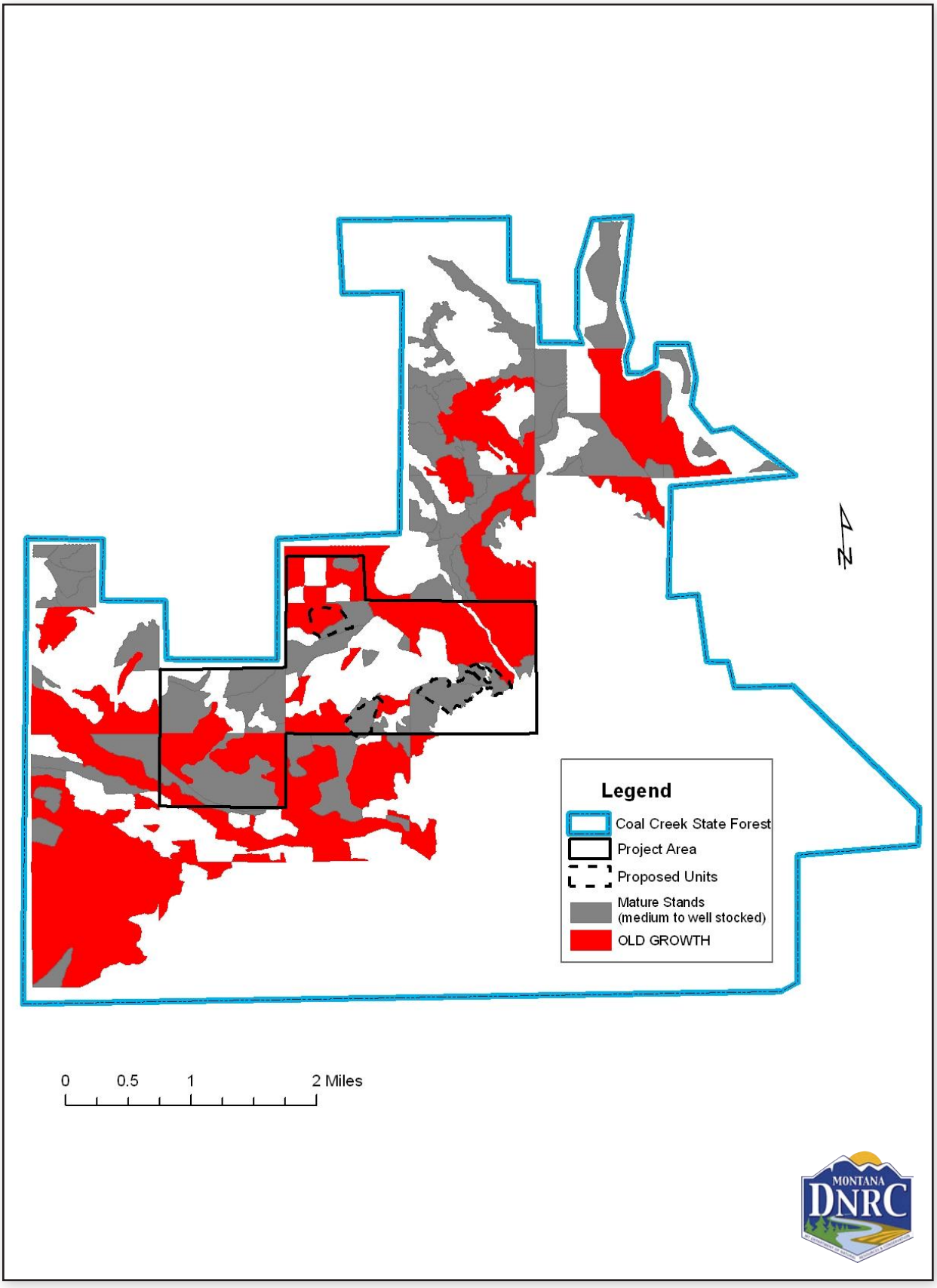
- **Road planning to access state land for continued forest management**

Areas of the forest are not accessible with ground-based or skyline harvest systems. DNRC would minimize the number of roads and optimize the locations of those roads across the landscape for the purpose of reaching these areas, now and in the future.

Mitigation Measures Applied During Project Design

To accomplish the various elements of the proposed project, certain mitigation measures were designed into the project. Mitigation measures are designed to reduce impacts and protect resources during harvesting and road-improvement activities. Many of the listed mitigation measures are written into the Forest Management Rules, others have been utilized with desired results by DNRC in similar

FIGURE II-1 – COAL RIDGE PROJECT AREA OLD GROWTH AND MATURE STAND CONNECTIVITY



projects. For a more complete list of mitigation measures, refer to *APPENDIX A – STIPULATIONS AND SPECIFICATIONS.* The following is a brief list of mitigation measures that address some issues involved in this project:

Access and Roads

- Current road restrictions would stay in-place for the general public; any road opened for this project would be restricted to administrative use only.

- The longest segments of temporary road are located in units 6 and 7, and would be reclaimed to near-natural levels following the sale.

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

- Motor vehicle barriers would be installed on both roads accessing state land on Winona Ridge from the North Fork Road *(see FIGURE II-2 – ROAD MAP)*. The northern access would be closed in Section 11, T34N, R21W and the southern access in Section 30, T34N, R20W to provide additional grizzly bear security habitat.

- A motor vehicle barrier would be installed past proposed Unit 2 on the Coal Ridge Road.

- Earthen berms would be installed on two spur roads off the Coal Ridge Road and on two spurs off the Unit 6 Road.

- Motorized public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs would be used during active periods and a physical closure (gate, barriers, equipment, etc.) would be used during inactive periods (nights, weekends, etc.).

- Roads and skid trails that are opened with the proposed activities would be reclosed to reduce the potential for unauthorized motor vehicle use.

Aesthetics

- The size and number of landings would be limited.

- In most harvest areas, trees of all diameter size classes and species would be retained. To help provide structure or different forest levels (overstory, mid-story, and understory) for both the near term and long term, retention trees would generally be the healthiest trees with full crowns, although wildlife trees and snags would also be retained.

- In areas where cable logging is required, the width of the cable corridor would be limited, and a minimum distance between corridors would be required to reduce the amount and visibility of corridors in the harvest areas.

- The temporary roads into units 2, 6, and 7 and all jump-ups would be reclaimed after harvesting. *TABLE II-1 – ROADS* describes the reclamation levels of the temporary roads.

- Sites of disturbed soil along road right-of-ways would be grass seeded.

- A higher concentration of trees would be left within 100-foot buffers in units along the Cyclone Creek Road *(FS 909)*.

- The hillside within proposed Unit 2 is visible from parts of Cyclone Lake; following harvest, a stocked stand of variable density would remain.

Noxious Weed Management

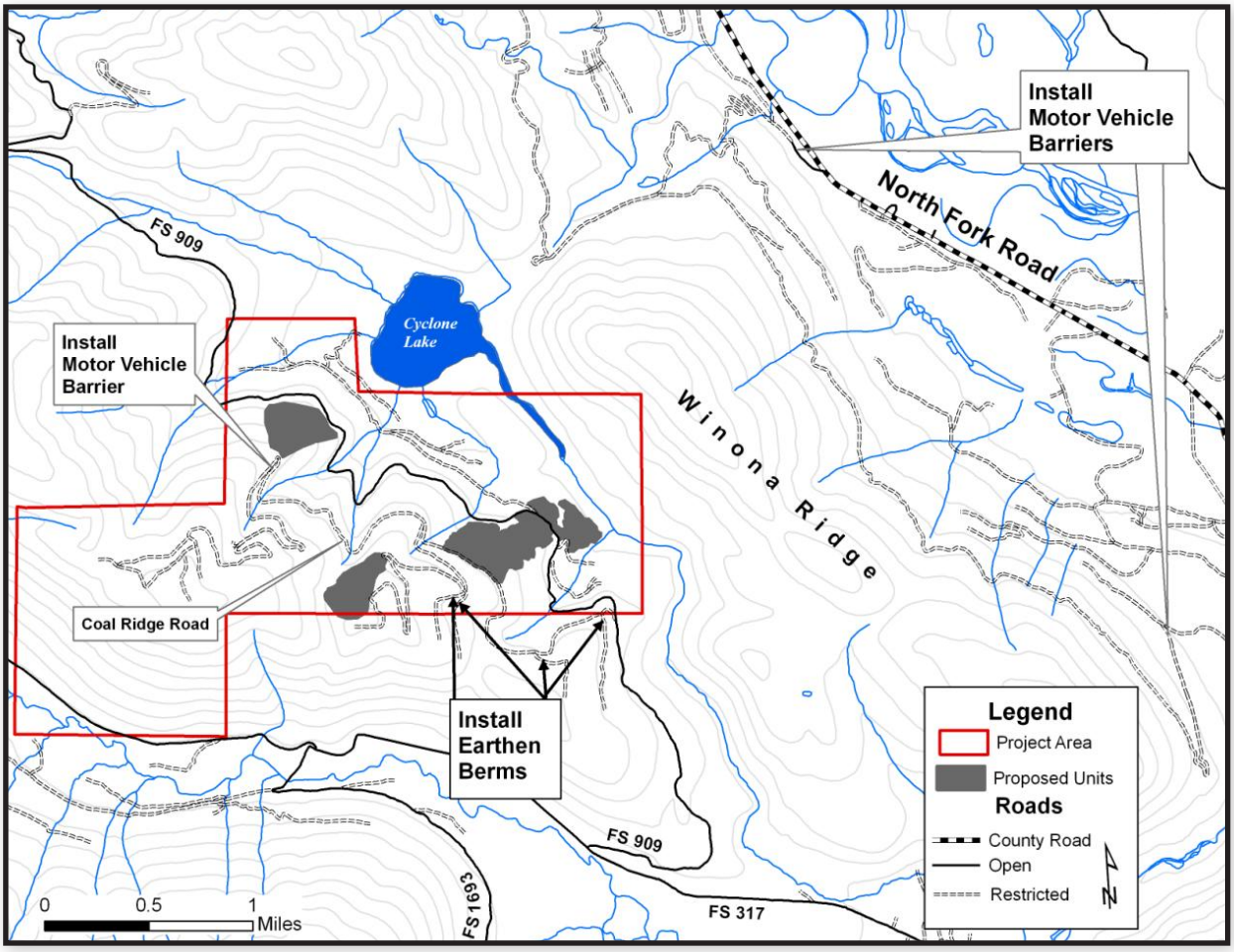
- All off-road equipment would be cleaned of noxious weeds prior to beginning project operations.

- Prompt vegetation seeding (with a native grass seed mix) of disturbed roadside sites would be required. Roads used and closed as part of this proposal would be reshaped and seeded.

- The DNRC would require that the purchaser of the timber sale would be responsible for weed spraying on restricted roads that would be used for log hauling in the project area.

- DNRC foresters would monitor the project area for weeds and strive to contain and suppress Category 2 weeds, such as orange hawkweed and tansy ragwort.

FIGURE II-2 – ROAD MAP



Old Growth and Timber Stand Structural Diversity

- The old-growth portion of Unit 2 would be harvested with an old-growth maintenance harvest treatment that combines elements of sanitation cutting with improvement cutting. The primary reason for entering Unit 2 is to remove shade-tolerant whitewoods that show signs of poor health and begin restoring the stand to its desired cover type. The attributes of an old-growth stand, such as maintaining multiple canopy levels, downed woody debris, ground cover, and species diversity would be retained.

- Existing old-growth stands, and those areas not proposed for harvesting in the Action Alternative, would have a longer growing period before they are potentially harvested with a regeneration treatment in the future. This, in turn, provides the DNRC the opportunity to manage some stands with longer rotation periods.

- Trees of all size classes would be retained; where openings are created, sites for new regeneration would be provided.

- Snags would be retained as directed in the Forest Management Rules and as described under *ALTERNATIVE DESCRIPTIONS* in this chapter.

- Certain portions of the harvest areas would be left uncut; these areas may include large healthy trees, snag patches, small healthy trees, rocky outcrops, SMZs, small wetlands, etc.

Watershed and Fisheries

- SMZs and Riparian Management Zones (RMZs) would be established along streams, lakes, and/or wetlands in, or adjacent to, the harvest areas.

- The new temporary road construction in units 2, 6 and 7 would be reclaimed to near-natural levels following timber-harvesting activities.

- All applicable Forestry Best Management Practices (BMPs), including the Streamside Management Zone Law and Rules, and Forest Management Administrative Rules, would be applied for fisheries, soils, and wetland riparian management zones *(ARMs 36.11.425 and 36.11.426)*.

- All road-stream crossings in the project area have been, and would continue to be, monitored for sedimentation and road-prism deterioration.

- The BMP audit process will continue. This project would likely be reviewed in an internal audit, and may be selected at random as a statewide audit site.

Wildlife

- Visual screening would be provided along open roads, where practicable.

- Timber-harvesting activities would not occur within 100 feet of all Class 1 steams. This would address and exceed those Forest Management Rules for fisher buffers and the RMZ and SMZ laws.

- Snags, snag recruits, and coarse woody debris would be managed according to *ARM 36.11.41*1 *through 36.11.414*, particularly favoring western larch and western white pine. Clumps of existing snags could be maintained, where they exist, to offset areas without sufficient snags.

- Contractors and purchasers conducting contract operations would be prohibited from carrying firearms while operating on restricted roads.

- Some forested corridors would be retained to maintain landscape connectivity and patches of dense vegetation, when possible, to provide security cover for wildlife.

- A DNRC biologist would be consulted if a threatened or endangered species is encountered in order to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species *(ARM 36.11.428 through 36.11.435)* are needed.

Alternative Descriptions

The No-Action and Action alternatives are described in this section. The decisionmaker may select a modification or combination of these alternatives.

No-Action Alternative

No timber harvesting, improvements to existing roads, or revenue generation for the School of Mines, State Reform School, Public Buildings, and School for the Deaf and Blind trusts would take place in the area of the Coal Ridge Timber Sale Project at this time. Salvage logging, firewood gathering, recreational use, fire suppression, noxious weed control, and other ongoing forest-improvement management activities may occur.

Nonpoint-source sediment delivery (sediment that cannot be traced back to a single origin or source) from roads within and accessing the project area that do not fully meet BMPs may occur.

Natural events, such as plant succession, tree mortality due to insect infestations and disease infections, wind throw, down fuel accumulation, in-growth of ladder fuels, and wildfires, would continue.

Future proposed management activities, including timber harvesting, Land Use License requests, and easements, would go through the appropriate environmental analyses before implementation.

This alternative can be used as a baseline for comparing the effects that the Action Alternative would have on the environment. The No-Action Alternative is considered a possible alternative for selection.

Action Alternative

The ID Team developed strategies for harvesting timber within the framework of the SFLMP and the Forest Management Rules. Opportunities for harvesting timber were identified based on current and desired timber-stand conditions. Proposed treatments were developed that would, in the long term, move the stand conditions toward desired age classes, species compositions, structures, and stocking densities. Proposed treatments would also maintain long-term site productivity, thereby ensuring the long-term capability of trust lands to produce revenue for the trusts.

The following sections describe the prescriptions as they relate to timber management, and are followed by the section titled, *ROADS AND ACCESS*.

Timber-Management Activities

Under this alternative, approximately 1.4 MMbf would be harvested from an estimated 150 acres using a combination of harvest treatments and both skyline and ground-based harvest systems. *FIGURE II-3 – COAL RIDGE PROPOSED PROJECT MAP* displays the proposed harvest locations, harvest treatments, and roads.

Several types of harvest treatments would be used to meet the described management objectives. A variation of silvicultural prescriptions across the landscape would emulate the effects of mixed-severity fires.

The preferred tree species for retention would be disease-free western white pine, western larch, and Douglas-fir. Western larch and blister rust resistant white pine seedlings would be planted in most units after harvesting has been completed.

For the regeneration prescriptions that specify "reserve trees", extra trees would remain individually or in clumps within the harvest unit. Reserve trees would include existing snags, extra seedtrees, vigorous trees of various age classes, and large seral trees that have a high potential to become future cavity-nesting sites. To provide for structural and species diversity, small clumps of younger trees may also be retained as reserve trees.

Where available, 2 snags and 2 live recruitment trees, 21 inches dbh or greater, per acre, would be left as wildlife trees. When 21-inch and greater trees are not available, the next size class trees would be left. In some harvest areas, the snags and recruitment trees may be left in groups or in special leave areas, such as SMZs. If 2 snags cannot be found, up to 4 live recruitment trees would be left.

In compliance with the Montana SMZ Law, limited selective harvesting of individual trees may occur in SMZs. Depending on an area's timber and hydrologic characteristics, harvesting in SMZs around springs and wetlands would be determined on a case-by-case basis.

In areas planned for regeneration, sapling-sized trees of low vigor that remain after the harvesting of sawlogs would be felled or cut. These trees and excess logging slash would be piled or trampled. On the units being piled or trampled, a maximum of 30 percent of the area would be disturbed with an excavator or dozer in order to create enough exposed soil to regenerate seedlings. Within those areas too steep for an excavator or dozer, site preparation would be achieved through broadcast burning. Units 2 and 6 would be broadcast burned. This is the fuels reduction and site preparation phase of forest-improvement practices.

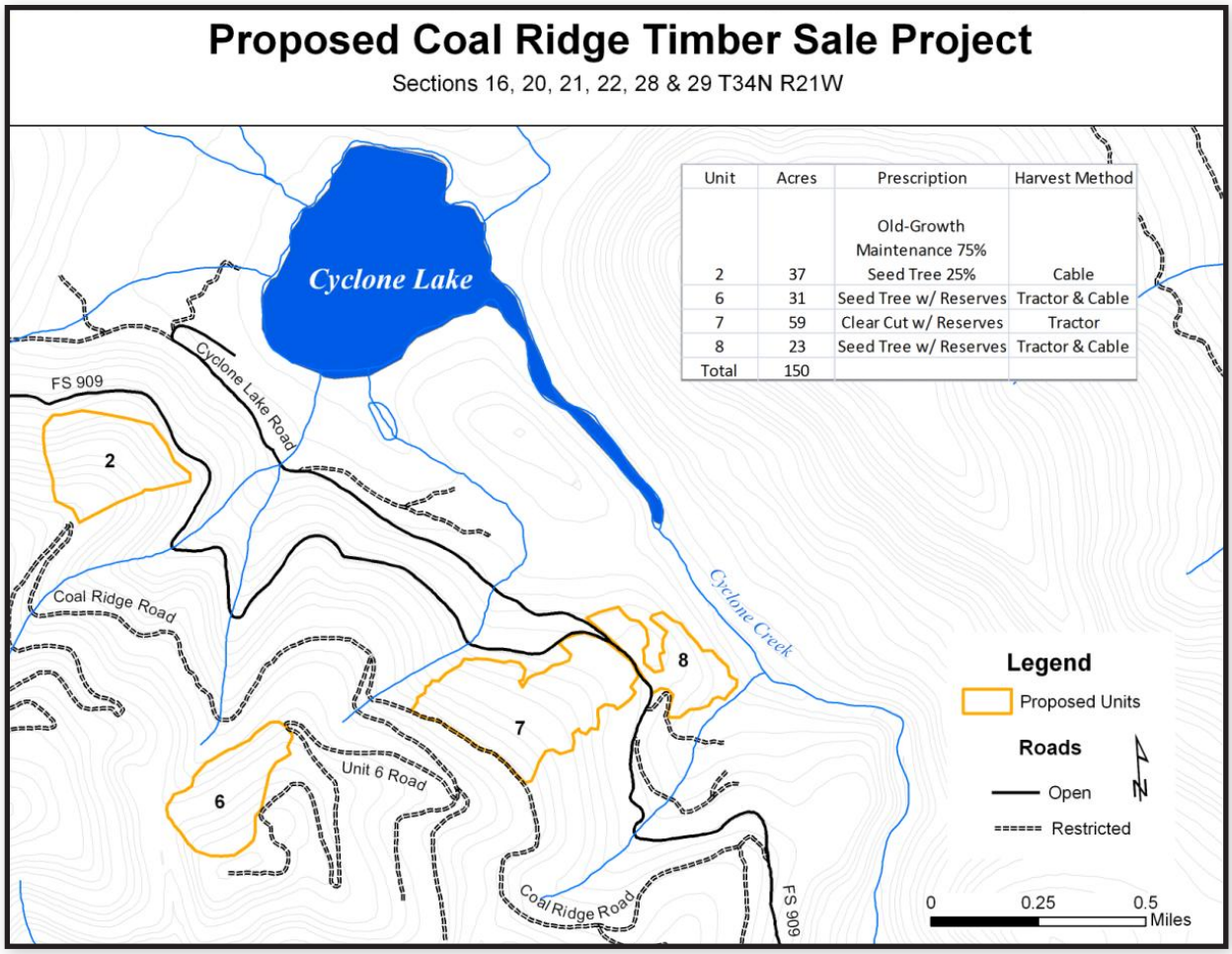
The proposed treatments would leave 8 to 15 tons of woody debris greater than 3 inches in diameter per acre. This debris would be spread across the harvest area to ensure that the Hazard Reduction Law *(76-13-401 through 76-13-424, MCA)* is met. Slash generated from the harvest may be collected or utilized as biomass. If not utilized in this way, the slash may be piled in either landing piles or smaller piles, and burned during periods when air-quality standards can be met.

TABLE II-2 – PROPOSED PRESCRIPTIONS FOR THE COAL RIDGE TIMBER SALE PROPOSAL displays the harvest areas and their associated harvest treatments and harvest systems.

Harvest Treatments

Seedtree with Reserves (63 acres): This treatment would regenerate portions of the unit by cutting all merchantable timber with the exception of 6 to 10 trees per acre of the larger-diameter western larch,

FIGURE II-3 – COAL RIDGE PROPOSED PROJECT MAP



Douglas-fir, and Engelmann spruce. The selected leave trees would show the most vigor, contain the healthiest crowns, and have the potential to produce healthy cone crops. Additional reserve trees, as noted above, would also be retained.

Old-growth maintenance (28 acres): Silvicultural treatments in old-growth stands would meet *ARM 36.11.418* and specifically Section c(ii). This would primarily be achieved through an intermediate harvest. This treatment would remove encroaching shade-tolerant species (subalpine fir and grand fir), and create small canopy gaps of generally less than one acre in size to promote regeneration of shade-intolerant species, in particular, western larch. The treatment would be designed to retain various old-growth attributes, including, as a minimum, the number of large live trees required per acre to be classified as old growth, snags, and coarse woody debris. This treatment would also enhance the growth, quality, vigor and composition of tree species within the stands being treated.

Clearcut with Reserves (59 acres): The removal, in a single cutting, of all merchantable trees in a stand. Clearcutting emulates components of conditions that are created by stand-replacement disturbances. Additional reserve trees would be retained.

Roads and Access

Some changes to the current transportation system and road management would occur with the

Transportation Plan design for this area. *FIGURE II-3 – COAL RIDGE PROPOSED PROJECT MAP and TABLE II-1 – ROADS* show an overall plan for roads, but several specific actions include:

- Coal Ridge Road and Unit 6 Spur road would be opened for roadwork and harvesting activities, as well as, administrative use related to the sale.
- Barriers to motor vehicles would be installed to fortify existing gate closures on both roads accessing state land on the north and south ends of Winona Ridge from the North Fork Road. The northern access would be closed in Section 11, T34N, R21W, and the southern access in Section 30, T34N, R20W, for the purpose of providing additional grizzly bear security habitat.
- A motor vehicle barrier would be installed past proposed Unit 2 on the Coal Ridge Road.

TABLE II-1 – ROADS displays the roads accessing this proposal, amount of road, standard of road, and a discussion about the road.

TABLE II-1 – ROADS

ROAD	ROAD LENGTH (miles)	STANDARD OF ROAD	ROAD STATUS	USE/TREATMENT
Big Creek Road USFS 316	.86	18 ft wide - gravel surface crown and ditch road.	Open	Maintenance and minor repair.
Coal Creek Road USFS 317	6.91	16 ft wide - gravel surface crown and ditch road.	Open	Maintenance and minor repair.
Cyclone Creek Road USFS 909	2.96	14 ft wide - native surface crown and ditch road.	Open	Maintenance and minor repair.
Coal Ridge Road	2.92	14 ft wide - native surface out-sloped road.	Restricted year-round	Maintenance and minor repair.
Unit 6 Spur Road	1.75	14 ft wide - native surface out-sloped road.	Restricted year-round	Maintenance and minor repair.

TABLE II-2 - PROPOSED PRESCRIPTIONS FOR THE COAL RIDGE TIMBER SALE PROPOSAL

PROPOSED HARVEST AREA	HARVEST TREATMENT	TOTAL ACRES HARVESTED/ ESTIMATED VOLUME (Mbf)	HARVEST PARTICULARS	FOLLOW-UP TREATMENTS
2	25% Seedtree, with reserves in areas not meeting old-growth classification, and an old-growth maintenance treatment in areas meeting old growth classification. (75%)	11/ 200 Mbf 25/300 Mbf	– Utilize a seed tree and old-growth maintenance harvest prescription, favoring western larch and Douglas-fir. – Leave 6-8 TPA in the seed tree treatment areas.	– Prescribed fire, depending on budget, personnel and weather restrictions. – Backup Plan includes pile and burn slash. – Mechanically site-prep.
6	Seedtree with Reserves.	31/350 Mbf	– Utilize a harvest prescription of seedtree with reserves; favoring western white pine, western larch and Douglas-fir. – Leave 6-8 TPA. – Combination cable yarding and ground based.	– Pile and burn slash. – Mechanically site-prep. – Plant with western white pine.
7	Clearcut with Reserves.	58/500 Mbf	– Utilize a harvest prescription of, clear cut with reserves; favoring western white pine, western larch and Douglas-fir for the reserve trees. – Tractor log.	– Pile and burn slash. – Mechanically site-prep. – Plant with western white pine and western larch.
8	Seedtree with reserves.	23/300 Mbf	– Utilize a harvest prescription of seedtree with reserves; favoring western white pine, western larch and Douglas-fir. – Leave 6-8 TPA. – Combination cable yarding and ground based.	– Pile and burn slash. – Mechanically site-prep open areas. – Plant with western white pine and western larch within the seedtree portion of unit, scalp and interplant western white pine within openings of the intermediate treatments.

TABLE II-3 SUMMARY OF ENVIRONMENTAL EFFECTS

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION		
COVER TYPE AND AGE CLASS	*No-Action Alternative*	
	In the short-term, no changes would be expected.	Other timber sale forest-management actions would increase the amount of western white pine and western larch/Douglas-fir cover types by reducing the mixed-conifer, subalpine fir, and lodgepole pine cover types. Other forest-management actions would increase the amount of area in the 0-to-39 year age class by decreasing the percentage of area in the other age classes.
	Action Alternative	
	Approximately 68 acres would be converted from a subalpine fir cover type to the western larch/ Douglas-fir cover type. In 82 acres of western white pine cover type, the cover type would not change. Of the 150 acres proposed to be harvested, there would be a change in age class from 150+ to 0-39 years on 58 acres. On the remaining 92 acres, no notable change in age class would occur due to the amount of older-aged trees that would be retained and DNRC's SLI methodologies used in determining age class.	The cumulative effects would be the same as under the cumulative effects of the No-Action Alternative.
OLD GROWTH	*No-Action Alternative*	
	In the short-term, no changes would be expected.	No changes to the amount of old-growth would be expected.
	Action Alternative	
	Twenty eight acres of old growth would be treated with a maintenance harvest which would maintain the stands as old growth, as defined by DNRC.	Old-growth acres would be maintained at 12,646 acres; the amount of old growth on Stillwater Unit would remain at 10.8 percent.
INSECTS AND DISEASES	*No-Action Alternative*	
	Mortality would likely continue causing loss of timber volume and value.	The current trend in mortality, infection, and infestation levels in mature stands throughout the Stillwater Unit would continue. Increases in insect infestations and disease could be expected in mature timber stands that are more densely stocked, lower in vigor, and contain increased levels of blown-down timber.
	Action Alternative	
	Mortality from some insects and diseases that are currently active in the project area would likely continue, but the amount would decrease as: a) older, decadent components of the timber stands are harvested and eventually replaced with young vigorous trees; b) tree species susceptible to current insect and disease infestations are reduced; and, c) species with greater resistance to disease are regenerated.	Salvage harvesting would reduce losses caused by insects and diseases. This project would create forest stands that are more resilient to the impacts of insects and disease and are more in-line with desired forest conditions.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
FOREST FUELS	*No-Action Alternative*	
	In the short term, stands would retain current density, fuel load, and ladder fuels until disturbance, occurs. Risk of torching and crown fires would remain high. Over time, increased fuel loading would be expected to increase the risk and intensity of fires.	With the present levels of shade-tolerant species and down woody debris, and due to the difficult terrain and limited access, a wildfire would be difficult to suppress and a stand-replacement fire would likely occur.
	Action Alternative	
	The existing overstory would be thinned and fuel loads and ladder fuels would be reduced. In the event of a wildfire, a resulting decrease in fire intensity within harvest areas would help wildfire initial-attack suppression efforts.	Due to the location of the harvest units, the reduction in fuel loads and the amount of canopy, the potential for high-intensity wildfires would be reduced.
NOXIOUS WEEDS	*No-Action Alternative*	
	The risk of additional establishments of weed populations would not increase. Established infestations of noxious weeds are being addressed with an ongoing program of site-specific herbicide spraying on open roads. Approximately 5 miles of the Coal Ridge Road and the spur leading to Unit 6 would not be treated due to the current restriction on motorized use behind the berm, and the noxious weeds present in those areas would be expected to spread.	Open roads in the project area would continue to have dispersed traffic from recreation and other timber-management activities, thus increasing exposure for weed establishment. Monitoring would continue as DNRC personnel travel in the project area.
	Action Alternative	
	Mechanized equipment and ground disturbance could increase or introduce noxious weeds along roads and throughout forested areas. Approximately 5 miles of the Coal Ridge Road and the spur leading to Unit 6 would be treated with herbicide over multiple consecutive years within the time frame of the project. Successive herbicide applications could eliminate current noxious weed populations along these roads and possibly prevent further spread. FI money would be collected the sale to help the weed-spraying program and site-specific weed spraying would continue.	Cumulative effects would be the same as under cumulative effects of the No-Action Alternative.
WATERSHED, HYDROLOGY, AND FISHERIES RESOURCES		
SEDIMENT DELIVERY AND WATER YIELD	*No-Action Alternative*	
	Sediment from existing sources would continue. No increase in water yield would occur.	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 dictate. No cumulative effects on water yield are expected.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SEDIMENT DELIVERY AND WATER YIELD	*Action Alternative*	
	With this alternative, erosion control and the implementation of BMPs would be improved on up to 15.4 miles of existing road (9.4 miles in the Cyclone Creek drainage). This work would reduce the estimated sediment load to Cyclone Creek by approximately 0.65 tons of sediment per year. This represents an approximate 33% reduction in sediment from the current estimates. The risk of long-term adverse effects to water quality or beneficial uses would be low because the increase in water yield is below threshold values and BMPs would be conducted on the project area, thereby limiting the amount of sediment. In-channel sources of sediment would be expected to continue contributing sediment at the current rate. The annual water yield in the Cyclone Creek watershed would increase by an estimated 0.6 percent over the current level. This level of water-yield increase would produce a low risk of creating unstable channels in any of the project-area streams. Peak flow volume and duration may be elevated, and the timing of peak flows may be slightly earlier as a result of the proposed harvest activities. These changes have a low risk of low impacts to the stream channels in the Cyclone Creek watershed.	Sediment generated from the exposure of bare soil would increase the risk of sediment loading in the short term. These increases would not exceed any State water-quality laws. In the long term, the cumulative effects to sediment delivery would be a reduction from approximately 1.977 tons of sediment per year to approximately 1.328 tons of sediment per year in Cyclone Creek. This project would have an overall low risk of adverse cumulative impacts to sediment yield in project-area watersheds and presents a low risk to adversely affect downstream beneficial uses. The annual water-yield would increase from 5.1% to 5.7% and would remain below the thresholds of concern. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in Cyclone Creek or its tributaries.
FISHERIES	*No-Action Alternative*	
	No additional direct or indirect effects to fisheries resources would occur.	The existing levels of road sedimentation and WYI may consequently affect the fisheries resources of both channel forms and stream temperature, although these potential existing impacts are likely to be very low.
	Action Alternative	
	The decrease in sediment delivery is expected to be a positive impact to channel forms and stream temperature. The net direct and indirect effect to fisheries resources is expected to be slightly positive, which is primarily due to the anticipated reductions in sediment delivery.	Compared to the No-Action Alternative a slightly positive cumulative effect is also expected.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SOIL RESOURCES		
	No-Action Alternative	
	No direct or indirect effects to the physical properties of soils in the project area would be expected. Skid trails from previous timber harvesting activity would continue to recover.	No adverse cumulative effects would result.
	Action Alternative	
	These activities would leave approximately 14.6 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the SFLMP, and well within the 20-percent impacted area established as a level of concern in the SFLMP *(DNRC 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts.	Cumulative effects would be controlled through implementation of BMPs, skid-trail planning on tractor units, and limiting operations to dry or frozen conditions. Due to mitigation measures and the limited area of re-entry, the cumulative effects from compaction, erosion, and displacement would be low.
ECONOMICS		
	No-Action Alternative	
	Trust revenue from the project area would not be realized at this time.	No change to the area's economy would be expected, provided a local mill purchases a substituted amount of timber from another location. The deferral of harvesting timber may change the region from which the trees are harvested, which would impact another area of the State.
	Action Alternative	
	An estimated $ 83,146 in project revenue would be deposited into the trust accounts for the School of Mines, State Reform School, Public Buildings, and School for the Deaf and Blind, approximately $ 54,740 would be contributed into the FI account, and approximately $42,000 would be invested in the maintenance of DNRC's transportation system. This sale would provide work for approximately 14 positions.	This alternative is part of the sustainable yield that contributes a relatively stable supply of state trust land timber for the regional market and, therefore, has an effect on the preservation of economic viability in Montana's timber resources. The net revenue of this sale would add to trust funds for the School of Mines, State Reform School, Public Buildings, and School for the Deaf and Blind, to offset tax dollars used to fund education.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE		
FORESTED HABITATS AND CONNECTIVITY	*No-Action Alternative*	
	No changes in wildlife use would be expected. The forest would continue to age and conditions would move toward shade-tolerant tree species with high amounts of canopy cover.	Continued use would be expected by wildlife species that favor dense stands of shade-tolerant tree species, and by wildlife species that require larger areas of mature forests.
	Action Alternative	
	Approximately 125 acres of mature, forested habitats would receive a regeneration-type treatment, which would reduce habitat for species relying on mature, closed-canopied forested habitats. Moderate changes to landscape connectivity would occur with the removal of 1 of the 3 connectivity corridors in the project area, and some changes to wildlife use would be expected.	Reductions in mature forested habitats associated with this alternative would be additive to losses associated with other harvesting activities. Moderate adverse effects would be expected since: 1) harvesting would further reduce the amount of mature forested cover; 2) landscape connectivity would be diminished; and, 3) some changes to wildlife use would be expected.
SNAGS AND COARSE WOODY DEBRIS	*No-Action Alternative*	
	Negligible effects would be anticipated because no harvesting would alter present or future concentrations of snags or coarse woody debris, and no changes to access for firewood gathering would occur.	Snags and snag recruits have been retained with recent harvesting across Coal Creek State Forest. Wildlife species relying on snags and coarse woody debris would be expected to persist across the analysis area.
	Action Alternative	
	Minor adverse effects are anticipated because harvesting would reduce snags, recruitment trees and coarse woody debris, and no changes to access for firewood gathering would occur.	Minor adverse effects would be anticipated because harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris, no changes would occur in public access for firewood gathering, and the representation of shade-intolerant tree species would slightly increase.
GRAY WOLF	*No-Action Alternative*	
	No effects would be expected because there would be no change in human disturbance levels, nor any changes to big game winter ranges.	No effects would be expected because there would be no change in human disturbance levels, nor any changes to big game winter ranges.
	Action Alternative	
	Negligible direct and indirect effects would be expected to affect gray wolves in the project area since: 1) minor short-term increases and negligible long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and, 2) no changes to white-tailed deer, mule deer, or elk winter ranges would occur.	Negligible effects are expected since: 1) negligible short-term and long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and, 2) no changes to white-tailed deer, mule deer, or elk winter range would occur.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
GRIZZLY BEAR	*No-Action Alternative*	
	No direct effects to grizzly bears would be expected. No changes in road densities, hiding cover, or security core would be anticipated.	No further adverse cumulative effects would be expected to affect grizzly bears because of the following factors: 1) no changes in human disturbance levels would be expected; 2) no further losses of hiding cover would occur; 3) no changes to security habitats would be anticipated; and, 4) no changes to open-road densities would occur.
	Action Alternative	
	Minor adverse direct or indirect effects to grizzly bears in the local area would be expected since: 1) minor to moderate levels of disturbance and displacement would be anticipated; 2) hiding cover on 150 acres would be lost in the short-term, but would be expected to recover fairly rapidly; 3) security habitats would be reduced; and, 4) short-term increases in open-road densities would be anticipated, but no changes to long-term open-road densities would occur.	Minor adverse cumulative effects to grizzly bears would be expected in the short-term due to the following factors: 1) Minor increases in human-disturbance levels would be expected. 2) Hiding cover would be reduced in the short-term on a relatively small portion of each of the cumulative-effects analysis areas, but would be expected to recover fairly rapidly. 3) Slight increases in security habitats would be expected. 4) No changes in long-term open-road densities would be anticipated.
CANADA LYNX	*No-Action Alternative*	
	Negligible adverse effects to lynx habitats would be expected to occur due to the following factors: 1) adequate denning habitats would persist; 2) sufficient mature foraging habitats would exist; 3) longer-term availability of young foraging habitats would likely decline without disturbance; 4) The amount of temporary non-lynx habitats would not increase, but would continue to represent a rather sizeable portion of the habitats present; and, 5) Landscape connectivity would not be altered.	Negligible adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative-effects analysis area due to the following factors: 1) adequate denning habitats would persist; 2) sufficient mature foraging habitats would exist; 3) young foraging habitats would continue developing in the near-term; 4) longer-term availability of young foraging habitats would likely decline without disturbance; 5) no changes in the amount of the cumulative-effects analysis area that is in the temporary non-lynx habitat class would occur; and, 6) landscape connectivity would not be altered.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
CANADA LYNX	*Action Alternative*	
	Minor to moderate adverse direct and indirect effects to lynx habitats would be expected in the project area since: 1) adequate denning habitats would persist; 2) sufficient mature foraging would exist; 3) young foraging habitats would continue developing in the next 20 to 50 years in the project area; 4) moderate amounts of the project area (~25 percent) would be in the temporary non-lynx habitat category, meaning most of the lynx habitats would be in a usable state for lynx; and, 5) moderate reductions in landscape connectivity could alter lynx movements through the project area.	Minor to moderate adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative-effects analysis area since: 1) adequate denning habitats would persist in the cumulative-effects analysis area; 2) sufficient mature foraging habitats would exist in the cumulative-effects analysis area; 3) young foraging habitats would continue developing for the next 20 to 50 years across the cumulative-effects analysis area; 4) moderate to high amounts of lynx habitats would be in the temporary non-lynx habitat category (roughly 36 percent), meaning a large portion of the lynx habitats would be in a usable state for lynx; and, 5) moderate reductions in landscape connectivity would occur, particularly adjacent to the Moose Fire perimeter where landscape connectivity has already been compromised.
BALD EAGLE	*No-Action Alternative*	
	No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels. No changes in available nesting habitats would occur.	No cumulative effects to bald eagles would be expected since: 1) no changes to human disturbance levels would occur; and, 2) no changes in the availability of large, emergent trees would be expected.
	Action Alternative	
	Minor direct and indirect effects to bald eagles would be expected since: 1) disturbance would be elevated within the territory during operations; 2) no appreciable change in human access within the project area would occur; and, 3) negligible changes in the availability of large, emergent trees would be expected.	Minor cumulative effects are expected since: 1) disturbance would be elevated within the territory during operations; 2) no appreciable change in human access within the territory would occur; and, 3) negligible changes in the availability of large, emergent trees would be expected.
FISHER	*No-Action Alternative*	
	No effects to fishers would be expected.	No additional effects would be anticipated.
	Action Alternative	
	Minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area since: 1) harvesting would avoid riparian areas; 2) harvesting would reduce or remove upland fisher habitats; 3) moderate reductions in landscape connectivity would occur, but those areas associated with riparian areas would remain unaffected; 4) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; however, some of these resources would be retained; and, 5) no appreciable changes in motorized human-access levels would be anticipated.	Minor adverse cumulative effects would be anticipated that would affect fisher in the cumulative-effects analysis area since: 1) harvesting would remove upland fisher habitats, but considerable upland habitats would persist; 2) moderate reductions in landscape connectivity would be anticipated, but connectivity in riparian areas would not be altered; 3) harvesting in a relatively small portion of the cumulative-effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and, 4) no appreciable changes to motorized human access would occur.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
PILEATED WOODPECKER	*No-Action Alternative*	
	Negligible adverse effects to pileated woodpeckers in the project area would be expected since: 1) no further harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and, 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.	Negligible effects are expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and, 3) long-term, succession-related changes in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.
	Action Alternative	
	Minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous-forested habitats available; 2) no potential nesting habitats would be removed and a small amount of potential nesting habitat would be modified while potential foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included, and, 4) harvest prescriptions would promote seral species in the proposed harvest areas.	Minor adverse cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative-effects analysis area since: 1) harvesting would reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but forested habitats would persist; 2) potential nesting and foraging habitats would be reduced, but habitats would persist in the cumulative-effects analysis area; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in several of the harvest areas; and, 4) harvest prescriptions would promote seral species in the proposed harvest areas.
ELK SECURITY HABITAT	*No-Action Alternative*	
	No adverse effects would be expected due to the following factors: 1) no changes in existing elk security habitats would be anticipated and continued maturation of forest cover would improve elk security habitats; 2) the level of human access would remain similar; and, 3) no appreciable changes to big game survival would be anticipated.	Minor positive effects would be anticipated due to the following factors: 1) no changes in open roads, motorized access, or human access would be anticipated; 2) no further reductions in elk security habitat would occur; and, 3) modest levels of security habitat and hiding cover would persist.
	Action Alternative	
	Minor adverse effects would be anticipated due to the following factors: 1) no changes in open roads or motorized access for the general public would be anticipated, therefore access by hunters would not be expected to increase; 2) minor increases in non-motorized access could increase hunter access; 3) negligible elk security habitats would be affected; and, 4) negligible changes in big game survival would be anticipated.	Minor adverse cumulative effects to elk security would be anticipated that would affect elk using the cumulative-effects analysis area since: 1) no changes in open roads or motorized access for the general public would be expected; 2) changes to nonmotorized access would be minor; 3) negligible amounts of elk security habitat would be altered; and, 4) some security habitat and hiding cover would persist in the cumulative-effects analysis area.

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Environmental Assessment

CHAPTER III
Existing Conditions and Environmental Effects

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Chapter III – Existing Conditions and Environmental Effects

Introduction

This chapter presents both the existing environment of the project, and the potential consequences to that environment that may occur as a result of implementing the Action Alternative presented in *CHAPTER II - ALTERNATIVES*. Discussions of environmental consequences form the scientific and analytical basis for comparing the alternatives. The means by which potential adverse effects would be reduced or mitigated are also described *(see MITIGATION MEASURES APPLIED DURING PROJECT DESIGN in CHAPTER II – ALTERNATIVES and APPENDIX A – STIPULATIONS AND SPECIFICATIONS).* The proposed Action Alternative is limited to the specific timber harvest and the fuel treatments, reforestation activities, and roadwork in the Coal Ridge Timber Sale Project Area–although some components are analyzed across the landscape of Stillwater Unit.

The analysis of effects disclosed in this document includes those occurring from the entire 'scope' of the decision. Scope is defined as the range of actions, alternatives, and impacts to be considered in an environmental review. The discussions of resources and potential effects take advantage of existing information included in the Stand-level Inventory (SLI) and other project documents. The project files for the Coal Ridge Timber Sale Project encompass additional project-specific information, including resource reports and the results of field investigations.

Direct, Indirect, and Cumulative Effects

Direct effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time, or are spatially removed from the activity but would be considerable in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of the agency or person that undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant actions that take place over a period of time.

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Vegetation Analysis

Introduction

This section describes conditions of the existing vegetation on Stillwater Unit (STW) and Coal Creek State Forest as a whole, and in the project area specifically. It also describes how the No-Action and Action alternatives would affect the various components of this resource. A number of vegetation parameters could be affected by implementation of the alternatives; therefore, each will be analyzed. Forest cover types, age-class distributions and the amounts, distribution, and attributes of old growth will be discussed at the landscape and stand levels to facilitate the analysis of direct, indirect, and cumulative effects. Forest fuels, fire regimes, insects, diseases, and noxious weed conditions will be discussed at the project-area level. Past, present, and reasonably foreseeable activities are identified and considered in the analysis of cumulative effects.

Analysis Methods

The Forest Management Rules direct DNRC to promote biodiversity by taking a coarse-filter approach that favors an appropriate mix of stand structures and composition on state lands *(ARM 36.11.404)*. Static ecological parameters, including land type, climatic section, habitat type, disturbance regime, and other unique characteristics each influence the forest communities that occur in a given area and provide a basis for determining and managing for appropriate structures and composition. Dynamic characteristics of forest communities, such as species composition, age class distribution, cover type, and stand structure reflect the ecological parameters influencing a site and describe the resulting biodiversity in an area. The described effects of an action on these characteristics explain the contribution of the action toward promoting biodiversity.

To assess the existing condition of the Stillwater Unit, project area, and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, Stand Level Inventory (SLI) data, and consultations with other professionals provided information for the analysis.

The current cover type distribution was compared to DNRC's desired future conditions. The Stillwater (STW) SLI, specifically *STW SLI_2009*, was used to describe current cover types. DNRC's desired future conditions refer to the cover type which the DNRC attempts to manage toward in a forest stand. Desired future conditions are determined according to the model described in *ARM 36.11.405*. DNRC's desired future conditions have been delineated in the Forest Management Bureau's Desired Future Condition DATASET. This information is available at the Stillwater Unit office in Olney. The *STW SLI_2009* was used to address the cumulative effects on cover type and age class distributions.

Historic age class distributions described by *Losensky (1997)* for climatic section M333C, which represents Upper Flathead Valley, were compared to the current age class distribution on Stillwater Unit. STW SLI_2009 was used for this analysis.

The old-growth amounts and distribution for the Stillwater Unit will utilize the old-growth acres found through *STW SLI_2009* and during field verification in the Duck-to-Dog, Olney Interface, Jim Beaver, NE Smith Lake, Beaver Smith, Chicken/Antice, SE Stryker, Swedish Chicken timber sales, and this proposed project.

Analysis Areas

Montana DNRC Stillwater Unit administers Stillwater State Forest, Coal Creek State Forest, most of the scattered lands north of Coal Creek State Forest in Flathead County and the northeastern portion of Lincoln County.

The analysis area for direct, indirect, and cumulative effects for cover types, age classes, and the amount and distribution of old growth is the Stillwater Unit.

The assessment of direct and indirect effects to old-growth attributes, insect and disease conditions, forest fuels and noxious weeds were conducted on Coal Creek State Forest. The cumulative effects analysis area (CEAA) for insects and disease is based on the Stillwater Unit.

Cover Types And Age Classes

Existing Condition

Cover type refers to the dominant tree species that currently occupy a forested area. *TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVER TYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)* shows the percentage of the current cover types and the percentages of cover types for the desired future condition.

Data indicates, as illustrated by *TABLE III-1 - THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVER TYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)*, that mixed-conifer and subalpine fir stands are currently over-represented when compared to DNRC's desired future conditions. Many of the species that make up the mixed-conifer and subalpine cover types are shade tolerant, and stand structure tends to be multistoried. The multistoried structure has resulted, in part, from the in-growth of shade-tolerant trees over time. Therefore, the component of shade-tolerant species increases as the interval between disturbances such as wildfires or timber harvests is lengthened.

The western larch/Douglas-fir and western white pine cover types are currently under-represented on the Stillwater Unit when compared to the desired future condition cover type distribution. Western larch and western white pine are not shade tolerant and historically have been perpetuated through fairly intensive disturbances such as wildfires. These

TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVER TYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)

COVER TYPE	CURRENT (PERCENT)	DESIRED FUTURE CONDITION COVER TYPE (PERCENT)
Douglas-fir	3.5	1.4
Subalpine fir	27.0	16.3
Lodgepole pine	11.0	9.9
Ponderosa pine	0.8	1.7
Mixed conifer	25.9	6.5
Western larch/Douglas-fir	24.7	47.4
Western white pine	2.5	14.8
Hardwoods	3.0	3.1
Area that does not have a cover type designated in the SLI*	4.3	

**A major portion of those stands not inventoried with a cover type are stands that were involved in the stand-replacement fires of the Moose Fire of 2001; at the time of data collection in 2001 and 2002, these areas were nonstocked. Since the fire and salvage harvest, reconnaissance shows that many areas are regenerating to the early successional cover types of primarily lodgepole pine or western larch/Douglas-fir.*

disturbances have most often created single and two-storied stands primarily comprised of western larch and Douglas-fir overstories, and western larch, western white pine, and Douglas-fir understories. While western larch is not shade tolerant, past silvicultural treatments have promoted multistoried western larch/Douglas-fir stands with numerous age classes represented in small groups of trees within larger stands. Over several decades, white pine blister rust infection has drastically affected the western white pine cover type by substantially reducing the number of healthy western white pine that occupies the canopy as overstory dominants.

Age-class distributions delineate another important characteristic that is used for determining trends on a landscape level. Comparing the entire Stillwater Unit's administrative area with historical data for the Upper Flathead Valley climatic section *(Losensky [1997], TABLE III-2 – DISTRIBUTION OF AGE CLASSES* shows that Stillwater Unit currently has proportionately less area of 0-to-39-year (seedling/sapling stands) and 100-to-150 year age classes, and higher proportions of areas of 40-to-99 year and greater-than-150 year age classes. DNRC's Forest Management Rules reflect the ecological principle that age-class distributions are not static and are dependent upon disturbances, regardless of whether those disturbances are natural or implemented by man through silvicultural practices.

A fairly clear picture emerges of the forest conditions when distributions are combined with information on cover types as displayed in *TABLE III-3 – AGE-CLASS DISTRIBUTION OF CURRENT COVER TYPES ON STILLWATER UNIT.*

TABLE III-2 – DISTRIBUTION OF AGE CLASSES

AGE CLASS	HISTORIC PERCENT IN CLIMATIC SECTION M333C	HISTORIC ESTIMATES OF PERCENT ON STILLWATER UNIT	CURRENT PERCENT
0-to-39-year	36	22.8	13.6
40-to-99-year	12	17.9	22.8
100-to-150-year	22	24.7	13.8
150+-year	29	32.8	45.8
No age provided in SLI*			3.9
**A major portion of these stands were partially burned in the Moose Fire of 2001; SLI updates in 2001 and 2002 could not discern which age class to assign these stands.*			

TABLE III-3 - AGE-CLASS DISTRIBUTION OF CURRENT COVER TYPES ON STILLWATER UNIT

CURRENT COVER TYPE	AGE CLASS					
	0 TO 39 YEARS	40 TO 99 YEARS	100 TO 149 YEARS	150 YEARS AND OLDER	NO AGE DATA	TOTAL ACRES
	NUMBER OF ACRES					
Douglas-fir	94	420	577	2,349	666	4,106
Hardwoods	100	122	68	64	0	354
Lodgepole pine	2,713	8,578	318	407	973	12,989
Mixed conifer	3,474	6,666	4,523	15,478	375	30,516
Ponderosa pine	170	0	531	192	0	893
Subalpine fir	3,992	6,514	4,112	16,735	376	31,729
Western larch/ Douglas-fir	522	4,247	6,198	16,105	2,076	29,147
Western white pine	360	198	325	2,019	0	2,902
Nonstocked	4,939	0	0	0	0	4,939
TOTAL ACRES (total percent)	16,364 (13.6)	26,745 (22.8)	16,652 (13.8)	53,349 (45.8)	4,466 (3.9)	117,578

As was noted in *TABLE III-2 - DISTRIBUTION OF AGE CLASSES*, current age-class distributions are predominately in the oldest age class. The stand structure of the older age classes tend to be multistoried; this occurs when a stand has progressed through time and succession to the point that shade-tolerant species, such as grand fir, Engelmann spruce, and subalpine fir, are replacing a shade-intolerant overstory, such as western larch.

Environmental Effects to Cover Types and Age Classes

Direct and Indirect Effects of the No-Action Alternative to Cover Types and Age Classes

Neither cover types nor age-class distributions in the analysis area would be directly or indirectly affected. Over time, lacking substantial disturbances such as timber harvests or wildfires, the proportion of seedling/sapling-sized stands would gradually decrease.

Direct and Indirect Effects of the Action Alternative to Cover Types and Age Classes

Following harvesting and regeneration within those areas where treatment is proposed, approximately 68 acres would be converted from a subalpine fir cover type to the western larch/Douglas-fir cover type. In the 82 acres of western white pine cover type, the cover type would not change. Most of these treatments would result in 2-storied stands following regeneration. The overall trend with the Action Alternative would be to slowly move the stands towards the desired cover type of western white pine through the planting of rust-resistant seedlings within proposed harvest units, and to increase the representation of western larch/Douglas-fir cover type.

Of the 150 acres proposed to be harvested, there would be a change in age class from 150+ to 0-39 years on 58 acres. On the remaining 92 acres, no notable change in age class would occur due to the amount of older-aged trees being retained and

DNRC's SLI methodologies used in determining age class. Based on SLI methodologies, when the sawtimber component of a stand has greater than 10-percent canopy coverage, the stand will be evaluated and classified with the age class of the sawtimber component; therefore, not all areas of seedtree or old-growth maintenance harvests would change to the 0-to-39 year age class.

Cumulative Effects of the Action and No-Action Alternatives to Cover Types and Age Classes

The cumulative effects of timber-stand management on the Stillwater Unit trend toward increasing seral cover types in areas where recent forest-management activities have taken place.

In addition to the changes in cover type distributions from the no-action or action alternatives, the stands involved in the stand-replacement fires of the 2001 Moose Fire were inventoried in 2009-2010 but have not yet been compiled. The timber sale projects that have been designed or sold since the STW 2006 SLI show an increasing trend in the amount of the western larch/Douglas-fir cover type over the analysis area and, subsequently, reduce the amount of area in the mixed-conifer and subalpine fir cover types. Stillwater Unit has a precommercial thinning program that often favors the retention of western larch and western white pine saplings; in some cases this changes a mixed-conifer cover type to a western larch or western white pine cover type.

As a result of implementing either alternative, as well as, from past projects implemented since 2006, the overall trend across the Stillwater Unit is a gradual transition of more stands being represented by western larch/Douglas-fir and western white pine cover types.

A minor increase in the amount of the 0-to-39-year age class has occurred; the minor amount is due to SLI methodologies for calculating age class as described in the *DIRECT AND INDIRECT EFFECTS TO COVER TYPES AND AGE CLASSES.*

Old Growth

Existing Condition

DNRC uses the minimum criteria described by *Green et al. (Old-Growth Forest Types of the Northern Region, 1992)* to determine old-growth stands on state lands. Green et al described characteristics of old-growth forests in Montana and provided minimum amounts of trees per acre of a given diameter at breast height (dbh) and age for each old-growth type. DNRC classifies stands that meet or exceed those minimums as old-growth. For this analysis, existing conditions and effects on old growth are presented according to this definition.

Based on SLI data and field surveys across Stillwater Unit (including Coal Creek State Forest), approximately 10.8 percent (12,646 acres) of the Stillwater State Forest analysis area can be classified as old growth.

TABLE III-4 - OLD-GROWTH ACRES BY COVER TYPE ON STILLWATER STATE FOREST displays old growth by forest cover type. Cover type is related to habitat type, habitat-type groups, and successional stages. Subalpine fir and mixed conifer are the dominant old-growth cover types on Stillwater Unit.

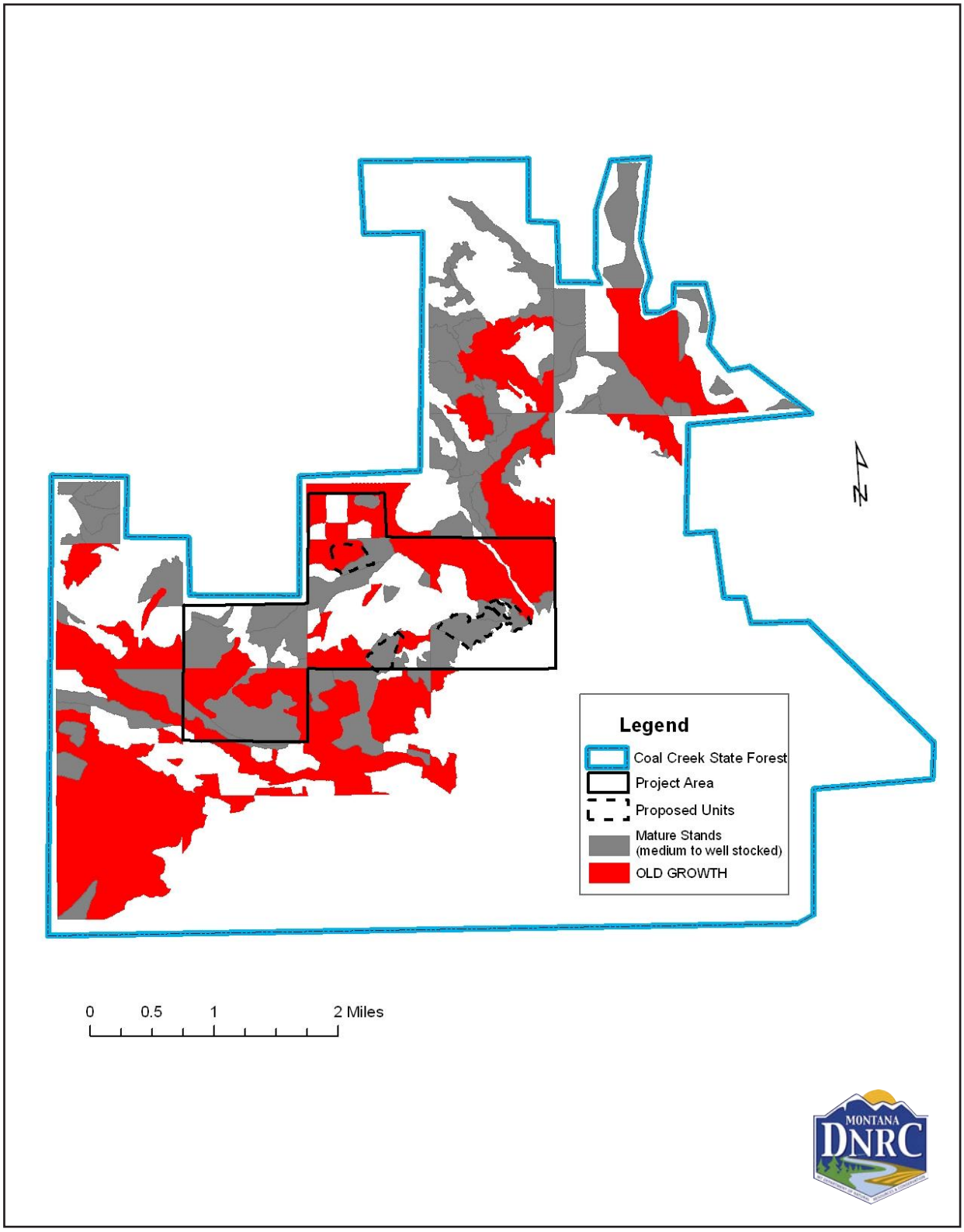
FIGURE III - 1 – OLD GROWTH AND MATURE STANDS IN THE COAL RIDGE PROJECT AREA shows the old-growth and mature stands in the Coal Creek State Forest and proposed project area

TABLE III-4 - OLD-GROWTH ACRES BY COVER TYPE ON STILLWATER STATE FOREST *

PONDEROSA PINE	DOUGLAS-FIR	LODGEPOLE PINE	MIXED CONIFER	SUBALPINE FIR	WESTERN LARCH/ DOUGLAS-FIR	WESTERN WHITE PINE	TOTALS
12	531	408	3,918	4,242	2,720	815	12,646

**This information comes from 2009 SLI and field reconnaissance done during 2009, and accounts for harvest treatments in all current timber sale projects on Stillwater Unit.*

FIGURE III - 1 – OLD GROWTH AND MATURE STANDS IN THE COAL RIDGE PROJECT AREA



Old-Growth Attributes

DNRC has developed a tool called the Full Old-Growth Index (FOGI) to describe the level of attributes commonly associated with old growth for stands on state lands. The attributes considered are:

– number of large live trees per acre;

– number of snags per acre based on diameter class;

– amount of coarse woody debris per acre;

– amount of decadence;

– stand structures;

– gross volume per acre; and,

– crown cover.

These attributes are assigned a value or index rating that, when summed with the values or index ratings of the other attributes, indicate a total score or index rating for the stand. These scores can be grouped into low, medium, and high attribute categories. This provides an indication of the condition of the stand in reference to attributes that are often associated with old-growth timber stands. These attribute levels are not necessarily an indication of quality, but are tools to compare and classify a collection of older stands over the landscape.

Currently, SLI data shows approximately 30.7 percent of the old-growth stands for the Coal Creek State Forest are in the high attribute category, 61.1 percent are in the medium attribute category, and 8.2 percent are in the low attribute category.

Some old-growth characteristics in the Coal Creek State Forest:

• Western larch, Douglas-fir, and Engelmann spruce are the dominant overstory tree species in the old-growth stands.

• The stand structures are all two-storied or multistoried, with tree sizes ranging from seedlings to large sawtimber-sized trees.

• Vigor is average to poor in all stands.

• Snag levels are generally high, with greater than 7 snags per acre in most areas; most of the snags are Engelmann spruce, western larch, western white pine, and Douglas-fir.

Environmental Effects to Old Growth

Direct Effects of the No-Action Alternative to Old-Growth Distribution and Attributes

The distribution or attributes of old-growth stands would not be affected in the short term.

Direct Effects of the Action Alternative to Old-Growth Distribution and Attributes

Approximately 28 acres of old growth would be harvested under the Action Alternative; however, all 28 acres would receive an old-growth maintenance treatment that maintains the stand as old growth as defined by DNRC. The primary purpose of treatment within these stands is to:

• Remove encroaching shade-tolerant species (grand fir, spruce, and subalpine fir) that natural disturbances, such as fire, would likely remove.

• Reduce the stocking levels of the stands which would free resources for the remaining residual trees, thus increasing their vigor and their ability to defend themselves from insect and disease attacks.

Old-growth characteristics would be retained, leaving the old-growth stands moderately stocked with at least 10 trees per acre, 21 inches or larger dbh, consisting primarily of western larch, Douglas-fir, and Engelmann spruce. Although old-growth characteristics would be retained, some attributes would change. Gross volume, crown cover, multi storied features, coarse woody debris, snags, and the number of large trees would likely be reduced, which would likely modify the FOGI of the 28 acres, moving it from a medium to low.

Indirect Effects of No-Action Alternative to Old-Growth Distribution and Attributes

Stands that currently meet DNRC's old-growth definition, and are not proposed for harvesting, would become more decadent. Stocking levels and the loading of down woody debris would increase in

some stands, increasing wildfire hazards. Shade-tolerant species would continue to replace shade-intolerant species. Various factors, such as insects, diseases, and decreasing vigor, would eventually cause more snags to occupy portions of the stands.

Indirect Effects of the Action Alternative to Old-Growth Distribution and Attributes

The risk of blowdown along the proposed unit boundaries would potentially increase and likely add to the down-fuel loading. Harvested areas next to the old-growth stands could possibly act as a fuel break, which could slow or stop wildfires before they could burn the old growth.

Cumulative Effects of the No-Action Alternative to Old-Growth Distribution and Attributes

Stands that currently meet *Green et al*. old-growth definition, and are not proposed for harvesting, would become more decadent. Stocking levels and the loading of down woody debris would increase in some stands, increasing wildfire hazards. Shade-tolerant species would remain the major species component in stands. Various factors, such as insects, diseases, and decreasing vigor, would eventually cause more snags to occupy portions of the stands.

Cumulative Effects of the Action Alternative to Old-Growth Distribution and Attributes

114 acres of old growth would be treated using old-growth maintenance treatments, (89 acres in Swedish Chicken Timber Sale, and 28 acres in the proposed Coal Ridge Timber Sale). This would not affect the distribution of old growth, since all 114 acres would retain old-growth status, but it would affect the attributes by removing much of the shade-tolerant components as well as some volume, canopy closure and snags in the existing stands. Post-harvest planting of western white pine and western larch within portions of the stands treated under the Swedish Chicken Timber Sale would, over time, move these stands towards more desired cover types.

Timber Stand Health

Insects and Diseases

Planning for the long-term management of forest insects and diseases is an important part of designing project-level timber sales. Various forest species compositions and structures are more vulnerable than others to certain insects, diseases, windthrow, and wildfires. Insect and disease activities are recorded and mapped annually using aerial-flight surveys. Information is collected on new occurrences and the progression of existing pockets of insect infestations and disease infection, including the approximate acreages and locations. Field surveys identify areas with insect and disease activities for timber-harvesting opportunities.

Existing Condition

Damage and mortality from insects and diseases are relatively minor in forest types that exist in the project area. A notable rise has occurred in the incidence of western spruce budworm in the project area. White pine blister rust and Douglas fir beetle are present in the project area at endemic levels. Indian paint fungus is not uncommon in grand fir and subalpine fir throughout the project area.

The following is a discussion of the major insects or diseases that have been influencing vegetation in the project area:

Western spruce budworm

Western spruce budworm *(Choristoneura occidentalis)* in its larval form feeds on the needles, buds, staminate flowers and developing cones of host conifer trees. Budworm host tree species include: Douglas-fir, subalpine fir, grand fir, Engelmann spruce, and western larch. Stands composed primarily of shade-tolerant species are far more susceptible to budworm damage than stands consisting of mostly shade-intolerant seral species. Other fundamental characteristic of suitable budworm habitat are dense, multi-storied stands in which there is greater opportunity for larvae to reach food

and shelter as they disperse. Stands become more susceptible to budworm damage as they mature and as trees become less vigorous. Sustained feeding by budworm larvae for 3 years or more often results in reduced growth, top kill and mortality. Young trees with relatively few needles and shoots can be especially at risk to mortality from budworm defoliation. Budworm damage to staminate flowers and cones can critically impede regeneration.

In 1989, U.S. Forest Service scientists N. William Wulf and Clint Carlson developed a rating method for determining stand susceptibility to western spruce budworm where 0 to 20 is low, 21 to 50 is moderate and 51 and greater is highly susceptible. The proposed project area rated in the mid to high twenties as moderately susceptible to western spruce budworm.

Fire exclusion in the project area has promoted dense, multi-storied stands dominated by climax tree species favored by western spruce budworm. Spruce budworm is a naturally present insect in the Stillwater Unit, however during the summer of 2010, populations reached near epidemic levels within the project area. Silvicultural treatments that reduce the amount of preferred host species and increase the vigor of trees tend to reduce the susceptibility to budworm attack.

White Pine Blister Rust

White pine blister rust *(Cronartium ribicola)* is probably the most destructive disease of 5-needle (white) pines in North America. Around 1900, the disease was introduced into North America on white pine seedlings grown in European nurseries; by the 1950s, the disease had spread to most of the commercial white pine regions.

Western white pines not only die directly due to white pine blister rust, but also as a result of secondary causes, such as bark beetles. This is due to severely compromised health caused by the blister rust infection, leading to a reduction in the tree's natural ability to defend itself from environmental factors.

Much of the naturally occurring western white pine scattered throughout the project area is infected with blister rust, although there are a few mature individuals showing a high degree of natural resistance. A salvage effort in 1980 removed approximately 2 Mbf of dead and dying white pine from the project area in small, 1 to 2 acre clear cuts and as individually selected trees. Openings created by the salvage were not planted but did regenerate naturally with white pine as well as other species. Natural western white pine regeneration can be found scattered in the understory throughout most of the project area. Following both the Cyclone and Moose fires, rust resistant white pine was planted in fire salvaged units. Based on field observations, natural white pine regeneration in the project area shows a moderate to high level of infection while the planted, rust-resistant stock shows a low level of infection.

Douglas-fir beetle

Douglas-fir beetle *(Dendroctonus pseudotsugae)* is an aggressive and opportunistic organism that kills Douglas-fir trees by feeding on the living tissue (phloem) of the tree beneath the bark. They generally attack older, larger trees greater than 16-inches dbh, although younger trees as small as 7 inches dbh may be attacked when beetle populations are high. Warm, dry weather conditions, such as have occurred recently in western Montana—favor beetle survival and increase stress on trees, which can lead to a high level of tree mortality. The beetle normally kills small groups of trees, but during outbreaks it may kill groups of 100 or more. It prefers dense stands with a high percentage of mature or over-mature Douglas-fir.

Silvicultural treatments to reduce stand characteristics that are susceptible to the insect are effective when implemented before an outbreak. Thinning to reduce stand density will relieve competition between the remaining trees for water, light, and nutrients, thus increasing tree vigor and reducing tree susceptibility to Douglas-fir beetle attack.

The Douglas-fir beetle population increased greatly in Coal Creek State Forest and the surrounding Flathead National Forest following the Cyclone Ridge Fire in 2000 and Moose Fire in 2001. Unburned areas on the south face of Coal Ridge and west face of Winona Ridge, both adjacent to the project area, contain large pockets of trees that are dead and dying due to Douglas-fir beetle attacks.

Indian Paint Fungus

Indian Paint Fungus *(Echinodontium tinctorium)*, also known as brown stringy trunk rot, is a common heartrot of mature and overmature grand fir and subalpine fir. Decay from this fungus within a tree can extend nearly 16 feet in either direction from a conk on the trunk. Multiple conks scattered on a trunk indicate rot is present throughout the entire tree. Trees are infected as saplings through tiny branch stubs. Once overgrown, the infection becomes dormant. Later injuries from fire scars and basal wounds reactivate the infection. Silvicultural treatments include managing susceptible species on short rotations, and thinning stands to increase vigor of the residual trees. Within the project area, Indian Paint Fungus is found within pockets generally located in the more moist areas at lower elevations.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative to Insects and Diseases

In general, insect populations would continue to rise or fall based on natural disturbances or climatic conditions. Diseases would continue to exist and may increase in susceptible species, resulting in mortality over time. As mortality in the project area occurs, loss of sawlog volume and value due to mortality and stem decay would also occur. Continued defoliation from western spruce budworm could increase tree mortality within the shade-tolerant species, thereby causing a loss of sawlog volume and value for the trusts, and increasing the potential of a wildfire within the stands. Western white pine populations would continue to die from beetles and pine blister rust until possibly disappearing from the area all together. Douglas-fir beetles may continue killing large diameter Douglas-fir.

Direct and Indirect Effects of the Action Alternative to Insects and Diseases

Mortality from some insects and diseases that are currently active in the project area would likely continue, but the amount would decrease as: a) older, decadent components of the timber stands are harvested and eventually replaced with young vigorous trees; and b) species susceptible to current insect and disease infestations are reduced and the more-resistant species are regenerated. Harvest treatments would target those species or individuals affected by insects and diseases, as well as the salvage of recently killed trees.

This project would change stand conditions on approximately 125 acres into habitat that is less favorable to western spruce budworm. Through harvesting, canopy layers and tree density would be minimized, thus eliminating potential food and shelter for budworm larvae. Harvested stands would be converted to early seral species, a less preferred food source, and the vigor of leave trees would increase making them more resilient to defoliation.

This project would also involve planting approximately 16,000 rust-resistant western white pine seedlings on 81 acres.

Cumulative Effects of the No-Action Alternative to Insects and Diseases

The current trend in mortality, infection, and infestation levels in mature stands throughout the Stillwater Unit would continue. Increases in insect infestations and disease could be expected in mature timber stands that are more densely stocked, lower in vigor, and contain increased levels of blown-down timber. By comparison, managed stands would be less likely to experience adverse impacts caused by insect infestations and disease outbreaks.

Cumulative Effects of the Action Alternative to Insects and Diseases

On Stillwater Unit, insects and disease are addressed on a project area basis; and on recent timber sales, prescriptions have generally been implemented that would reduce losses and recover mortality caused by insects and disease. This project would create forest stands that are more resilient to the impacts of insects and disease and are more in-line with desired forest conditions. This would be achieved by reducing stocking density, increasing vigor, promoting the regeneration of western larch and Douglas-fir, and by the growth of rust-resistant western white pine.

Fire Regimes and Forest Fuels

Existing Conditions

Fire regimes vary across Stillwater Unit. The Unit, as a whole, has a mosaic pattern that developed from different fire frequencies and intensities. Historically, areas with short fire frequencies produced relatively open, single-storied and occasionally two-storied stands of the Douglas-fir and western larch cover types. Areas with long fire frequencies resulted in multi-storied stands dominated by more shade-tolerant cover types such as Engelmann spruce, subalpine fir, grand fir, western hemlock, and western red cedar. With the arrival of aggressive fire-suppression efforts nearly a century ago, fire frequencies and cover types were extensively altered. As a result, stands of western larch and/or Douglas-fir have grown into multistoried stands with shade-tolerant understory species. Stands that were once open now have a dense understory of predominantly Douglas-fir, grand fir, Engelmann spruce, and subalpine fir. Highly-effective fire suppression generally keeps forest fires small, thus limiting natural fire effects. If a large-scale fire were to subsequently occur, many acres could be affected due to ladder fuels, heavy fuel accumulation, and other environmental factors.

Fisher and Bradley (1987), Fire Ecology of Western Montana Habitat Types, described the fire ecology of habitat-type groups in Montana. The fire groups present in the Coal Ridge project area are summarized in *TABLE III-5 – CHARACTERISTICS OF FIRE GROUPS OCCURRING WITHIN THE COAL CREEK STATE FOREST.*

TABLE III-5 – CHARACTERISTICS OF FIRE GROUPS OCCURRING WITHIN THE COAL CREEK STATE FOREST

	FIRE GROUP					
	5	6	7	8	9	11
Habitat type group	Cool, dry Douglas-fir habitat types	Moist Douglas-fir habitat types	Cool types dominated by lodgepole pine	Dry lower subalpine habitat types	Moist lower subalpine habitat types	Moist grand fir, western red cedar, and western hemlock habitat types
Percent of Coal Creek State Forest	1.5	9.7	13.1	6.8	68.6	0.4
Fire return interval/ Severity (Fisher and Bradley)	Frequent/ Low	Frequent/ Low to Moderate	Infrequent/High	Frequent to Infrequent/ Mixed	Infrequent/ Low or High	Infrequent/ Low to Moderate
Average fuel loading (tons/ acre) *(Fisher and Bradley)*	10	12	18	18	25	25
Postharvest fuel loading (tons/acre)	10 to 15	10 to 15	10 to 15	10 to 15	10 to 15	10 to 15

Approximately 69% of the Coal Creek State Forest is represented by the Fire Group 9 Fire Regime. Fire Group 9 represents moist, lower subalpine habitat types where fires are infrequent, and either very low intensity or severe, with the effects long-lasting. Under typical conditions, high soil moisture and lush understory vegetation hamper most fires before they have a chance to grow. However, when fires occur during unusually hot and dry conditions, a combination of a deep duff layer and high down wood fuel loads result in intense, stand-replacement conflagrations. Moderately severe fires, while less frequent than stand replacement events, do occasionally occur. While fire history information for subalpine fir habitat types is limited, research suggests fire-free intervals range from 117 years in valleys to more than 146 years on lower alpine slopes *(Fischer and Bradley, 1987)*.

Fuel loads were measured in the proposed harvest units, all of which are in Fire Group 9, and were found to be consistent with those reported by *Fischer and Bradley*. The minimum fuel load was 7 tons per acre; the maximum was 48 tons per acre; the average was 21 tons per acre and the median was 18 tons per acre.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative to Fire Regimes and Forest Fuels

In the short term, stands would retain current density, fuel load, and ladder fuels until disturbance, occurs. Risk of torching and crown fires would remain high. Over time, increased fuel loading would be expected to increase the risk and intensity of fires, as described above.

Direct and Indirect Effects of the Action Alternative to Fire Regimes and Forest Fuels

Following treatment, ladder fuels to crowns would be removed in the proposed harvest units, and fuel treatments could limit the fire intensity under most circumstances. The success of aerial and ground attacks on potential wildfires in the proposed harvest units would likely be improved because fires would be limited to burning at the ground level and in the understory rather than climbing into the overstory canopy layer.

Areas treated with an old-growth maintenance prescription would reduce the amount of trees, and consequently fuel loads, resulting in less intense fires than would occur in non-harvested stands. However, the connectivity of fuel and ladder fuels may not be impacted. Additionally, thinning may result in increased air flow through the stand, which could promote the drying of fuels on the forest floor and increase rates of spread for fires that do occur.

Areas treated with the regeneration treatments would emulate a mixed severity fire without the risk of burning desired seral species seed trees or over heating the soil. Approximately 10 to 15 tons of large woody debris per acre would be retained following site-preparation treatments.

Cumulative Effects of the No-Action Alternative to Fire Regimes and Forest Fuels

Forest succession and fire suppression would continue; however, with the present levels of shade-tolerant species and down woody debris, as well as the difficult terrain and limited access, a wildfire would be difficult to suppress.

Cumulative Effects of the Action Alternative to Fire Regimes and Forest Fuels

Natural stand development, past timber sales, and wildfires have created the current vegetative mosaic in this area. These mosaics break up the continuity of fuels and behave as natural fire breaks. Maintaining an age-class mosaic in conjunction with fuel-treatment projects would reduce the potential of high-intensity wildfires.

Noxious Weeds

Existing Conditions

A noxious weed is defined as a nonnative plant competing with desirable plants for nutrients, water, and sunlight; and is harmful to agriculture, wildlife, forestry, and other beneficial uses, thus reducing the value and productivity of the land. Most noxious weeds are exotic species, originating in Eurasia *(Flathead County Weed Management Plan)*. Montana has declared 15 weeds noxious; Flathead County has added 10 to their Noxious Weed Management list.

The following noxious weeds have been located on the project area and along access routes to the project area:

- spotted knapweed *(Centraurea maculosa)*
- oxeye daisy *(Chrysanthemum leucanthemem)*
- orange hawkweed *(Hieracium aurantiacum)*
- tansy ragwort *(Senecio jacobaea)*

Spotted knapweed and oxeye daisy are Category 1 weeds, which are established weeds with high disbursement; orange hawkweed and tansy ragwort are Category 2 weeds, which are established, but have a moderate disbursement level. These invading weed species are not new to Flathead County; new invading weed species would be listed as Category 3 weeds.

Spotted knapweed and orange hawkweed are the most widely distributed noxious weeds in the project area. On Coal Creek State Forest, these are found in areas where ground disturbances such as landings, skid trails, and roadsides occur.

Environmental Effects to Noxious Weeds

Direct and Indirect Effects of the No-Action Alternative to Noxious Weeds

Additional mineral soil would not be exposed and heavy tree canopies would continue to compete with weeds; therefore, the risk of additional establishment of weed populations would not increase. Currently, weed seed is introduced primarily from motor vehicle use. Established infestations of noxious weeds are being addressed with an ongoing program of site-specific herbicide spraying along currently open roads and in small areas of infestation.

The Coal Ridge Road and the spur road leading to Unit 6 have an established, moderate to high level population of spotted knapweed, orange hawkweed and ox-eye daisy along a length of approximately 5 miles. It is highly unlikely that these roads would be sprayed due to the impracticality of treating such a large area with backpack sprayers, the prohibition of motor vehicles behind the current closure and a potential lack of funding. Without the ability to effectively spray these roads, there may be an increased risk of noxious weeds spreading into previously uninfected locations within the project area.

Direct and Indirect Effects of the Action Alternative to Noxious Weeds

The proposed activities would result in an increase in ground disturbance. Mechanized equipment and ground disturbance could increase or introduce noxious weeds along roads and throughout forested areas. Weed seeds are likely to be scattered throughout the forested areas, and the reduction of canopy and disturbance from the timber-harvesting activities are expected to provide the catalyst for spread. Mitigation measures would include:

– washing equipment before entering the site,

– sowing grass seed on roads after harvesting has been completed, and

– application of herbicide along roadsides and on spots of weed outbreaks.

Approximately 5 miles of the Coal Ridge Road and the spur leading to Unit 6 could be treated with herbicide over multiple consecutive years within the time frame of the project. Successive herbicide applications could eliminate current noxious weed populations along these roads and possibly prevent further spread.

Cumulative Effects of the No-Action to Noxious Weeds

The open roads in the project area have traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These uses, in addition to illegal motorized use on restricted roads, increase exposure to weed establishment. The weed-management program at Stillwater Unit, including cooperative agreements with the USFS and weed departments of Flathead County, has improved over time and more weed control along open roads is taking place.

Noxious weed populations on some restricted roads would likely not receive treatment and there would possibly be no effect to the potential rate of spread to uninfected areas that are located away from open roads.

Cumulative Effects of the Action Alternatives to Noxious Weeds

The open roads in the project area have traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These uses, in addition to illegal motorized use on restricted roads, increase exposure to weed establishment. The weed-management program at Stillwater Unit, including cooperative agreements with the USFS and weed departments of Flathead County, has improved over time and more weed control along open roads is taking place.

A limited number of noxious weed populations on restricted roads could likely receive treatment, potentially slowing the rate of spread to some uninfected areas that are located away from open roads.

Introduction

Project Area and Project Activities

The gross project area includes 2,207 acres within the Coal Creek State Forest. Affected watersheds include the Cyclone Creek watershed in the North Fork Flathead River drainage. This watershed includes land managed by the Flathead National Forest, non-industrial private ownership, and the DNRC. The proposed Action Alternative would include a combination of ground based and cable yarding methods to harvest timber on approximately 150 acres within the project area. Infrastructure for the proposed action would require the construction of temporary roads to access proposed harvest areas. All proposed road construction would be done outside of the SMZs, except to cross a stream.

Resource Description

Water yield, sediment delivery and fisheries resources will be assessed in this analysis. Water yield increases (WYI) can affect channel stability if dramatically altered, and sediment delivery from both in-channel and introduced sources is a primary component of overall water quality in a watershed. Fisheries resources may be affected by changes in water yield and sediment delivery, as well as other actions such as riparian harvest or road construction across fish-bearing streams. A brief description of potentially affected fisheries and fisheries habitats is described in Existing Environment.

Issues and Measurement Criteria

The following issues encompass the specific issues and concerns raised through public comment and scoping of the proposed project. For a specific list of individual comments and concerns, please refer to the project file.

Sediment Delivery

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

Measurement Criteria: Tons of sediment delivery per year using procedures adapted from the Washington Forest Practices (WFP) Board *(Callahan 2000)*. Sediment from harvesting activities and vegetative removal will be analyzed qualitatively through data collected in the BMP audit process.

Water Yield

Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal *(Haupt 1976)*, because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow, and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by

changing the timing of snowmelt. Openings will melt earlier in the spring with solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

Measurement criteria: Equivalent Clearcut Acres (ECA). All past and proposed timber management activities are converted to ECA using procedures outlined in Forest Hydrology Part II *(Haupt 1976)*. Peak flow duration and timing will be addressed qualitatively.

Fisheries Resources

In limited circumstances, fish species interactions and presence may be affected by proposed DNRC timber sale activities, especially through actions that affect habitat connectivity; however, since no road construction is proposed that may affect connectivity, this habitat variable, and consequent effects to species interactions and presence, will not be further assessed (except as noted under related actions in Cumulative Effects).

Fisheries resources will be primarily addressed through the assessment of potential effects to fisheries habitats. Habitat complexity is a primary indicator of fisheries habitat quality that will be addressed through the assessment of potential changes to channel forms. Sediment budgets and flow regime are major components of channel forms, which may be affected by the proposed actions and will be addressed in this assessment. The delivery of woody debris to the stream channel also contributes to habitat complexity in fish-bearing streams; however, this habitat variable is not expected to be affected by the proposed actions and will not be further assessed for the following two reasons (except as noted under related actions in Cumulative Effects): (1) riparian stand surveys within the project area indicate the average site potential tree height at 100 years is approximately 88 feet, and (2) the recruitment of woody debris to fish-bearing streams is not expected to be affected due to no proposed timber harvests within 120 feet of all Class 1 streams.

Many different variables affect the natural fluctuations and ranges of stream temperatures (e.g., groundwater inflows, loss of flow, canopy closure, stream gradient, stream width to depth ratio and volume). The degree to which stream temperatures may be affected by changes in direct solar radiation (i.e., canopy closure provided by riparian shrubs and trees) will not be further addressed in this assessment (except as noted under related actions in *CUMULATIVE EFFECTS*), since there would be no timber harvesting proposed within 120 feet of all Class 1 streams, and as a result no expected measurable or detectable effects on this variable. Potential changes to stream temperatures due to WYI and sediment delivery effects (e.g., aggradation and increases in in-stream sedimentation) will be addressed.

Measurement criteria: Potential effects to the fisheries resource variables of channel forms and stream temperature will addressed through the analysis of water yield and sediment delivery.

Analysis Area

Sediment Delivery

Direct, indirect and cumulative effects to sediment delivery will be analyzed on all existing and proposed roads in and leading to the proposed project area. Road construction activities related to the Coal Ridge project will be analyzed using procedures adapted from the WFP Board *(Callahan 2000)*. This area was chosen as an appropriate scale of analysis for the WFP method, and will effectively display the estimated impacts of proposed activities. Additional sites not located within the project area will be assessed qualitatively for their potential to affect downstream water.

Water Yield

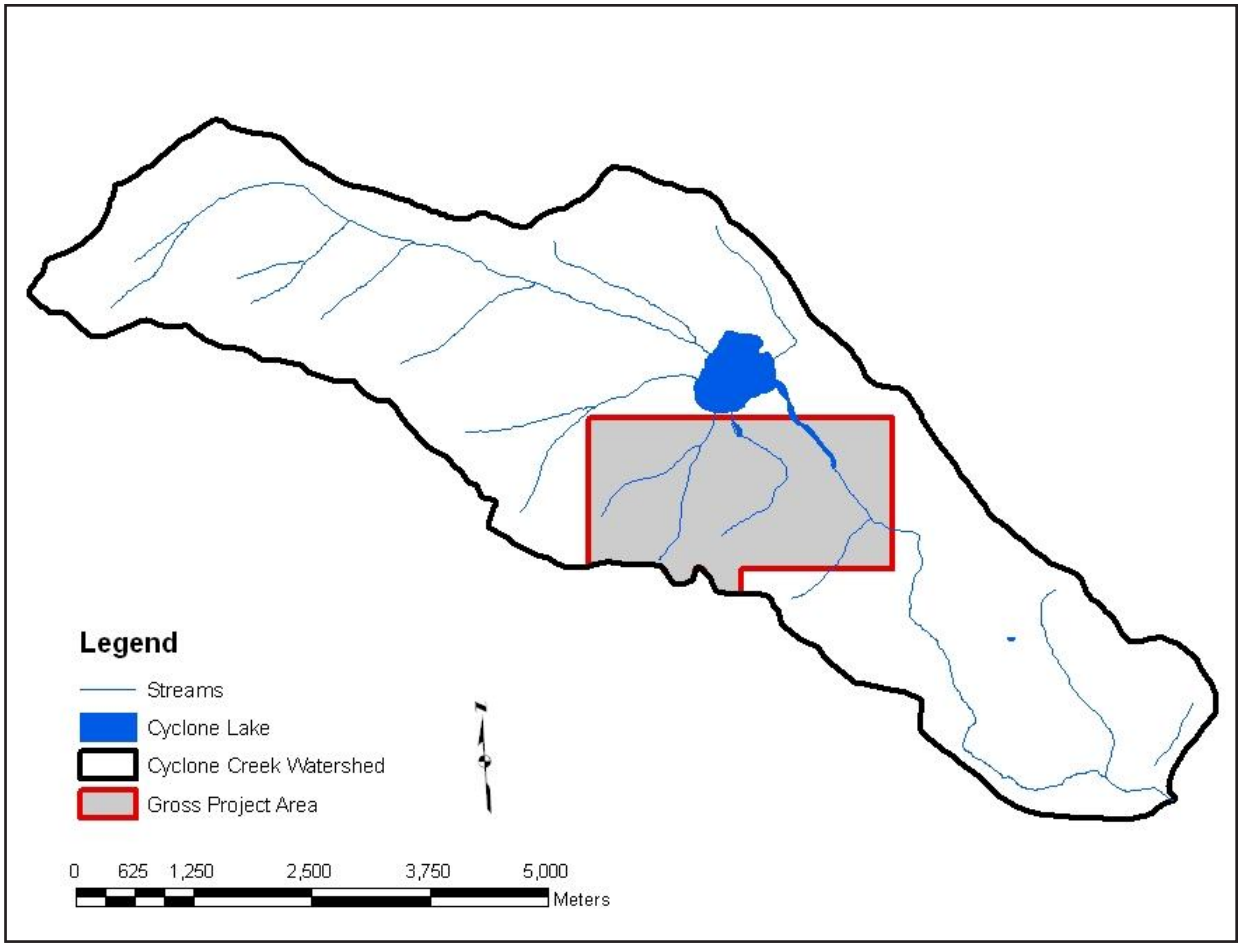
Direct, indirect and cumulative effects to water yield will be analyzed in the Cyclone Creek watershed listed in the *PROJECT AREA* and *PROJECT ACTIVITIES* portion of this analysis. A map of the project area watershed and its relation to the proposed project area is found below in *FIGURE III-2 – CYCLONE CREEK WATERSHED*. All existing

activities on all ownership and proposed activities related to the Coal Ridge project, including road construction, will be analyzed using the ECA method to estimate the water yield changes that may occur as a result of the proposed project. This watershed was chosen as an appropriate scale of analysis for the ECA method, and will effectively display the estimated impacts of proposed activities.

Fisheries Resources

Direct, indirect and cumulative effects to fisheries resources will be analyzed in the Cyclone Creek watershed.

FIGURE III-2 – CYCLONE CREEK WATERSHED. Map of project area watershed & streams



Analysis Methods

Each of the analyses below was conducted on a watershed basis, and included activities on all roads and acres, regardless of ownership. For cumulative effects analyses, all proposed DNRC activities and proposed actions on other ownership were considered. Potential future management on other ownerships was not considered due to the speculative nature of predicting the intentions of other landowners.

Sediment Delivery

Methodology for analyzing sediment delivery was completed using a sediment-source inventory. All roads and stream crossings were evaluated to determine sources of introduced sediment. Data were collected in 2010 to quantify sediment delivery from roads using procedures adapted from the WFP Board *(Callahan, 2000)*. In addition, in-channel sources of sediment were identified using channel-stability rating methods developed by *Pfankuch (1975)* and through the conversion of stability rating to reach condition by stream type developed by *Rosgen (1996)*. These analyses were conducted in 2010 by a DNRC hydrologist.

Water Yield

The water-yield increase for the watershed in the project area was determined using the ECA method as outlined in Forest Hydrology Part II *(Haupt 1976)*. ECA is a function of total area roaded and harvested, percent of crown removal in harvesting, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown or canopy removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percentage of canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees begin to grow and move toward preharvest water use.

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

Fisheries Resources

As noted under Issues and Measurement Criteria, the foreseeable effects to fisheries resources as a result of the proposed actions are expected to be a function of the anticipated impacts to water yield and sediment delivery. A qualitative effects assessment of fisheries resources will be tiered to the analysis results for these two variables.

Risk Assessment Criteria

Where risk is assessed in both sediment-delivery and water-yield analyses, the following definitions apply to the level of risk reported:

- low risk means that impacts are unlikely to result from proposed activities,
- moderate risk means that there is approximately a 50-percent chance of impacts resulting from proposed activities, and
- high risk means that impacts are likely to result from proposed activities.

Where levels or degrees of impacts are assessed in this analysis, the following definitions apply to the degree of impacts reported:

- very low impact means that impacts from proposed activities are unlikely to be measurable or detectable and are not likely to be detrimental to the water resource;
- low impact means that impacts from proposed activities would likely be measurable or detectable, but are not likely to be detrimental to the water resource;
- moderate impact means that impacts from proposed activities would likely be measurable or detectable, and may or may not be detrimental to the water resource;
- high impact means that impacts from proposed activities would likely be measurable or detectable, and are likely to have detrimental impacts to the water resource.

Relevant Agreements, Laws, Plans, Rules, and Regulations

Montana Surface Water-Quality Standards

According to *ARM 17.30.608 (1)(b)(i)*, the Coal Creek drainage, including Cyclone Creek, is classified as B-1. 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. 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 oper¬ation 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 and recreational use in the streams, wetlands, and lakes in the surrounding area. There are no existing surface water rights in the project area.

Water-Quality-Limited Waterbodies

None of the streams in the proposed project area are currently listed as water-quality-limited waterbodies in the 2010 Montana 303(d) list.

Coal Creek was previously listed as in need of a Total Maximum Daily Load (TMDL). This document was completed in 2004 by a group of stakeholders, including the Flathead National Forest, Montana DNRC, Montana DEQ and the US Fish and Wildlife Service. The document titled Water Quality Assessment and TMDLs for the Flathead River Headwaters Planning Area, Montana was submitted in December of 2004, and approved by EPA on May 25, 2005. Montana DNRC is an active partner and participant in this process. All proposed activities within the project area would implement measures to alleviate identified sources of sediment and comply fully with all TMDL requirements.

Montana SMZ Law

By the definition in *ARM 36.11.312 (3)*, the majority of the stream reaches in the Cyclone Creek watershed are Class 1 streams. All of these streams and many of their tributaries have flow for more than 6 months each year. Some of these stream reaches also support fish. Some of the smaller first-order tributaries may be classified as Class 2 or 3 based on site-specific conditions. A Class 3 stream is defined as a stream that does not support fish; normally has surface flow during less than 6 months of the year; and rarely contributes surface flow to another stream, lake or other body of water *(ARM 36.11.312 [5])*. According to *ARM 36.11.312 (4)*, a Class 2 stream is a portion of a stream that is not a Class 1 or Class 3 stream segment.

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*. All applicable rules will be implemented if they are relevant to activities proposed with this project.

Existing Environment

Introduction

The proposed project lies entirely within the Cyclone Creek watershed. This drainage lies on the north face of the Coal Ridge, and forms a portion of the southern geologic boundary of the Cyclone Creek watershed. Precipitation ranges from approximately 20 inches annually in the valley bottom to approximately 70 inches near ridge tops. Due to the north and east facing nature of these drainages, stream flows are generally not as "flashy" during spring runoff due to cooler temperatures and lower levels of direct sun. The result of these more stable flows is generally high channel and bank stability. These and other attributes will be described in more detail in the following sections.

Native fisheries known to occur within the Cyclone Creek watershed include: bull trout, westslope cutthroat trout, longnose sucker, mountain whitefish, and sculpin. Nonnative fisheries include rainbow trout. Bull trout are identified as "threatened" under the Endangered Species Act. Both bull trout and westslope cutthroat trout are listed as Class-A Montana Animal Species of Concern. DNRC has also identified bull trout and westslope cutthroat trout as sensitive species *(ARM 36.11.436)*. Westslope cutthroat trout are the predominant species occurring within fish-bearing, unnamed tributaries to both Cyclone Creek and Cyclone Lake. All perennial streams connected to known fish-bearing waterbodies are presumed to also be fish-bearing for project planning purposes and the analysis of proposed actions.

Sediment Delivery

In-channel and out-of–channel sediment-source reviews were conducted by DNRC hydrologists in 2000 and 2010. The results of these assessments were used in the following sections of this analysis.

Cyclone Creek In-channel Sources

Based on field reconnaissance from 2000 and 2010, stream channels in the project area are primarily in good condition *(Rosgen 1996)*. Most of the project area contains reaches of unnamed tributaries to Cyclone Creek. These streams were classified as B4 channels using a classification system developed by *Rosgen (1996)*. Channel types rated as "B" are typically in the 2-to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B4 types are mainly gravel. Given the gravel content and the gradient of these stream types, bed materials commonly move. No areas of down-cut channels were identified during field reconnaissance. Large woody debris appeared to be in adequate supply to support channel form and function. Woody material in a stream provides traps for sediment storage and gradient breaks to reduce erosive energy and work as flow deflectors to reduce bank erosion. Little evidence of past SMZ harvesting was found, and where past logging took place in the SMZ, no deficiency of existing or potential downed woody material to support hydrologic function was apparent in the streams.

Road System

The existing road system located within and leading to the proposed project area was reviewed in 2010 for existing and potential sources of sediment. Based on the sediment-source review, no existing large sources of sediment were identified. Most of the potential delivery sites are located at stream and draw crossings. Sediment delivery estimates were low due to the implementation of BMPs on much of the existing road system during fire salvage harvest activities in 2000 and 2001, and because much of the existing road system is closed to traffic year-round and is well vegetated. The total estimated sediment

TABLE III-6 – CURRENT SEDIMENT DELIVERY.
Current estimated sediment delivery to project area streams.

	CYCLONE CREEK
Existing tons per year	1.98

delivery from roads in the project area to Cyclone Creek is displayed in *TABLE III-6 – CURRENT SEDIMENT DELIVERY.* These sediment-delivery values are estimates based on procedures outlined above and are not measured values. Much of the existing road system in the proposed project area meets applicable BMPs. Surface drainage and erosion control features were installed on the road systems in most of the proposed project area through recent past project work.

Sources of sediment delivery found during the sediment source inventory are minor and located on sites needing additional road surface drainage and BMP upgrades. These sites are found mainly on older roads that were constructed before the adoption of forest management BMPs. Some sites have BMPs in place, but are not functioning as designed due to lack of maintenance. These sites are also responsible for some of the smaller delivery sources.

Water Yield

According to *ARM 36.11.423*, allowable WYI values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low degree of risk. This means that the allowable level is a point below which water yields are unlikely to cause any measurable or detectable changes in channel stability. The allowable WYI for the Cyclone Creek watershed has been set at 10 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This WYI would be reached approximately when the ECA level in Cyclone Creek reaches the estimated level of 2,093 acres. Based on review of aerial photography and DNRC section records in the project area, timber-harvesting and associated road-construction activities have taken place in the Cyclone Creek watershed since the late 1960s as well as two fires. In addition, an assessment of past timber management on Flathead National Forest (FNF) land in the Cyclone Creek watershed was conducted using FNF harvest history data. These activities, combined with the vegetative recovery that has occurred, have led to an estimated 5.1 percent WYI over a fully forested condition in the Cyclone Creek watershed. *TABLE III-7 – CURRENT WATER YIELD* summarizes the existing conditions for water yield and the associated ECA levels in the Cyclone Creek watershed. Estimated water yield and ECA levels are well below the established threshold.

TABLE III-7 – CURRENT WATER YIELD. Water yield and ECA increases in Cyclone Creek watershed.

	CYCLONE CREEK
Existing % WYI	5.1
Allowable % WYI	10.0
Existing ECA	1,308
Allowable ECA	2,093

Fisheries Resources

Channel forms and stream temperature are the two fisheries resource variables carried through analysis in this qualitative assessment. Sediment budgets, flow regime, in-stream woody debris and potentially recruitable woody debris contribute to existing channel forms. The assessment of in-stream sediment sources note that existing sediment budgets and woody debris frequencies appear to be within the ranges expected for channel types in the project area. Existing impacts from historic riparian harvest are observed to be very minor or not detectable. Existing sedimentation to streams in the analysis area from forest roads is measured to be approximately 2.0 tons per year, and an existing WYI over a fully forested condition is also measured to be approximately 5.1%. The existing levels of road sedimentation and WYI may consequently affect the fisheries resources of both channel forms and stream temperature, although these potential existing impacts are likely to be very low.

Environmental Effects

Sediment Delivery

Direct and Indirect Effects of the No-Action Alternative to Sediment Delivery

This Alternative would have no direct effects to sediment delivery beyond those currently occurring.

Existing sources of sediment, both in-channel and out of channel would continue to recover or degrade based on natural or preexisting conditions.

There would continue to be an increased risk of sediment delivery to streams from crossings that do not meet applicable BMPs. These sites would continue to pose a moderate risk of sediment delivery to streams until other funding became available to repair them.

Direct and Indirect Effects of the Action Alternative to Sediment Delivery

With this alternative, erosion control and BMPs would be improved on up to 9.4 miles of existing road. This work would reduce the estimated sediment load to Cyclone Creek by approximately 0.65 tons of sediment per year. This represents an approximate 33% reduction in sediment from the current estimates.

These projected sediment reductions are net values for the Cyclone Creek watershed. These values include the projected increases in sediment delivery from new temporary road construction, as well as projected sediment reductions from BMP improvements and road and stream-crossing improvement activity. A more detailed summary of sediment delivery estimates is found in *TABLE III-8 – CYCLONE CREEK DELIVERY.*

Approximately 0.5 miles of temporary road would be constructed to access proposed harvest units. The main impacts of roads are associated with stream crossings. Since none of the proposed temporary roads cross streams, the main impacts of these roads is related to the risk of erosion resulting from exposure of bare soil. As a result, the risk of sediment delivery from temporary roads is low since these roads are located away from stream crossings. As cut slopes and fill slopes revegetate, this risk would decrease. Installation of surface drainage and the implementation of other BMPs and Forest Management Rules would further reduce the risk of erosion or sediment delivery from new temporary roads.

Proposed timber harvesting activities would pose a low risk of sediment delivery to streams. The SMZ law, Administrative Rules for Forest Management, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams. The Montana BMP audit process has been used to evaluate the application and effectiveness of forest-management BMPs since 1990; this process has also been used to evaluate the application and effectiveness of the SMZ Law since 1996. Since 1990, evaluation of ground-based-skidding practices near riparian areas has been rated 92-percent effective, and these same practices have been found effective over 99 percent of the time from 1998 to present *(DNRC 1990 through 2008)*. Since 1996, effectiveness of the SMZ width has been rated over 99 percent *(DNRC 1990 through 2008)*. As a result, with the application of BMPs and the SMZ Law, proposed activities are expected to have a low risk of low impacts to sediment delivery. No timber harvesting is proposed within an SMZ or RMZ.

Cumulative Effects of the No-Action Alternative to Sediment Delivery

The cumulative effects would be very similar to those described in the existing conditions portion of this analysis. All existing sources of sediment would continue to recover or degrade as dictated by natural and preexisting conditions until a source of funding became available to repair them. Sediment loads would remain at or near present levels.

Cumulative Effects of the Action Alternative to Sediment Delivery

Cumulative effects to sediment delivery would be primarily related to roadwork. Sediment generated from the exposure of bare soil would increase the risk of sediment loading in the short term. These increases would not exceed any State water-quality laws. In the long term, the cumulative effects to sediment delivery would be a reduction from approximately 1.98 tons of sediment per year to approximately 1.33 tons of sediment per year in Cyclone Creek. These values include projected increases from new temporary road construction, and the projected reductions in sediment delivery from upgrading surface drainage, erosion control, and BMPs on existing roads. A summary of sediment-delivery estimates is found in *TABLE III-8 – CYCLONE CREEK DELIVERY* at the end of the

SEDIMENT DELIVERY effects.

The construction of temporary roads and installation and improvement of erosion-control and surface-drainage features on existing roads would also affect the cumulative sediment delivery to Cyclone Creek as described above *(Burroughs and King 1989)*. In the short term, new road construction and the installation and improvement of surface drainage features would expose bare soil. This would increase the risk of short-term sediment delivery to the streams in and around the proposed project area. The application of all applicable BMPs during this work would minimize the risk of potential short-term sediment loading to downstream waters. Over the long term, cumulative sediment delivery to Cyclone Creek is projected to be lower than existing conditions. Projected increases in sediment delivery from new road construction would be far less than the sediment-delivery decreases expected with the installation of more effective surface-drainage and erosion-control features on the existing road system. The net long-term effect to sediment delivery from this alternative is expected to be a cumulative decrease from pre-project levels.

The proposed project would have an overall low risk of adverse cumulative impacts to sediment yield in project-area watersheds and presents a low risk to adversely affect downstream beneficial uses. Although risk is elevated at site-specific locations, overall risk of adverse cumulative effects to sediment loading is low. Implementation of BMPs, the SMZ Law, and Forest Management Rules would ensure low risk of increased sediment delivery, and improvements to the existing road system would substantially reduce cumulative levels of sedimentation compared to current levels. All activities would comply with applicable laws, rules, and regulations.

TABLE III-8 – CYCLONE CREEK DELIVERY. Estimates of sediment delivery in the Cyclone Creek watershed.

	ALTERNATIVE	
	No Action	Action
Existing delivery (tons/year)[1]	1.98	1.98
Estimated reduction[2]	0.0	0.65
Estimated increase[3]	0.0	0.0
Post-project delivery (tons/year)	1.98	1.33
Reduction (tons/year)[1]	0	0.65
Percent reduction[4]	0	33%

[1]These sediment-delivery values are estimates based on procedures outlined in Analysis Methods, and are not measured values.

[2]Includes projected decreases from rehabilitation and BMP work on existing roads and crossings.

[3]Includes projected increases from construction of new roads and new stream crossings.

[4]Percent reduction values are estimates based on procedures outlined in Analysis Methods, not on measured values.

Water Yield

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

There would be no direct or indirect effects on water yield. Water quantity would not be changed from present levels and the harvest units would continue to return to fully forested conditions as areas of historic timber-harvests regenerate.

Direct and Indirect Effects of the Action Alternative to Water Yield

The annual water yield in the Cyclone Creek watershed would increase by an estimated 0.6 percent over the current level. This level of projected water-yield increase is an incremental value that refers only to water yield generated by this proposed project and does not include water yield increases from past activities. The cumulative water-yield increase will

assess the impacts of the proposed project when added to the impacts of past and planned future activities; this will be discussed in *CUMULATIVE EFFECTS* portion of this analysis. This level of water-yield increase would produce a low risk of creating unstable channels in any of the project-area streams. Peak flow volume and duration may be elevated, and the timing of peak flows may be slightly earlier as a result of the proposed harvest activities. These changes have a low risk of low- impacts to the stream channels in the Cyclone Creek watershed.

Cumulative Effects of the No-Action Alternative on Water Yield

No cumulative effects on water yield are expected as a result of this project. Existing timber-harvest units would continue to revegetate and move closer to pre-management levels of water use and snowpack distribution.

Cumulative Effects of the Action Alternative on Water Yield

The proposed timber harvest would increase the water yield in the Cyclone Creek watershed from its current level of approximately 5.1 percent over a fully forested condition to an estimated 5.7 percent. This water-yield increase, and its associated ECA level, includes the impacts of all past management activity, existing and proposed roads, proposed timber harvesting, and vegetative hydrologic recovery in the Cyclone Creek watershed. The water-yield increase expected from this project leaves the watershed well below the established threshold of concern reported in the existing conditions portion of this analysis. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in Cyclone Creek or its tributaries.

The proposed project is expected to have a low risk of cumulative impacts to water yield as a result of the proposed timber harvesting. A summary of the anticipated water-yield impacts of Action Alternative to the Cyclone Creek drainage is found in *TABLE III-9 – CYCLONE CREEK WATER YIELD.*

TABLE III-9 – CYCLONE CREEK WATER YIELD. ECA and percent WYI results for the Cyclone Creek watershed.

	Alternative	
	No Action	Action
Allowable water-yield increase	10%	10%
Percent water-yield increase	5.1	5.7
Acres harvested	0	156
Miles of new temporary road	0	0.5
ECA generated	0	155
Total ECA	1,308	1,463
Allowable ECA	2,093	2,093

Fisheries Resources

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

As a result of implementing the No-Action Alternative, no additional direct or indirect effects to fisheries resources would occur beyond those described in the *EXISTING CONDITIONS*.

Direct and Indirect Effects of the Action Alternative to Fisheries Resources

Channel forms and stream temperature are the two fisheries resource variables carried through analysis in this qualitative assessment, and the foreseeable effects to these fisheries resources as a result of the proposed actions are expected to be a function of the anticipated impacts to water yield and sediment delivery. Sediment delivery from forest roads to streams in the analysis area is expected to be reduced by approximately 0.7 tons per year, which is a 33% reduction in sediment delivery compared to the No-Action Alternative. A WYI of 5.7% over fully forested conditions is expected as a result of implementing the Action Alternative, which is below the threshold. The decrease in sediment delivery is expected to be a positive impact to channel forms (e.g., reduced aggradation of pool habitat features) and stream temperature (e.g. declining width-to-depth ratios that may help maintain lower peak seasonal temperatures). The net direct and indirect effect of the proposed actions to fisheries resources is expected to be slightly positive, which is primarily due to the anticipated reductions in sediment delivery.

Cumulative Effects of the No-Action Alternative to Fisheries Resources

Cumulative effects to fisheries resources in the analysis area that would continue to occur as a result of selecting the No-Action Alternative collectively include the impacts already described under Existing Environment and other related actions. Other known related actions include: increasing hybridization of westslope cutthroat trout by rainbow trout, displacement of native fish species by nonnative rainbow trout, recreational fishing effects in Cyclone Lake, the occurrence of two road-stream crossing structures that partially limit native fisheries connectivity, and very limited historic riparian harvest that may have very minor effects on habitat complexity and stream temperature.

Cumulative Effects of the Action Alternative to Fisheries Resources

Cumulative effects to fisheries resources in the analysis area that would be expected to occur as a result of selecting the Action Alternative collectively include those cumulative effects already described under No-Action Alternative and, additionally, the foreseeable direct and indirect effects of the Action Alternative. As a net slightly positive direct and indirect effect to fisheries resources is expected for the Action Alternative (primarily due to the anticipated reductions in sediment delivery), a slightly positive cumulative effect is also expected (compared to the No-Action Alternative).

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Soils Analysis

Introduction

Landform Description

The Coal Ridge project area lies within the Cyclone Creek watershed in a valley formed by glaciers and river processes. The dominant soil types found in the project area are deep to moderately deep weathered bedrock derived from argillite, siltite and limestone from the Belt Supergroup. Upper slopes and ridges are weathered bedrock scoured by glaciers.

Soil Physical Properties

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

Slope Stability

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

Analysis Methods

Soil Physical Properties

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

Slope Stability

Slope stability risk factors will be assessed by reviewing the Soil Survey of the Flathead National Forest Area, Montana to identify landtypes listed as high risk for mass movement. Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

Analysis Area

The analysis area for evaluating soil physical properties and slope stability will include DNRC owned land within the Coal Ridge project area.

Existing Conditions

Soil Physical Properties

In the proposed project area, timber harvesting activities have been conducted since 1970, with the most recent activity occurring in 2001 due to the salvage activities associated with the Cyclone Ridge and Moose Fires. Skid trails in old harvest units are

spaced approximately 100 to 120 feet apart based on pace transects. Trails are located mainly on gentle to moderate slopes, and away from streams. A few of the identified skid trails intersect seasonal runoff and spring flow. Erosion was not identified as a problem in these areas due to well vegetated trails. Several miles of roads have been constructed within the project area in order to access these past harvest areas. Many of these roads have been brought up to applicable BMP standards during salvage harvesting activities during the past decade.

Slope Stability

Landtypes in the project area are gentle to moderate (10-55%) residual soils and glacial till found on hilly terrain. The Soil Survey of the Flathead National Forest Area, Montana *(USDA, 1998)* identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated on this project in the remainder of this analysis. A list of landtypes found in the Coal Ridge project area and their associated management implications is found in *TABLE III-11 AND FIGURE III-3 COAL RIDGE TIMBER SALE PROPOSAL LANDTYPE MAP*.

Environmental Effects

Direct and Indirect Effects of the No Action Alternative

Soil Physical Properties

This alternative would have no direct or indirect effects on soil physical properties beyond those occurring due to past management activities. No ground-based activity would take place under this alternative, which would leave the soil in the project area unchanged from the description in the *EXISTING CONDITIONS* portion of this analysis.

Direct and Indirect Effects of the Action Alternative

Soil Physical Properties

This alternative includes 82 acres of ground-based mechanical harvesting, and 68 acres of cable skyline yarding. Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts would be expected on up to 22 of the total 150 acres proposed for harvesting. This value includes the projected impacts of construction of 0.5 mile of temporary road. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with ground-based machinery had a range of impacts from 8.1 to 33.8 percent of the acres treated, with an average disturbance rate of 17.8% *(DNRC, 2009)*. The low range of impacts includes operations on frozen or snow-covered soils, and the high range includes operations on moist soils during non-winter conditions. Based on these monitoring results, the extent of impacts expected would likely be similar to those reported by DNRC *(2009)*, or approximately 8.1 to 33.8 percent of ground-based harvested acres.

Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be done intentionally, and these impacts are considered light and promote reforestation of the site. *TABLE III-10* summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave approximately 14.6 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the SFLMP, and well within the 20-percent impacted area established as a level of concern in the SFLMP *(DNRC 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in *ARM 36.11.422* and the SFLMP *(DNRC, 1996)*.

TABLE III-10 – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVE ON SOIL PHYSICAL PROPERTIES

Description of Parameter	No Action	Action Alternative
Acres of harvest	0	150
Acres of ground based yarding	0	82
Acres of ground based impacts[1]	0	**15**
Acres of skyline yarding	0	68
Acres of skyline impacts[2]	0	**5**
Miles of new roads	0	.5
Acres of new roads[3]	0	**2**
Total estimated acres of impacts	**0**	**22**
Percent of harvest area with impacts	**0%**	**14.6%**

[1] 17.8% of tractor units based on average impacts found on similar soils and sites by DNRC soil monitoring
[2] 10.0% of skyline units affected by corridors, and approximately 75% of skyline corridors impacted
[3] Assuming an average width of 25 feet, roads are approximately 3 acres per mile

Cumulative Effects of the No Action Alternative

Soil Physical Properties

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

Cumulative Effects of the Action Alternative

Soil Physical Properties

Approximately 50 acres with previous timber sale operations would be entered. Cumulative effects to soils may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and revegetation would return to a higher level of impact due to the Action Alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to soil physical properties in areas previously managed are still expected to fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the SFLMP and are expected to remain within the 20-percent impacted area established as a level of concern in the SFLMP *(DNRC, 1996)*.

Since no past management activities have occurred within the remaining 106 acres of the project area, the cumulative effects to soils in these areas would be identical to those displayed in the *DIRECT AND INDIRECT EFFECTS* section of this analysis. Cumulative impacts to soil physical properties under the Action Alternative would fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP *(DNRC, 1996)*.

DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following: 1) existing skid trails from past harvest activities would be used if they are properly located and spaced; 2) additional skid trails would be used only where existing trails are unacceptable; 3) mitigating the potential direct and indirect effects with soil moisture restrictions, season of operation, and method of harvest; 4) retention of a portion of coarse woody debris and fine litter for nutrient cycling.

FIGURE III-3 – COAL RIDGE TIMBER SALE PROPOSAL LANDTYPE MAP

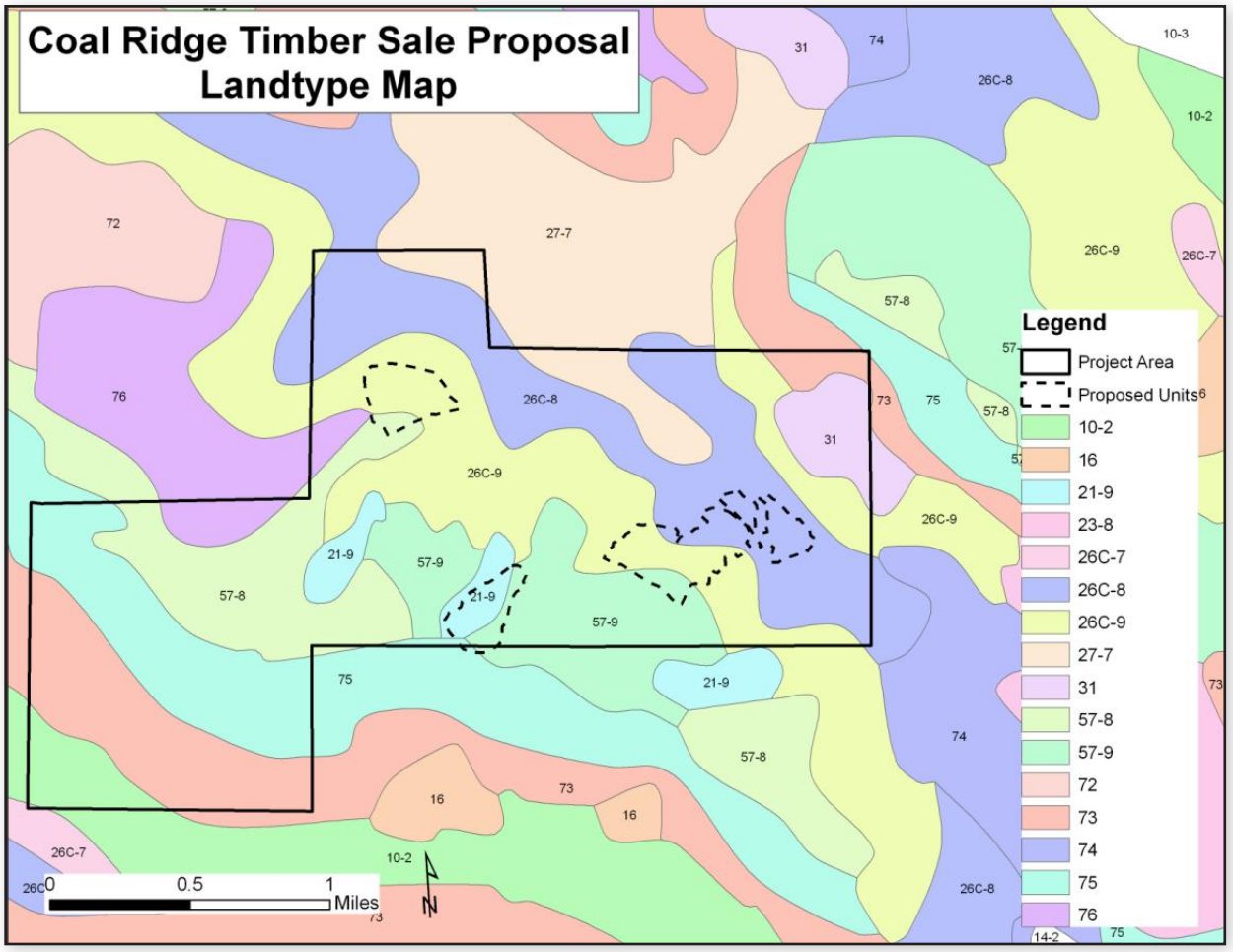

TABLE III-11 – LANDTYPE DESCRIPTIONS FOR THE COAL RIDGE PROJECT AREA

Land Type	Description	Soil Drainage	Road Limitations	Topsoil Displacement & Compaction	Seedling Establishment	Erosion (Bare Surface)	Notes
21-9	Rock Outcrops, Shallow Glacial Till, 40-60%	Moderate to well	Low/mod	Moderate	Poor	Moderate	Unsurfaced roads are very bumpy due to shallow bedrock.
26C-8	Glacial Moraines, 20-40%	Well Drained	Mod/High	Mod./High	Good	Moderate	Deep, productive soil. Topsoil depth important.
26C-9	Glacial Moraines, 40-60%	Well Drained	Mod/High	Mod./High	Good	Mod/High	Deep, productive soil, avg. season of use. Limit soft track skidder to slopes less than 45%.
57-8	Glaciated Mountain Ridges, 20-40%	Well Drained	Low	Moderate	Fair, Droughty	Moderate	Shallow and moderately deep very gravelly/rocky soils. Cable yarding on slopes over 45%, broadcast burn.
57-9	Glaciated Mountain Slopes, 40-60%	Well Drained	Moderate	Severe Displacement	Fair-Good Dry on S. Slopes	Moderate	Steep slopes limit tractor operation. Use cable or helicopter yarding system.

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Economic Analysis

Introduction

This analysis describes the existing economic environment and identifies the potential direct, indirect, and cumulative economic effects associated with the proposed action.

Issues and Measurement Criteria

The following issue statement is a guide for the economic analysis.

- The proposed action may affect program revenue, income for state trusts, and funding for forest improvement (FI) projects. The proposed action may also affect timber-related employment levels, and the regional economy.

The following measurement criteria are used to 'measure' the potential direct, indirect, and cumulative economic effects under each alternative.

- For all revenue, expenses, income and taxes, the measurement criterion is current U.S. dollars.
- For employment, the measurement criterion is, number of jobs sustained for one year.

Analysis Area

The geographic scope of the economic analysis is confined to counties which are economically relevant to the proposed action; counties where the direct, indirect, and cumulative effects are expected to occur.

Analysis Methods

The economic analysis of timber sale proposals includes a review of revenue, expenses, income and employment related to the proposed action. Measurements for revenue are derived from the appraisal of timber value (stumpage price). Stumpage price estimates for timber sale proposals factor comparable timber sales, regional market conditions, unique characteristics of the proposed sale (i.e. species mix, mean tree density and diameter, terrain, development requirements), and the precise location of the proposed action. Measurements for expenses are estimated from annual cash-flow records from the forest management program[1]. Income distributed to state trusts is the net of the measured revenue and expenses related to the proposed action. Finally, measurements for changes to income and employment in the regional economy are estimated from county level economic data by sector.

Primary data sources for the economic analysis include the Trust Land Management Division (TLMD) of Montana DNRC, the Bureau of Business and Economic Research (BBER) of the University of Montana, the Western Wood Products Association (WWPA) and Random Lengths (RL).

The operating profit margin is the ratio of net income to all revenue from the proposed action. A positive operating profit margin indicates an economically viable action. A TLMD forest management fiscal objective is to maintain a 50 percent, or higher, operating profit margin at the land office and state-wide level. This provides a baseline in which to evaluate individual timber sale proposals, but is not a program requirement of any single project.

[1]The Trust Land Management Division (TLMD) of Montana DNRC does not maintain a project level accounting system. Project expenses are therefore estimated from land office and program level accounting records.

Stated analysis parameters:

- Northwest Land Office FI fee, $39.24/Mbf
- State Forest Management Plan FY 2010 operating profit margin, 47.4 percent
- State Forest Management Plan five year operating profit margin, 59.7 percent
- BBER employment multiplier, 10.0 jobs/MMbf

Existing Environment

The proposed action would take place on state lands managed by DNRC's Northwest Land Office and Stillwater Unit Office. Timber sales in this area supply raw materials for framing lumber, board and beam, and pulp industries in the surrounding region including Flathead and Lincoln County.

The economies in Flathead and Lincoln County share a major component of Montana's forestry and logging sector.

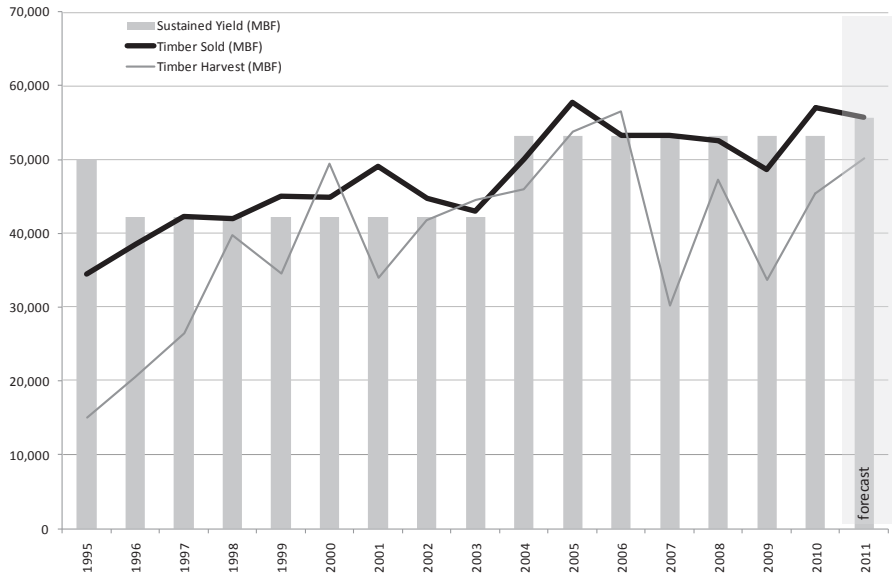
Employment and wages for forestry and logging (NAICS) in this 2-county area are described in detail below *(TABLE III-12 – EMPLOYMENT AND WAGES)*. Forestry and logging employment data (Montana Department of Labor and Industry, Research and Analysis Bureau) is likely lower than actual employment due to missing data on a number of small informal logging and milling operations.

FIGURE III - 4 – TIMBER SALE VOLUME AND HARVEST shows the aggregate timber sale and harvesting activity performed by DNRC. Currently, DNRC has an annual statewide sustained yield of 53.2 MMbf.

TABLE III-12 – EMPLOYMENT AND WAGES. County Employment and Average Wages 2009

COUNTY	INDUSTRIAL SECTOR	JOBS	NUMBER OF ESTABLISHMENTS	TOTAL WAGES ($)
Flathead	Forestry and logging	165	47	1,812,705
Lincoln	Forestry and logging	121	36	1,270,240

FIGURE III - 4 – TIMBER SALE VOLUME AND HARVEST. Total timber sale volume and harvest since 1995.



State-owned forests generate revenue depending on harvested volume and timber prices. Timber sale revenues vary widely due to fluctuations in timber prices. TABLE III -13 – TIMBER SALE REVENUE and FIGURE III -5 – TIMBER SALE REVENUE show gross revenue from harvests, net revenues distributed to the trusts, and FI fees collected over the most recent operating years.

TABLE III-13– TIMBER SALE REVENUE

YEAR	GROSS TIMBER REVENUE ($)	TIMBER REVENUE DISTRIBUTED TO TRUSTS ($)	FI FEES COLLECTED ($)
2010	8,044,850	3,231,746	1,196,307
2009	7,584,556	3,386,103	868,511
2008	10,000,724	5,858,579	1,098,577
2007	7,482,894	3,179,167	1,316,404
2006	13,000,338	8,963,990	2,875,277
2005	13,651,631	9,904,500	2,924,052

FIGURE III-5 – TIMBER SALE REVENUE. Timber revenues and expenses on state lands.

In addition to timber sale revenues, FI fees are collected on non-Morrill Grant lands and are used to finance projects that improve the health, productivity, and value of forested trust lands. FI activities may include the piling and disposal of logging slash, reforestation, thinning, prescribed burning, site preparation, noxious-weed control, seed collection, acquiring access and maintaining roads necessary for timber harvesting, monitoring, other activities necessary to improve the condition and income potential of forested state lands, and to comply with other legal requirements associated with timber harvesting *(77-5-204, MCA)*.

Environmental Effects

Direct economic environmental effects are those that alter trust land revenues and timber-related industries in the 2-county area. Indirect economic environmental effects are those that alter other sectors in the economy. Cumulative economic environmental effects are typically seen as those that contribute to long-term changes in any part of the economy.

Direct and Indirect Effects of the No-Action Alternative to Economics

As displayed in *TABLE III-14 – COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE*, revenue from the project area would not be realized at this time. If timber from this project is not sold, equivalent volumes would need to come from sales elsewhere. Additionally, local mills may not be able to substitute for the potential loss of logs that would not be delivered to their mill from this alternative. Trust funding would not benefit from this alternative.

Direct Effects of the Action Alternative to Economics

As displayed in *TABLE III-13 – COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE*, an estimated $83,146 in revenue would be deposited into the involved trusts and an estimated $54,740 would be deposited into the FI account. Approximately $42,042 of road development and maintenance work would be accomplished. An estimated $19,950, or $150 per acre, would be spent from the FI budget to reduce fire hazards and prepare harvested areas for natural and planted regeneration.

TABLE III-14 – COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE

	ALTERNATIVES	
	NO-ACTION	ACTION
Estimated total harvest volume (MMbf)	0	1.4
Road development costs ($/Mbf)	0	30.03
Estimated stumpage value ($/Mbf)	0	59.39
FI fee ($/Mbf)	0	39.24
Estimated stumpage value, FI, and road development cost ($/Mbf)	0	128.52
Total timber-dollar value based on estimated stumpage value, FI, and road-development value, multiplied by the estimated harvest volume ($)	0	179,128
Estimated stumpage value and FI ($/Mbf)		98.63
Total revenue ($) to the State (stumpage value and FI)	0	137,886
Total revenue ($) to the involved trusts (stumpage value)	0	83,146

Indirect Effects of the Action Alternative

Approximately 150 acres of timber would be treated, and 67 acres would be moved toward a more desirable future condition. Both Flathead and Lincoln counties have a substantial presence in the wood-processing industry. To the extent that sales provide employment, and using the employment multiplier as stated under *ANALYSIS METHODS*, this sale would sustain one year's work for approximately 14 positions. As a result, the short-term impact would be positive.

Cumulative effects of the No-Action Alternative on Economics

DNRC has a statewide sustained-yield annual harvest goal of 53.2 MMbf. If this project were not sold, this volume could come from alternate sales; however, the timber may be harvested from other areas and therefore would not benefit this region of the State. This forest area would again be available for harvesting considerations.

Cumulative Effects of the Action Alternative on Economics

The Action Alternative would contribute volume to the annual sustained yield of 53.2 MMbf. This yield establishes a relatively stable supply of state trust land timber for the regional market. The State's regional market share is becoming more significant as other timber supply sources dwindle. While the region's market health ultimately relies on energy and lumber prices established in international markets, an affordable local timber supply is still necessary for regional processing facilities to remain competitive and open. Therefore, one of the cumulative effects of the proposed action, in conjunction with other timber harvests, is the preservation of economic viability in Montana's timber resources.

The proposed action also contributes proportionally to public school funding. Funds distributed by the state trusts partially offset tax dollars needed to fund public education. The cumulative effect of this proposed action, in conjunction with revenue-generating activities of other trust land, is the continued financial contribution to public education in Montana. Tax dollars offset by these contributions either go to improve the State of Montana's budget for other public services or they benefit Montana taxpayers by partially reducing their tax burden.

The proposed action also contributes to the overall size of the FI fund. In the long term, FI funding represents an investment in forest health, future income-generating opportunities, fire protection, and other associated benefits. The economic benefits of work conducted with FI funds cannot be directly measured, but they represent an additional cumulative effect related to the proposed action.

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Introduction

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated direct, indirect, and cumulative effects that may result from each alternative of this proposal. The DNRC Forest Management Rules and comments received during initial scoping led to the following list of issues:

- The proposed activities could alter mature forested habitats and landscape connectivity, which could affect species that rely on these mature forested habitats and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.
- The proposed activities could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for wildlife species that are dependent on these resources, which could alter their survival and/or reproductive ability.
- The proposed activities could alter cover, increase human access, and reduce secure areas, which could affect grizzly bears by displacing them from important habitats and/or increasing the risk to bears of human-caused mortality.
- The proposed activities could change stand conditions, which could reduce or modify lynx foraging habitats, denning habitats, and temporary non-lynx habitats, rendering them unsuitable for supporting lynx.
- The proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.
- The proposed activities could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.
- The proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.
- The proposed activities could remove canopy cover and snags needed by pileated woodpeckers for foraging and nesting and/or displace pileated woodpeckers from active nests, resulting increased mortality to pileated woodpecker chicks.
- The proposed activities could remove elk security cover, which could affect hunter opportunity and local quality of recreational hunting.

Analysis Area

The discussions of existing conditions and environmental effects will focus on 2 different scales. The first will be the 'project area', which consists of approximately 2,207 acres of DNRC-managed lands in Sections 16, 20, 21, 22, and 29. The second scale or the 'cumulative-effects analysis area' relates to the surrounding landscape for assessing cumulative effects to wildlife species and their habitats. The scales of these analysis areas vary according to the species being discussed, but generally approximate the size of the home range of the discussed species.

Analysis Methods

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on state lands *(ARM 36.11.404)*. Appropriate stand structures are based on ecological characteristics (e.g., landtype, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist

and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a 'fine-filter' approach for threatened, endangered, and sensitive species *(ARM 36.11.406)*. The fine-filter approach focuses on habitat requirements for a single species.

To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program (MNHP) data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative. Past and current activities on all ownerships in each analysis area, as well as planned future agency actions, have been taken into account for the cumulative-effects analysis.

Relevant Agreements, Laws, Plans, Rules, and Regulations

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

Coarse Filter Wildlife Analysis

Of the 108 mammal species found in Montana, 66 are suspected or known to occur in Flathead County *(Foresman 2001)*. The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Six amphibian and 7 reptile species have also been documented in Flathead County *(Maxell et al. 2003)* and at least 100 species of birds have been documented in the vicinity between 1996 and 2003 *(Lenard et al. 2003)*. Terrestrial species that rely on special habitat elements, such as white bark pine *(Pinus albicaulis)* or western white pine *(Pinus monticola)* may not be present or may occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have increased and shade-tolerant species, such as Douglas-fir and grand fir, have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats. Additionally, recent wildfires in the vicinity have created burned habitats for species that rely on those habitats, while reverting succession and creating additional habitats that are more open. However, in the vicinity of the project area, the forests are a mosaic of mature stands and regenerating forests, which benefit both the wildlife species that rely upon mature forests, and species that use early seral stages, either exclusively or seasonally. Past timber harvesting and recent wildfire activity that led to the early seral stages has likely reduced the quality and quantity of snags and coarse woody debris compared to historical conditions, thereby reducing habitat for those wildlife species that require these components.

Mature Forested Habitats and Landscape Connectivity

Issue: The proposed activities could alter mature forested habitats and landscape connectivity, which could affect species that rely on these mature forested habitats and/or alter connectivity and the ability of wildlife requiring corridors to move through the landscape.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial

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

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the contiguous Coal Creek State Forest. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

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

Existing Environment

The project area currently contains approximately 1,447 acres of mature stands (100-plus years in age) of Douglas-fir, subalpine fir, Engelmann spruce, and mixed-conifer stands that have a reasonably closed canopy. Of these older stands, at least 736 acres likely meet the definition of old growth *(Green et al. 1992)*. These stands are interspersed with a variety of Douglas-fir/western larch, subalpine fir, Engelmann spruce, and mixed-conifer stands of varying ages and stocking densities. Currently, forested areas cover most (~83 percent) of the project area, facilitating some use by those species requiring connected-forested conditions and/or forested-interior habitats. However, connectivity within the project area has been reduced with past timber harvesting, recent wildfires, and the network of open roads. In the project area, there are at least 3 potential corridors *(FIGURE III-6- MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY CORRIDORS*) that could facilitate some travel between Winona Ridge and Coal Creek (and beyond to Moose Peak). These potential corridors are at least 300 feet wide and are almost entirely forested, with the vast majority of those areas being mature stands (over 100 years old) with at least 40% canopy closure.

The network of open roads in the cumulative-effects analysis area, coupled with timber management in the past 40 years and recent wildfires on a total of roughly 7,104 acres, has reduced landscape-level connectivity, particularly in the southern portion of the cumulative-effects analysis area. The recent harvesting activities and wildfires have not only reduced landscape connectivity, but also fragmented existing stands and reduced forested- interior habitats. No other harvesting is occurring in the cumulative-effects analysis area that would be altering forested habitats and/or altering connectivity. Minor amounts (roughly 4,503 acres) of mature subalpine fir, western larch/Douglas fir, and mixed-conifer habitats that have a reasonably closed canopy exist on the DNRC-managed portions of the cumulative-effects analysis area. A portion of these mature stands on DNRC-managed lands are included in the 12,646 acres (10.8 percent) across Stillwater Unit *(see VEGETATION ANALYSIS)* that meets the definition of old growth *(Green et al. 1992)*.

Environmental Effects

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

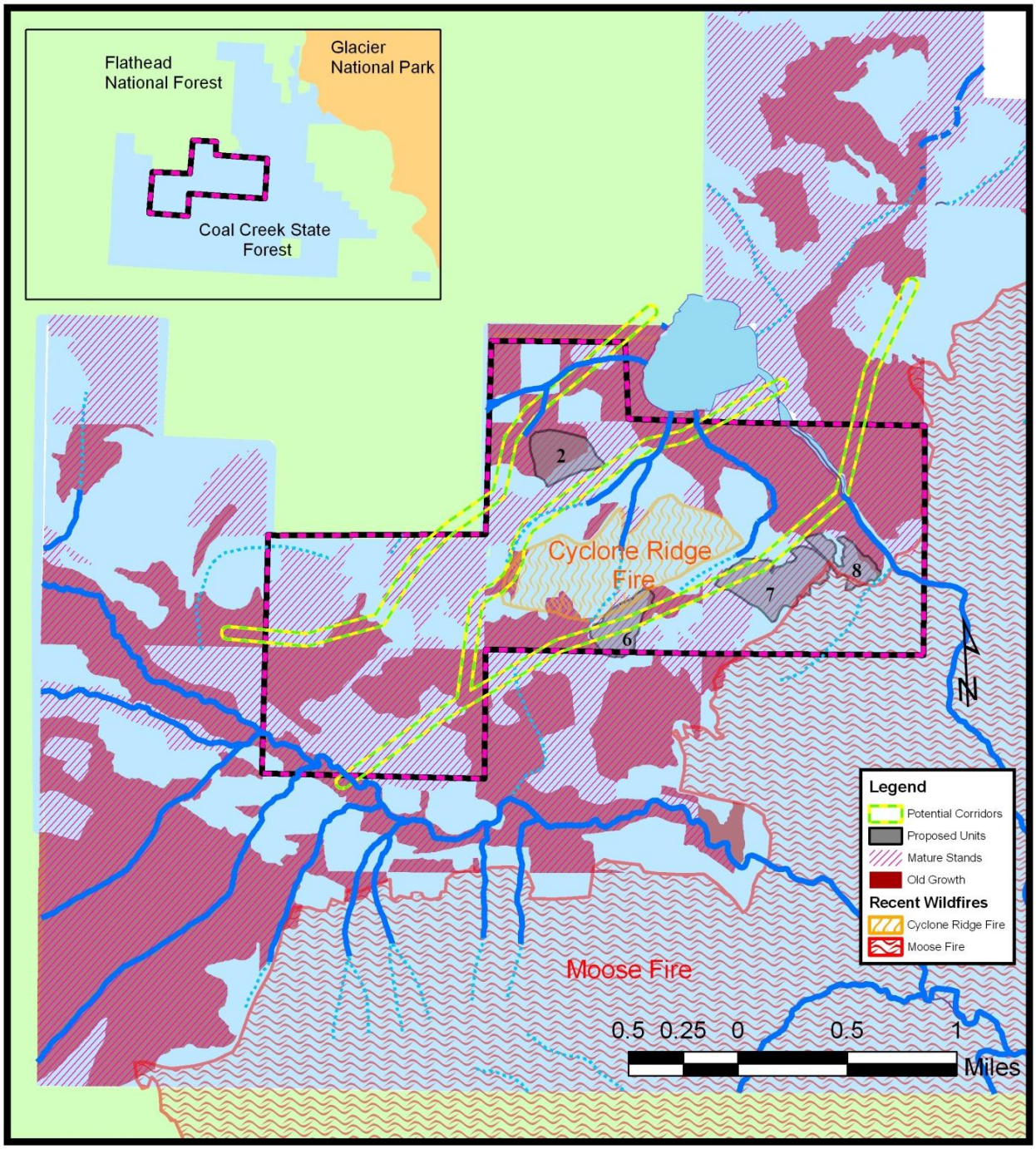
Forest conditions would continue to age, and denser stands of shade-tolerant tree species with high amounts of canopy cover would gradually develop. Continued maturation of the young stands

of shade-intolerant trees that are a result of recent wildfires would gradually move through the stages of succession and eventually become available for wildlife species requiring mature forested stands in 80-150 years. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated in the short-term. No changes in wildlife use would be expected. Existing habitats for forested interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would likely persist under this alternative; however, western larch and western white pine, the preferred snag species, could decline in abundance over time. Thus, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) no changes to existing stands would occur; 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Approximately 150 acres of sub-alpine fir, Engelmann spruce, and mixed-conifer stands would be harvested, including roughly 146 acres of mature stands with a closed canopy. Roughly 122 of these acres of mature, forested habitats would receive a regeneration-type treatment, which would reduce habitat for those species relying on mature, closed-canopied forested habitats. The remaining 28 acres of mature, forested habitats would receive an old-growth maintenance treatment, which again reduces habitat for species needing a mature, closed-canopied stand. However, these stands could provide lower-quality habitats for those species requiring mature, forested conditions more quickly than some stands receiving regeneration-type treatments due, to the anticipated tree retention levels. Alterations to mature forested habitats would include the proposed old-growth maintenance treatment on approximately 28 acres that meet the old-growth definition *(see VEGETATION ANALYSIS)* and would continue meeting that definition following the proposed treatment. Overall, the resultant changes in stand age and density would reduce habitats for species associated with older stands, such as the American marten and pileated woodpecker, which benefited from the increasing stand ages and densities caused, in part, by modern fire suppression. Alterations to existing habitats would likely alter animal movements in the landscape. Two of the 3 riparian connectivity corridors identified in the project area would not be altered with the proposed harvesting; meanwhile, the proposed harvesting would bisect the southern-most connectivity corridor identified in the project area. The proposed activities would sever the stringer of mature, forested habitats between the Cyclone Ridge and Moose fires, which would mimic an even larger fire on the landscape. This would further reduce landscape connectivity and could alter animal movements through the project area. In general, habitats for those species adapted to more-open forest conditions would increase in the project area, meanwhile habitats for wildlife species that prefer dense, mature forest conditions would be further reduced in the project area. Thus, moderate adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) harvesting would revert succession on roughly 114 acres of mature forested stands and reduce stand complexity on an additional 36 acres; 2) moderate changes to landscape connectivity would occur with the removal of 1 of the 3 connectivity corridors in the project area; and 3) some changes to wildlife use would be expected.

FIGURE III-6 – MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY CORRIDORS.
Relationship of the project area and proposed units to those mature forested stands and the identified potential connectivity corridors.



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

Habitats in the cumulative-effects analysis area are a mosaic of habitat types and age classes. Past harvesting and recent wildfires have reduced the amount of mature, forested habitats; however, continued successional advances in the cumulative-effects analysis area is advancing stands toward mature forests. This alternative would continue to contribute to the mature forested stands in the cumulative-effects analysis area. Losses of individuals and pockets of trees would not likely alter the overall age or landscape connectivity. Continued use of the analysis area by species favoring dense stands of shade-tolerant tree species, and those species requiring larger areas of mature forests, would be expected at similar levels to the present. Habitat for forested-interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would likely persist. Thus, no cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area since: 1) no changes to existing stands would occur; 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Despite advancing succession leading to more mature forested habitats, past harvesting and recent wildfires have reduced the amount of mature, forested habitats across the cumulative-effects analysis area. Reductions in mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities and recent wildfires. In general, the reductions in landscape connectivity associated with the proposed activities would increase the amount of the cumulative-effects analysis area that would not be providing connectivity, particularly in the already compromised southern portion of the cumulative-effects analysis area. Habitats for forested interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would be expected to be reduced; however, continued use of the analysis area by these species would be expected. Thus, moderate adverse cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area since: 1) harvesting would remove mature stands, further reducing the amount of forested cover in the cumulative-effects analysis area; 2) landscape connectivity would be diminished with the proposed harvesting; and 3) some changes to wildlife use would be expected.

Snags and Coarse Woody Debris

Issue

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

Introduction

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

Snags and defective trees (e.g. partially dead, spiked top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species *(Hejl and Woods 1991)*. The quantity, quality, and distribution of snags affect the presence and population size of many wildlife species relying on these resources. Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e.

woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites *(Bull et al. 1997)*. Many species that use smaller-diameter snags will also use large snags; however, the opposite is not true. Typically, older-aged stands will have greater numbers of large snags. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting, but having others nearby for foraging or roosting opportunities.

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

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the contiguous Coal Creek State Forest. This scale of analysis would be large enough to support a diversity of species that use coarse woody debris resources, from birds to small mammals and meso-carnivores.

Analysis Methods

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

Existing Environment

During field visits to the project area, an average of 2.2 large (greater than 21 inches dbh) snags per acre were observed (a range of 0 to 13.2 per acre), which were largely dominated by Engelmann spruce, subalpine fir, western larch, and Douglas-fir. Large snags (greater than 21 inches dbh) were more abundant in the older stands and away from open roads where firewood cutting often occurs. Likewise, coarse woody debris is typically abundant in these older stands, with much of the volume coming from larger pieces of downed wood (greater than 10 inches dbh). Smaller-sized snags were also variable in the project area, with an average of 2.2 snags (15 to 21inches dbh) per acre (a range of 0 to 13.2 per acre), with a similar species mixture as the larger snags. Generally, evidence of snag use for feeding and/or cavity building was observed across the project area. Coarse woody debris levels were also variable across the project area, with a range of 7.1 - 47.8 tons per acre with an average of 21.3 tons per acre (median =17.9 tons/ac; n=9). Elsewhere in the project area, areas that have been harvested in the past decade or so typically have a couple of snags per acre and abundant coarse woody debris. Additionally, numerous snags and coarse woody debris were recruited in those recently burned areas in the project area. The network of open roads in portions of the project area has facilitated some firewood gathering, which has affected snag and coarse woody debris levels in the vicinity of those open roads.

Past harvesting in the cumulative-effects analysis area has reduced the availability of snags and snag recruits while increasing coarse woody debris levels; however, minimum-retention thresholds for each of these resources have been retained in the recent past. Numerous snags and coarse woody debris were recruited in those recently burned areas in the cumulative-effects analysis area. No other harvesting is occurring in the cumulative-effects analysis area that would be altering snags, snag recruits, or coarse woody debris. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and considerable firewood gathering occurs in the cumulative-effects analysis area.

Environmental Effects

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

No direct changes in the deadwood resources would be expected. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. However, in the long-term, densities of shade-intolerant trees and resulting snags could decline, as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Coarse woody debris would persist without other disturbances influencing its distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, negligible direct and indirect effects would be anticipated to snags, coarse woody debris, and subsequently to those wildlife species requiring these habitat attributes since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations, and 2) no changes to human access for firewood gathering would occur.

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

Present and future snags and coarse woody debris would be reduced due to timber harvesting on 150 acres in the project area. Portions of the project area adjacent to open roads or in stands that lack larger snags would not see appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Prescriptions call for a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees would be left if sufficient large snags are not present), and 10 to 15 tons of coarse woody debris per acre (emphasizing retention of some logs 15 inches dbh and larger) would be planned for retention in the proposed harvest areas. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with *ARM 36.11.411*. Future snag quality in the harvested areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species that tend to provide important habitats, such as long-lasting nesting structures and foraging habitats, for cavity nesting birds. Given the amounts, range of variability in sizes, and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. No changes in human access would occur and no changes to the potential risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; and 2) no changes to human access for firewood gathering would occur.

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

Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during much of the past harvesting across the cumulative-effects analysis area, with greater numbers present in locations away from open roads, and reduced numbers near these open roads. Snags and snag recruits have been retained with recent harvesting across the cumulative-effects analysis area. Additionally, numerous snags and coarse woody debris were recruited in those recently-burned areas in the cumulative-effects analysis area Firewood and other forest product-gathering activities have reduced deadwood resources in the vicinity of the open roads. Wildlife species in the cumulative-effects analysis area that rely on snags and coarse woody debris

would be expected to persist. Thus, no cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur; 2) changes in the numbers of snags would be negligible; and 3) no change in the level of firewood gathering would be expected.

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

Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Across the cumulative-effects analysis area, snags and coarse woody debris are common, and past harvesting activities have placed an emphasis on the retention of these landscape attributes. Additionally, numerous snags and coarse woody debris were recruited in those recently burned areas in the cumulative-effects analysis area. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past harvesting and recent wildfires, as well as ongoing firewood gathering. However, the project requirements to retain a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), and 10 to 15 tons of coarse woody debris per acre (emphasizing retention of some logs 15 inches dbh and larger) would mitigate additional cumulative effects associated with this project. Due to a lack of snags and/or the risk of firewood gathering, some areas would not meet these requirements. No change in human access would be anticipated; thus, no changes to the potential loss of snags and coarse woody debris due to firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative-effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers in proposed units following treatment. Thus, minor adverse effects to wildlife species requiring snags and coarse woody debris would be anticipated in the cumulative-effects analysis area since: 1) a small, but cumulative amount of the cumulative-effects analysis area would be harvested, reducing snags and snag-recruit trees while increasing coarse woody debris levels; 2) no changes in access for the general public and associated firewood gathering would be anticipated; and 3) the slightly increased representation of shade-intolerant species could become snags in the long-term.

Fine-Filter Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and species managed as big game by DFWP. *TABLE III-15 – FINE FILTER* summarizes how each of the species considered was included in the following analysis or removed from further analysis because either suitable habitats does not exist in the project area, or proposed activities would not affect their required habitat components.

TABLE III-15 – FINE FILTER. Status of species considered in the fine-filter analysis for this proposed project.

SPECIES/HABITAT	DETERMINATION – BASIS
THREATENED AND ENDANGERED SPECIES	
Grizzly bear *(Ursus arctos)* Habitat: Recovery areas, security from human activity.	The project area occurs in the State Coal Cyclone Subunit of the Northern Continental Divide Ecosystem (NCDE).
Canada lynx *(Felis lynx)* Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone.	Potential Canada lynx habitats occur in the project area.
Gray Wolf *(Canis lupus)* Habitat: Ample big game populations, security from human activities.	The project area is partially in the annual home range of the Dutch wolf pack.
SENSITIVE SPECIES	
Bald eagle *(Haliaeetus leucocephalus)* Habitat: Late-successional forest more than 1 mile from open water.	The proposed project area includes portions of the nest area, primary use area, and home range associated with the Cyclone Bald Eagle territory.
Black-backed woodpecker *(Picoides arcticus)* Habitat: Mature to old burned or beetle-infested forest.	No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander *(Plethodon idahoensis)* Habitat: Waterfall spray zones, talus near cascading streams.	No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse *(Tympanuchus Phasianellus columbianus)* Habitat: Grassland, shrubland, riparian, agriculture.	No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon *(Gavia immer)* Habitat: Cold mountain lakes, nests in emergent vegetation.	Cyclone Lake is an active loon nesting lake that is near, but outside of, the project area. No suitable lake habitats occur in the project area. Thus, no direct, indirect, or cumulative effects to common loons would be expected to occur as a result of either alternative.
Fisher *(Martes pennanti)* Habitat: Riparian and dense mature to old forest less than 6,000 feet in elevation.	Potential fisher habitats occur in the project area.
Flammulated owl *(Otus flammeolus)* Habitat: Late-successional ponderosa pine and Douglas-fir forest.	No suitable dry ponderosa pine stands exist in the project area. Thus, no direct, indirect, or cumulative effects to flammulated owls would be expected to occur as a result of either alternative.

SPECIES/HABITAT	DETERMINATION – BASIS
Harlequin duck *(Histrionicus histrionicus)* Habitat: White-water streams, boulder and cobble substrates.	No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect, or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming *(Synaptomys borealis)* Habitat: Sphagnum meadows, bogs, fens with thick moss mats.	No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon *(Falco peregrinus)* Habitat: Cliff features near open foraging areas and/or wetlands.	No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker *(Dryocopus pileatus)* Habitat: Late-successional ponderosa pine and larch-fir forest.	Mature western larch/Douglas-fir and mixed-conifer habitats exist in the project area.
Townsend's big-eared bat *(Plecotus townsendii)* Habitat: Caves, caverns, old mines.	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect, or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.
BIG GAME SPECIES	
Big game winter range	No white-tailed deer winter range exists in the project area; minimal amounts of mule deer (10 acres) and elk (10 acres) exist in the project area, but are outside of the area where any activities would occur under any of the alternatives. Thus, no direct, indirect, or cumulative effects to big game winter range would be anticipated as a result of either alternative.
Elk security habitat	Elk security habitat *(Hillis et al. 1991)* in effective patches > 250 acres do not exist in the project area, but portions of the project area contribute to larger blocks of elk security habitat in the vicinity.

Threatened and Endangered Species

Grizzly Bear

Issue

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

Introduction

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

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 31,366-acre State Coal Cyclone grizzly bear subunit of the Northern Continental Divide Ecosystem (NCDE). This scale approximates the size of the home range of a female grizzly bear.

Analysis Methods

Field evaluations, aerial-photograph interpretation, and GIS analysis were the basis for this analysis. A moving-windows analysis *(Ake 1994)* was conducted to determine open-road density and amount of security core within the State Coal Cyclone grizzly bear subunit. Results of this analysis identified areas that exceeded an open-road density of 1 mile per square mile, and areas that are free of motorized human access that could contribute to security habitats. Security habitats are areas that are greater than 0.3 mile (500 meters) from any open, restricted, or high-use roads and trails, and meet a minimum size of 2,500 acres. Factors considered in the analysis include the amount of the area with open-road densities greater than 1 mile per square mile, the amount of available security habitat, and the availability of timbered stands for hiding cover.

Existing Environment

The project area exists in the State Coal Cyclone grizzly bear subunit of the NCDE Recovery Area *(USFWS 1993)*. Grizzly bears have been documented in the project area and continued use is anticipated. Grizzly bears generally use different habitats relative to season. The project area likely provides a combination of habitats for grizzly bears throughout the nondenning period. Areas of seasonally important habitats are spread-out throughout the project area, including the lower elevation riparian areas, areas with abundant berries, regenerating burns, and subalpine forests and mid-elevation areas with vegetation that are used during the summer period. No security habitats exist in the project area, but portions of the project area contribute to security habitats that extend beyond the project area. Roughly 1,585 acres of hiding cover exists in the project area.

Managing human access is a major factor in management for grizzly bear habitat. The open-road density in the State Coal Cyclone subunit is below the 1996 threshold *(TABLE III -16 – GRIZZLY BEAR HABITATS)*. DNRC is committed to designing projects to result in no net increase in the proportion of each subunit of a grizzly bear management unit that exceeds an open-road density of 1 mile

per square mile, in comparison to 1996 baseline conditions. No security core exists in the project area, but approximately 212 acres on Winona Ridge and 733 acres on Coal Ridge that exist in the project area contribute to larger blocks of security habitats that extend outside of the project area and DNRC-managed lands. Currently, security habitats are above the 1996 baseline threshold *(TABLE III -16 - GRIZZLY BEAR HABITATS)* on DNRC-managed lands and additional security habitats exist on USFS-managed lands in the cumulative effects analysis area. DNRC is committed to a no-net decrease in security core areas in comparison to the 1996 baseline conditions. Approximately 5,998 acres of hiding cover exists on DNRC-managed portions of the State Coal Cyclone grizzly bear subunit and additional hiding cover exists on USFS lands and privately-owned lands in the cumulative-effects analysis area. No other timber harvesting is occurring in the cumulative-effects analysis area that would be altering grizzly bear habitats or elevating human-disturbance levels.

Environmental Effects

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

No direct effects to grizzly bears would be expected. No changes to the level of disturbance to grizzly bears would be anticipated. Continued maturation of the stands that are a result of the recent wildfires would improve hiding cover, but somewhat at the expense of foraging habitats. No changes in security core, open-road densities, or hiding cover would be anticipated. Thus, no direct or indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected; 2) no changes in hiding cover would occur; 3) security habitat would not be altered; and 4) no changes in long-term open-road densities would be anticipated.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance, or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing impacts to grizzly bears. No specified season of operation exists on any of the proposed units, therefore they may be harvested either during the denning or non-denning period. Harvesting would likely have minor direct effects if conducted during the nondenning period, and no direct effects to grizzly bears would be anticipated if harvesting occurred during the denning period. Portions of several units are near open roads where disturbance from the open road has already reduced habitat quality, and any further reductions would not likely be realized by grizzly bears since they are already likely avoiding those areas. The disturbance associated with the proposed harvesting of areas away from existing disturbance sources and open roads has the highest chance of affecting grizzly bears in the area. Overall, grizzly bears likely use the project area for much of the nondenning period. Disturbance and displacement potentially caused by this alternative would likely disturb grizzly bears should the proposed harvesting activities occur during the nondenning period. Activities conducted during the denning period, or during the summer period, while avoiding the spring and fall periods, would have the lowest potential for grizzly bear disturbance or displacement.

Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on roughly 147 acres in the short-term; however, cover would improve with time as shrub and tree regeneration proceeds. Hiding cover is especially important along open roads and in areas that receive human disturbance. Hiding cover and visual screening in the form of brush, shrubs, and submerchantable trees would be retained along open roads where feasible, and hiding cover throughout the harvested areas would be expected to regenerate 5 to 15 years after proposed treatment.

No changes to motorized access for the general public

would occur, and no new, permanent roads would be constructed. Approximately 0.5 miles of temporary road would be constructed, which could temporarily alter habitat quality for grizzly bears. Additionally, roughly 4.9 miles of closed roads would be opened and used under this alternative. These restricted roads that are opened with this alternative would be closed to the public during proposed activities, and again closed to prevent public motorized access following the proposed activities. The temporary roads would either be behind an existing closure device that prevents motorized public access, or would be closed to discourage public motorized access after the proposed activities. Furthermore, portions of unit 8 would be harvested from the open road, during the denning period, or from the restricted road during an intense period of 30-days or less during any non-denning period to mitigate open road density concerns. Overall a short-term increase in open-road density would be anticipated with this alternative, which could decrease habitat quality for grizzly bears in the area. Following proposed activities, open road densities would revert to existing levels.

Portions of one unit (Unit 6) are far enough from the open roads that it would meet the definition of grizzly bear security habitats and the proposed alteration of vegetation would alter sight-distances, but would not reduce potential for use as security habitats by grizzly bears once the proposed activities are completed. Proposed road construction and use to access proposed units would reduce security habitats in the area. Thus, minor adverse direct or indirect effects to grizzly bears in the local area would be expected since: 1) minor to moderate levels of disturbance and displacement would be anticipated; 2) hiding cover on 150 acres would be lost in the short-term, but would be expected to recover fairly rapidly; 3) security habitats would be reduced; and 4) short-term increases in open-road densities would be anticipated, but no changes to long-term open-road densities would occur.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

Within the cumulative-effects analysis area, motorized access, security habitats, hiding cover, as well as seasonally-important habitats would all remain unchanged. Existing forested stands throughout the cumulative-effects analysis area would be expected to persist into the future. In the long-term, forest succession, including the continued maturation of those stands that resulted from the recent wildfires, would continue and may reduce food sources. Similarly, the amount of hiding cover in the cumulative-effects analysis area may increase with the continuing maturation. Existing human disturbance levels would be expected to continue into the future. Thus, no further adverse cumulative effects would be expected to affect grizzly bears in the cumulative-effects analysis area since: 1) no changes in human disturbance levels would be expected; 2) no further losses of hiding cover would occur; 3) no changes to security habitats would be anticipated; and 4) no changes to open-road densities would occur.

Cumulative Effects of the Action Alternative on Grizzly Bears

The increased use of road systems during the proposed project would temporarily increase human disturbance to grizzly bears in a portion of the cumulative-effects analysis area. The proposed activities would be concentrated in the north-central portion of the cumulative-effects analysis area. Much of the activities associated with this alternative would occur in the portion of the cumulative-effects analysis area that likely is already experiencing moderate levels of human disturbance. Continued use of the cumulative-effects analysis area by grizzly bears would be anticipated. Reductions in hiding cover would be additive to reductions from past timber harvesting and recent wildfires; however, moderate levels of hiding cover exists in the cumulative-effects analysis. Early successional stages of vegetation occurring in harvest areas could provide foraging opportunities that do not exist in some mature stands. Open-road density in the cumulative-effects analysis area would increase from the current condition *(TABLE III-16 - GRIZZLY BEAR HABITATS)*, but would be below the 1996 baseline conditions. No appreciable changes in long-term open-road density would be expected in

the cumulative-effects analysis area since all roads would revert to their present status and all trails and temporary roads would be closed to motorized public access following proposed activities. An established road system would persist that would facilitate some human access into the cumulative-effects analysis area. The installation of berms at both ends of state ownership on the Winona Road would offset the reductions in security habitats and yield a net increase in security habitats for grizzly bears in the cumulative-effects analysis area while the project activities would be occurring *(TABLE III-16 - GRIZZLY BEAR HABITATS)*. Thus, minor adverse cumulative effects to grizzly bears would be expected in the short-term since: 1) minor increases in human-disturbance levels would be expected; 2) hiding cover would be reduced in the short-term on a relatively small portion of the cumulative-effects analysis area, but would be expected to recover fairly rapidly; 3) increases in security habitats would be expected; and 4) no changes in long-term open-road densities would be anticipated.

TABLE III-16 – GRIZZLY BEAR HABITATS. Baseline 1996, current, and anticipated open-road densities, security habitats, and hiding cover under each alternative in the State Coal Cyclone subunit.

	OPEN ROAD DENSITY	SECURITY HABITATS	HIDING COVER
Baseline (1996)	35.4 percent	44.0 percent	80.0 percent [a]
Current (2010)	32.6 percent	45.3 percent	44.7 percent
No-Action Alternative	32.6 percent	45.3 percent	44.7 percent
Action Alternative	35.4 percent	48.2 percent	43.6 percent
[a] *Hiding cover estimate from the Cyclone/Coal Timber Harvest Project EIS*			

Canada Lynx

Issue

The proposed activities could change stand conditions, which could reduce or modify lynx foraging habitats, denning habitats, and temporary non-lynx habitats, rendering them unsuitable for supporting lynx.

Introduction

Canada lynx are associated with subalpine fir forests, generally between 4,000 and 7,000 feet in elevation in western Montana *(Ruediger et al. 2000)*. The proposed project area ranges from approximately 4,000 to 6,400 feet in elevation; the project area is dominated by mixed conifer with appreciable acreage in subalpine fir and Douglas-fir/western larch. Lynx habitats in western Montana consist primarily of stands that provide habitat for snowshoe hares, either dense young coniferous stands or dense mature forested stands, as well as mature subalpine fir types with abundant coarse woody debris for denning and cover for kittens, and densely forested cover for travel and security. These conditions are found in a variety of habitat types, particularly within the subalpine fir series *(Pfister et al. 1977)*. Historically, high intensity, stand-replacing fires of long fire intervals (150 to 300 years) within continuous dense forests of lodgepole pine, subalpine fir, and Engelmann spruce created extensive even-aged patches of regenerating forest intermixed with quite old stands that maintained a mosaic of snowshoe hare and lynx habitat.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the State Coal Cyclone grizzly bear subunit used for the grizzly bear cumulative-effects analysis *(per ARM 36.11.435 [7] [a] and [b])*. More information regarding this subunit can be found in the *GRIZZLY BEAR* section. The scale of this analysis area approximates the home range size of an individual lynx *(Ruediger et al. 2000)*.

Analysis Methods

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

1) denning,

2) young foraging,

3) mature foraging,

4) forested travel/other habitat, and

5) temporary non-lynx habitats.

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

Existing Environment

The majority of the 2,207-acre project area was identified as lynx habitats *(TABLE III-17 –EXISTING LYNX HABITATS)*. Much of this habitat was identified as mature foraging, forested travel/other and temporary non-lynx habitats. Much of the 19 percent of the project area that is in the temporary non-lynx habitat class is the result of recent wildfires and would be expected to develop into young foraging habitats in the near-term. Additionally, the project area and all of Coal Creek State Forest are included in the 39,000 square miles designated as Critical Habitat for Canada lynx by USFWS. Connectivity of forested habitats within the project area has been compromised by past timber harvesting, recent wildfires, and open roads in the area *(see WILDLIFE ANALYSIS—MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY)*.

Temporary non-lynx habitats and forested travel/other suitable habitats dominate the cumulative-effects analysis area *(TABLE III-17 – EXISTING LYNX HABITATS)*. The distribution of the various lynx habitat elements on DNRC-managed lands is primarily the result of past timber harvesting and the recent wildfires. Forest-management practices over the past 40 to 60 years produced the current levels of young foraging and temporary non-lynx habitats. Areas in which timber harvesting was conducted over 15 years ago have likely recovered to the point of at least providing forested travel/other habitat. In addition, areas burned with the Cyclone Ridge (2000) and Moose (2001) wildfires have contributed to the existing levels of temporary non-lynx and forested travel/other habitats that exist in the cumulative-effects analysis area; many of these stands are developing towards the young foraging habitats with continued stand development. At the subunit level, *ARM 36.11.435* requires a minimum of 5 percent and 10 percent of the lynx habitats in a bear management subunit to be in denning and foraging habitats, respectively. Currently, the cumulative-effects analysis area exceeds the minimum thresholds for both foraging and denning habitat requirements *(TABLE III-17 –EXISTING LYNX HABITATS)*. No other ongoing harvesting is occurring on DNRC-managed lands or USFS lands in the cumulative-effects analysis area that is affecting Canada lynx habitats; any harvesting that may occur on private ownership could continue altering Canada lynx habitats. Connectivity in the cumulative-effects analysis area has been appreciably altered with recent wildfires, past harvesting, and the network of roads. Canada lynx have been documented in the cumulative-effects analysis area in the past.

Environmental Effects

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

In the short-term, no changes in lynx habitat elements would be expected in the project area. Continued

maturation of the temporary non-lynx habitats resulting from the recent wildfires would gradually increase the availability of young foraging habitats. In the longer-term, barring any further major natural disturbances, natural succession would advance several classes forward, generally improving several classes of lynx habitats; however, a net reduction in young foraging habitats would be expected over time, in the absence of any stand disturbance. When this occurs, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx in the future. Mature foraging and denning habitats would be expected to remain at similar levels, or increase in the future, as shade-tolerant trees develop in the understory and coarse woody debris accumulates through time due to natural events. Forested travel/other habitats would be expected to increase in the future as temporary non-lynx habitats and young foraging habitats mature into this habitat element. Therefore, in the short-term, no effects to lynx would be expected. In the longer-term, without human or natural disturbance, young foraging opportunities in the project area would potentially decrease. Landscape connectivity would not be altered in the near-term and might improve in the long-term in a landscape where connectivity is somewhat limited. The existing stands of continuous forested habitats could facilitate lynx movement. Existing closed roads and skid trails would remain closed; no changes in human-disturbance levels would be expected. Thus, negligible adverse direct and indirect effects to lynx habitats would be expected to occur in the project area since: 1) adequate denning habitats would persist; 2) sufficient mature foraging habitat would exist; 3) longer-term availability of young foraging habitats would likely decline without disturbance; 4) the amount of temporary non-lynx habitats would not increase, but would continue to represent a rather sizeable portion of the habitats present; and 5) landscape connectivity would not be altered.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 148 acres of lynx habitats would be harvested with this alternative *(TABLE III-18 – CHANGES TO LYNX HABITATS)*. In units proposed to receive regeneration treatments, canopy cover and horizontal cover would be removed to prepare for regenerating trees. These prescriptions would convert available lynx habitat elements into temporary non-lynx habitats, until tree seedlings and shrubs recover and begin providing habitats for snowshoe hares. Conversely, habitats in the unit proposed to receive an old-growth maintenance treatment would be converted into the forested travel/other category *(TABLE III-18 – CHANGES TO LYNX HABITATS)*. Continued maturation of the temporary non-lynx habitats resulting from the recent wildfires would gradually increase the availability of young foraging habitats in the project area. Likewise the continued maturation of younger-aged stands in the project area would gradually move these stands away from the young foraging habitat class and into other classes of lynx habitats. However, the younger-aged stands created by the proposed even-aged harvest treatments would provide young foraging habitats further into the future, as tree seedlings and shrubs recover and begin providing habitats for snowshoe hares. It could take up to 10 years for seedlings to provide snowshoe hare habitats, and then these ephemeral habitats would gradually outgrow usefulness to snowshoe hares in 10 to 20 years. In all proposed units, 10 to 15 tons of coarse woody debris would be retained (emphasizing retention of some logs 15 inches dbh and larger) to provide some horizontal cover and security structure for lynx. In the short-term, lynx would likely avoid proposed harvest units that would be converted to temporary non-lynx habitat, resulting in habitat usage shifts away from the regeneration units. Use of the unit receiving old-growth maintenance treatment would be expected to continue at some level. Forest connectivity would be further compromised in a landscape where connectivity has been compromised *(see WILDLIFE ANALYSIS – MATURE FORESTED HABITATS AND LANDSCPE CONNECTIVITY)*; as connectivity of forested habitats is increasingly affected, the ability of the landscape to facilitate Canada lynx movements is also being increasingly compromised. Collectively, minor to moderate adverse direct and indirect effects to lynx habitats would be expected to affect Canada lynx in the project area since: 1) adequate denning habitats would persist; 2) sufficient mature foraging

would exist; 3) young foraging habitats would continue developing in the next 20 to 50 years in the project area; 4) moderate amounts of the project area (~25 percent) would be in the temporary non-lynx habitat category, meaning most of the lynx habitats would be in a usable state for lynx; and 5) moderate reductions in landscape connectivity could alter lynx movements through the project area.

Cumulative Effects of the No-Action Alternative on Canada Lynx

Within the cumulative-effects analysis area, the mosaic of habitats would be expected to continue providing snowshoe hare habitats intermixed with mature forested stands that facilitate travel and foraging. No appreciable change in lynx habitats would occur under this alternative, except the continued maturation of stands *(TABLE III-19 – CEAA LYNX HABITATS)*. A slight increase in young foraging habitats in the cumulative-effects analysis area would be possible in the near-term, as stands that burned and/or were harvested in the last 10 to 15 years regenerate tall, dense saplings. Gradually, however, as these young foraging stands continue maturing out of the young foraging category and into forested travel/other habitats, habitat quality for snowshoe hares could decline, thereby reducing the availability of prey for lynx in the long-term. Mature foraging and denning habitats would be expected to increase in the future as shade-tolerant trees develop in the understory, coarse woody debris accumulates through time due to natural events, and, in general, stands continue maturing out of young foraging and forested travel/other habitats. Therefore, in the short-term, negligible negative effects to lynx would be expected. No appreciable changes to landscape connectivity would be anticipated in the near-term. Thus, negligible adverse cumulative effects to lynx habitats would be expected in the cumulative-effects analysis area since: 1) adequate denning habitats would persist; 2) sufficient mature foraging habitats would exist; 3) young foraging habitats would continue developing in the near-term across the cumulative-effects analysis area; 4) longer-term availability of young foraging habitats would likely decline without disturbance; 5) no changes in the amount of the cumulative-effects analysis area that is in the temporary non-lynx habitat class would occur; and 6) landscape connectivity would not be altered.

Cumulative Effects of the Action Alternative on Canada Lynx

Within the cumulative-effects analysis area, considerable lynx habitats would continue to persist. Minor reductions in mature foraging habitat and negligible changes in denning and forested travel/other habitats in the proposed units would not be expected to appreciably alter use by lynx of the cumulative-effects analysis area. Following harvesting, sufficient denning and foraging habitats would be retained on DNRC-managed lands *(TABLE III-19 – CEAA LYNX HABITATS)* to satisfy DNRC's commitment for these habitat attributes (ARM 36.11.435) in the cumulative-effects analysis area. Anticipated reductions in denning, foraging, and forested travel/other habitats would be additive to past losses from timber harvesting, recent wildfires, and any ongoing habitat modifications occurring in the cumulative-effects analysis area; likewise, increases in temporary non-lynx habitats would be additive to past losses of lynx habitats. Gradually, young foraging stands would develop on these temporary non-lynx habitats, including those habitats that are a result of the recent wildfires. Within the next 2 decades, some of the forested travel and temporary non-lynx habitats would be expected to develop into some of the other suitable lynx habitat categories. Some denning and foraging habitats would be expected to persist in the cumulative effects analysis area in the absence of timber harvesting or another catastrophic event reducing existing habitat quality. However, sufficient foraging and denning habitats would persist in the cumulative-effects analysis area. Generally, minimizing the amount of an area in temporary non-lynx habitats would benefit lynx; the amount of the cumulative-effects analysis area presently in temporary non-lynx habitats is fairly high (largely due to recent wildfires, which pushed the landscape above the recommended 30 percent threshold), but the estimated 1% increase associated with this proposal would not be expected to appreciably alter lynx use of the cumulative effects

analysis. Forest connectivity would be further compromised in the cumulative-effects analysis area, *(see WILDLIFE ANALYSIS – MATURE FORESTED HABITATS AND LANDSCPE CONNECTIVITY)*, which would further limit the ability of the cumulative-effects analysis area to facilitate lynx movements. Additionally, landscape connectivity in the southern portion of the cumulative-effects analysis area was compromised with the Moose Fire, and the reductions in connectivity associated with this alternative would occur near the northern boundary of the Moose Fire, which would extend that compromised portion of the landscape further to the north, further limiting opportunities to move through that portion of the cumulative-effects analysis area. Thus, minor to moderate adverse cumulative effects to lynx habitats would be expected to affect Canada lynx in the cumulative-effects analysis area since: 1) adequate denning habitats would persist in the cumulative-effects analysis area; 2) sufficient mature foraging habitats would exist in the cumulative-effects analysis area; 3) young foraging habitats would continue developing for the next 20 to 50 years across the cumulative-effects analysis area; 4) moderate to high amounts of lynx habitats would be in the temporary non-lynx habitat category (roughly 36 percent), meaning a large portion of the lynx habitats would be in a usable state for lynx; and 5) moderate reductions in landscape connectivity would occur, particularly adjacent to the Moose Fire perimeter where landscape connectivity has already been compromised.

TABLE III-17 – EXISTING LYNX HABITATS. Acres of lynx habitats in the project area and State Coal Cyclone cumulative-effects analysis area with the proportion that each suitable class represents out of all suitable lynx habitats in both areas.

LYNX HABITAT	PROJECT AREA	STATE COAL CYCLONE SUBUNIT
Denning	241 (12 percent)	1,118 (10 percent)
Foraging	880 (43 percent)	2,108 (19 percent)
Forested travel	474 (23 percent)	3,575 (33 percent)
Young foraging	84 (4 percent)	236 (2 percent)
Temporary non-lynx habitats	382 (19 percent)	3,805 (35 percent)
Total lynx habitats	2,061	10,842
Permanently unsuitable	145	2,580
Total analysis area	2,206	13,422

TABLE III-18 – CHANGES TO LYNX HABITATS. Acreage changes in lynx habitat elements following implementation of each alternative.

CHANGES TO LYNX HABITATS	ALTERNATIVES	
	No Action	Action
Denning habitat converted to temporary non-lynx habitat	0	4
Mature foraging habitat converted to temporary non-lynx habitat	0	104
Forested travel/other habitat converted to temporary non-lynx habitat	0	15
Temporary non-lynx habitat treated but remaining as temporary non-lynx habitat	0	1
Total increase in temporary non-lynx habitat	*0*	*123*
Denning habitat converted to other habitat	0	0
Mature foraging habitat converted to other habitat	0	25
Forested travel/other habitat treated but remaining as forested travel/other habitat	0	0
Total increase in forested travel/other habitat	*0*	*25*
Total lynx habitat affected	*0*	*148*

TABLE III-19 – CEAA LYNX HABITATS. Acres of lynx habitats affected, resulting acres of lynx habitats after each alternative, and the proportion that each suitable habitat represents out of all suitable lynx habitats, by alternative, in the State Coal Cyclone cumulative-effects analysis area.

LYNX HABITAT		NO-ACTION ALTERNATIVE	ACTION ALTERNATIVE
Denning	Project level change	0	-4
	Acres post-treatment	1,118	1,114
	Percent of lynx habitats	10 percent	10 percent
Foraging	Project level change	0	-129
	Acres post-treatment	2,108	1,979
	Percent of lynx habitats	19 percent	18 percent
Forested travel	Project level change	0	+10
	Acres post-treatment	3,575	3,585
	Percent of lynx habitats	33 percent	33 percent
Young Foraging	Project level change	0	0
	Acres post-treatment	236	236
	Percent of lynx habitats	2 percent	2 percent
Temporary non-lynx habitats	Project level change	0	+123
	Acres post-treatment	3,805	3,930
	Percent of lynx habitats	35 percent	36 percent
Total lynx habitats	Project level change	0	0
	Acres post-treatment	10,842	10,842
Permanently unsuitable		2,580	2,580
Total analysis area		13,422	13,422

Gray Wolf

Issue

The proposed activities could displace gray wolves from important habitats, particularly denning and rendezvous sites and/or alter prey availability.

Introduction

The gray wolf was listed as 'endangered' under the Endangered Species Act in the northern portion of Montana, which includes the project area. The gray wolf was de-listed on March 28, 2008; however, a preliminary injunction (July 18, 2008) led to the re-listing of wolves in this area as 'endangered.' Following the injunction, the USFWS requested the Court allow them to voluntarily withdraw its decision to delist wolves and re-evaluate information and make a new decision, which was granted (October 14, 2008). The USFWS then de-listed the gray wolf (May 4, 2009), and a recent federal ruling (August 8, 2010) re-instated the Endangered classification for gray wolves under the Endangered Species Act. To meet the delisting criteria, the 3 recovery areas need to support a minimum of 30 breeding pairs for 3 consecutive years. The 3 recovery areas have met the recovery objectives for breeding pairs since 2000. In 2009, 115 of the 242 documented packs in the tri-state region met the definition of a 'breeding pair' *(USFWS et al. 2010).* Of those 115 packs, 37 occurred in Montana, with 23 of those found in the northern Montana portion of the recovery area, along with 41 additional packs that didn't meet the requirements to be considered a 'breeding pair' *(Sime et al. 2010).*

Wolves are a wide-ranging, mobile species that occupy a wide variety of habitats that possess adequate prey and minimal human disturbance, especially at den and/or rendezvous sites. The Dutch wolf pack has been in the vicinity for at least the last 9 years, and has been a breeding pair counted toward the recovery goals for 4 of the last 5 years. The home range for this pack is variable and has been adjacent to the project area in numerous years *(USFWS et al. 2010).*

Wolves are opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities *(Oakleaf et al. 2006, Fuller et al. 1992)*. In northwestern Montana, wolves prey primarily on white-tailed deer and, to a lesser extent, elk and moose *(Kunkel et al. 1999)*. However, some studies show that wolves may prey on elk more frequently during certain portions of the year (particularly winter) or in areas where elk numbers are higher *(Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006)*. Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

Wolves typically den during late April in areas with gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. When the pups are 8 to 10 weeks old, wolves leave the den site and start leaving their pups at rendezvous sites while hunting. These sites are used throughout the summer and into the fall. Disturbance at den or rendezvous sites could result in avoidance of these areas by the adults or force the adults to move the pups to a less adequate site. In both situations, the risk of pup mortality increases. No wolf den or rendezvous sites are known to be in the project area; however, some landscape features frequently associated with these sites occur in the project area. Wolves may be using the vicinity of the project area for hunting, breeding, and other life requirements.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the annual home ranges for the Dutch wolf pack, which includes most of the project area, and would be large enough to support this wolf pack.

Analysis Methods

Since changes in winter range could have a sizable effect on the availability of prey for wolves, portions of the analysis are tied to the big game winter range section. Meanwhile, disturbance at den and rendezvous sites are important during certain portions of the year, and the timing of proposed activities

in relation to these sites is also important. Direct and indirect, as well as cumulative effects, were analyzed using field evaluations, aerial-photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of winter range modified, and the level of human disturbance in relation to any known wolf dens or rendezvous sites.

Existing Environment

Big game species are abundant in the project area. No white-tailed deer winter range exists in the project area and very limited amounts of mule deer (~10 acres) or elk (~10 acres) winter ranges exist in the project area. Some landscape features commonly associated with denning and rendezvous sites occur in the project area, such as areas with gentle terrain near a water source (valley bottoms), openings from recent wildfires, and proximity to big game wintering areas. Wolves from the Dutch wolf pack have been documented in the project area in the past, and could continue using the area into the future. No known den or rendezvous sites occur in the project area. Wolves may be using the vicinity of the project area for hunting, breeding, and other life requirements.

Within the larger, cumulative-effects analysis area, big game species are somewhat abundant, but winter ranges are limited in the central portions along the North Fork Flathead River. Numerous landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur in the cumulative-effects analysis area. The known den site, along with the suspected rendezvous sites for this wolf pack, occurs in Glacier National Park and not in the project area *(K. Laudon, DFWP, personal communication, December 16, 2010)*. In the past, wolves from the Dutch wolf pack have utilized a fairly large portion of the cumulative-effects analysis area and would be expected to continue using this area into the future. Past harvesting and recent wildfires in the cumulative-effects analysis area altered big game and wolf habitats. No other ongoing harvesting is occurring on DNRC-managed lands or USFS lands in the cumulative-effects analysis area that is altering wolf habitats or big game habitats.

Environmental Effects

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

Disturbance to wolves would not increase. No changes in big game habitats, including no changes to big game winter ranges, would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. Wolf use of the project area would be expected to continue at current levels. Thus, no direct and indirect effects would be expected to affect gray wolves in the project area since: 1) no changes in human disturbance levels would occur; and 2) no changes to big game winter range would occur.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

Wolves using the area could be disturbed by the proposed activities but are most sensitive at den and rendezvous sites, which are not known to occur in the project area. After proposed activities, human disturbance levels would likely revert to pre-harvest levels, and no changes in human access or open-road densities would be anticipated. Likewise, wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. In the short-term, the proposed harvesting could lead to shifts in big game use, which could lead to a shift in wolf use of the project area. No changes in big game winter range would occur. Thus, negligible direct and indirect effects would be expected to affect gray wolves in the project area since: 1) minor short-term increases and negligible long-term changes in human disturbance levels would occur, with no increases near known wolf den and/or rendezvous sites anticipated; and 2) no changes to white-tailed deer, mule deer, or elk winter ranges would occur.

Cumulative Effects of the No-Action Alternative on Gray Wolves

White-tailed deer, mule deer, and elk winter ranges would not be affected and substantive changes in big game populations, distribution, or habitat use would be not anticipated. Levels of human disturbance

would be expected to remain similar to present levels. No other ongoing harvesting is occurring on DNRC-managed lands in the cumulative-effects analysis area that is altering wolf habitats or big game habitats. No changes in the level of gray wolf use of the cumulative-effects analysis area would be anticipated. No changes in human access would be anticipated. Thus, no further cumulative effects would be expected to affect gray wolves since: 1) no changes in human disturbance levels would occur, particularly near known wolf den and/or rendezvous sites; and 2) no changes to big game winter ranges would occur.

Cumulative Effects of the Action Alternative on Gray Wolves

No changes to white-tailed deer, mule deer, or elk winter range would be anticipated. Some slight shifts of big game use may occur. Reductions in cover may cause slight decreases in use by deer and elk; however, no appreciable changes would be expected within the cumulative-effects analysis area. These reductions in cover would be additive to losses from past timber-harvesting activities, recent wildfires, and any ongoing harvesting in the cumulative-effects analysis area. Human-disturbance levels would be elevated during proposed activities and would be expected to revert to levels similar to current levels after the proposed harvesting has been completed and roads would again be closed. No changes in motorized human access would be anticipated. No substantive change in wolf use of the cumulative-effects analysis area would be expected; wolves would continue to use the area in the long-term. Thus, negligible further cumulative effects would be expected to affect gray wolves since:
1) negligible short-term and long-term changes in human disturbance levels would occur with no increases near known wolf den and/or rendezvous sites anticipated; and 2) no changes to white-tailed deer, mule deer, or elk winter range would occur.

Sensitive Species

When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or may, if management activities result in continued adverse impacts, become listed under the Federal Endangered Species Act. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful 'fine filter' for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the Montana Natural Heritage Database documented bald eagles, fisher, black-backed woodpeckers, common loons, and harlequin ducks in the vicinity of the project area. As shown in *TABLE III-15 - STATUS OF SPECIES CONSIDERED IN THE FINE-FILTER ANALYSIS FOR THIS PROPOSED PROJECT*, the sensitive-species portion of this analysis will focus on bald eagles, fishers, and pileated woodpeckers.

Bald Eagle

Issue

The proposed activities could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.

Introduction

Bald eagles are diurnal raptors associated with significant bodies of water, such as rivers, lakes, and coastal zones. The bald eagle diet consists primarily of fish and waterfowl, but includes carrion, mammals, and items taken from other birds of prey. In northwestern Montana, bald eagles begin the breeding process with courtship behavior and nest building in early February; the young fledge by approximately mid-August, ending the breeding process. Preferred nest-stand characteristics include large emergent trees that are within site distances of lakes and rivers and screened from disturbance by vegetation.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the home range for the Cyclone Lake bald eagle territory. This cumulative-effects analysis area likely includes the areas used by the pair of eagles using the territory.

Analysis Methods

Effects were analyzed using a combination of field evaluations and aerial photograph interpretation within the bald eagle home range. Factors considered within this analysis include disturbance levels and availability of large, emergent trees with stout horizontal limbs for nests and perches.

Existing Environment

The project area is almost entirely within the Cyclone Lake bald eagle territory. This territory has not had an active nest in the last 5 years, but eagles have been documented in the territory at least 3 of those years. The aquatic habitat associated with the bald eagle territory includes Cyclone Lake, Cyclone Creek, Coal Creek, Dead Horse Creek, and North Fork Flathead River. These waterbodies may all be important components of the Cyclone Lake bald eagle territory. Aquatic and terrestrial prey species are fairly common in the home range. The terrestrial habitat incorporated by the Cyclone Lake bald eagle territory is a coniferous/deciduous mixture along the lakeshores and riparian areas, with coniferous forests in the upland areas. Within the present home range, black cottonwood is the deciduous tree of primary importance to bald eagles, while large emergent conifers also provide important nesting, roosting, and perching habitats.

Bald eagle habitat is managed at three spatial scales—the nest area (area within a 0.25-mile radius of the active nest tree or nest sites that have been active within five years), the primary use area (an area 0.25-0.50-miles from the nest tree), and the home range (area within 2.5 miles of all nest sites that have been active within five years). The most recently used nest has an associated nest-site area that largely encompasses USFS-managed lands. The primary-use area, in which it is assumed approximately 75 percent of the foraging, resting, and associated behaviors occurs *(Montana Bald Eagle Working Group, 1994)*, consists of USFS-managed lands (707 acres) and DNRC m anaged lands (328 acres). The delineated home range incorporates 12,566 acres of DNRC-managed lands (7,681 acres), US Forest Service-managed lands (4,628 acres), and private (257 acres) lands.

Human disturbance, including timber harvesting and various forms of recreation are potential sources of disturbance to the nesting territory. Several large emergent trees are available across portions of the home range, but logging in the last 100 years and recent wildfire activity has likely reduced some of these trees while others have experienced mortality and are declining in quality. No other timber management activities are ongoing within the home range of this nesting pair on DNRC-managed lands or USFS lands.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Bald Eagles

No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels. No changes in available nesting habitats would occur. Thus, negligible direct and indirect effects to bald eagles would be expected since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

Direct and Indirect Effects of the Action Alternative on Bald Eagles

None of the proposed units would be within in either the nest or primary use areas. All the proposed units would be within the home range associated with the bald eagle territory. These units would likely be harvested during the latter phases of the nesting season or during the non-nesting period (August 16 – February 1). Within the home range, proposed timber harvesting would alter forested canopy on approximately 150 acres. Harvesting in the latter portions of the nesting season could have minimal effects to bald eagles and any harvesting in the non-nesting phase (August 16 – February 1) would be expected to have no effects to nesting bald eagles. Efforts to limit harvesting to the non-nesting period would have the least risk of displacing the bald eagle pair and/or disrupting their breeding activities. The potential for displacement would only be expected

to affect eagles during the activities and not beyond. Most of the units would receive regeneration treatment and would the resultant stands would be fairly open after completion, which could slightly increase visibility and associated disturbance. Within the home range, prescriptions call for the retention of some large snags and emergent trees that could be used in the future as nest or perch trees as the stands develop around these resources. No appreciable changes to human access to the home range would occur, thus limiting potential for introducing additional human disturbance to this territory. Thus, minor direct and indirect effects to bald eagles would be expected since: 1) disturbance would be elevated within the territory during operations; 2) no appreciable change in human access within the project area would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

Cumulative Effects of the No-Action Alternative on Bald Eagles

Nesting bald eagles would continue to experience varying levels of disturbance from the ongoing recreational use associated with Cyclone Lake and surrounding area. Emergent trees exist across portions of the home range. No further changes in human disturbance, development, recreation, timber harvesting, or firewood gathering within the home range area would be anticipated. Thus, no cumulative effects to bald eagles would be expected since: 1) no changes to human disturbance levels would occur; and 2) no changes in the availability of large, emergent trees would be expected.

Cumulative Effects of the Action Alternative on Bald Eagles

Nesting bald eagles would continue to experience varying levels of disturbance from the ongoing recreational use of Cyclone Lake and surrounding area. Any potential disturbance and/or noise from the proposed harvesting would be additive to any of these other forms of disturbance, however no changes in bald eagle behavior would be anticipated. Emergent trees exist across the home range. Thus, minor cumulative effects would be expected to affect bald eagles, since: 1) disturbance would be elevated within the territory during operations; 2) no appreciable change in human access within the territory would occur; and 3) negligible changes in the availability of large, emergent trees would be expected.

Fisher

Issue

The proposed activities could reduce the amount and/or quality of fisher habitats, which could alter fisher use of the area.

Introduction

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds *(Powell and Zielinski 1994)*. They also take advantage of carrion and seasonally available fruits and berries *(Foresman 2001)*. Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies *(Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994)* and avoid openings or young forested stands *(Buskirk and Powell 1994)*. However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water *(Jones 1991)*. Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the State Coal Cyclone grizzly bear subunit used for the grizzly bear cumulative-effects analysis. More information regarding this subunit can be found in the *GRIZZLY BEAR* section. This scale includes enough area to approximate overlapping home ranges of male and female fishers *(Heinemeyer and Jones 1994)*.

Analysis Methods

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

Existing Environment

The project area ranges from 3,960 to 5,880 feet in elevation, with approximately 4.1 miles of perennial streams and at least another 2.1 miles of intermittent streams. DNRC manages preferred fisher cover types within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density *(ARM 36.11.440[1][b][i])*. Approximately 133 acres are in these riparian areas in the project area along the 6.2 miles of Class 1 and 2 streams. Modeling fisher habitats using SLI data generated an estimate of 685 acres of fisher foraging, resting, denning, and travel habitats (627 upland acres and 58 riparian acres) in the project area *(Heinemeyer and Jones 1994)*. Within the riparian areas, the majority of the preferred fisher cover types (58 of 70 acres, or 83%) are moderately or well-stocked and likely support the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity.

There are approximately 28 miles of Class 1 streams and another 14 miles of Class 2 streams in the cumulative-effects analysis area. Approximately 2,040 acres of riparian habitats are associated with these streams across ownerships in the cumulative-effects analysis area, including approximately 882 of those acres occurring on DNRC-managed lands. Within the riparian habitats below 6,000 feet in elevation and on DNRC-managed lands, 80.8 percent is in preferred fisher cover types and presently providing structural features necessary for use as fisher resting and denning habitats. Additionally, roughly 2,865 acres of upland fisher habitats exist on DNRC-managed lands in the cumulative-effects analysis area as well. Landscape connectivity in the cumulative-effects analysis area has been compromised with past timber harvesting, recent wildfires, and open roads. No other ongoing harvesting is occurring on DNRC-managed lands in the cumulative-effects analysis area that is altering fisher habitats. Similarly, no timber harvesting is occurring on USFS lands in the cumulative-effects analysis area.

Environmental Effects

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

No effects to fishers would be expected under this alternative. Minimal changes to the stands providing fisher habitats would be expected. Habitats that are conducive to fisher denning and travel may improve in time due to increases in tree growth and canopy closure; however, foraging opportunities may decline in future decades if disturbance is minimized, since habitats such as edges and younger age-class stands that support a variety of prey species would decline in abundance on the landscape. Human disturbance and potential trapping mortality would expect to remain similar to current levels. No changes in landscape connectivity would occur. Thus, no direct and indirect effects would affect fishers in the project area since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered further; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or the potential for trapping mortality would be anticipated.

Direct and Indirect Effects of the Action Alternative on Fishers

No riparian habitats would be altered with this alternative. Approximately 105 of the 627 acres (16.7 percent) of upland fisher habitats in the project area would receive treatments; roughly 80

acres would receive a regeneration-type treatment, which would result in stands that are too open for appreciable fisher use following proposed treatments, and the remaining 28 acres would receive an old-growth maintenance treatment which would likely retain at least 40% canopy closure and would continue to be available as potential fisher habitat, although at a reduced quality. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Moderate reductions in connectivity would be expected in a landscape where connectivity is somewhat limited *(see WILDLIFE ANALYSIS-MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY)*, but activities would largely avoid riparian areas where some connectivity exists. Thus, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area since: 1) harvesting would avoid riparian areas; 2) harvesting would reduce or remove upland fisher habitats; 3) moderate reductions in landscape connectivity would occur, but those areas associated with riparian areas would remain unaffected; 4) harvesting would reduce snags and snag-recruitment trees while increasing coarse woody debris levels; however, some of these resources would be retained; and 5) no appreciable changes in motorized human-access levels would be anticipated.

Cumulative Effects of the No-Action Alternative on Fishers

Fisher denning and resting habitats would be retained. Suitable fisher foraging, denning, and resting habitats occur across the cumulative-effects analysis area. Landscape connectivity in the cumulative-effects analysis area has been compromised with past timber harvesting, recent wildfires, and open roads, but some connectivity along riparian areas exists; no further changes in landscape connectivity would be anticipated. Road access in the cumulative-effects analysis area would not change; therefore, fisher vulnerability to trapping would remain unchanged. Thus, no further cumulative effects to fishers would be anticipated in the cumulative-effects analysis area since: 1) no changes to existing habitats on DNRC-managed land would occur; 2) landscape connectivity afforded by the stands on DNRC-managed land would not change appreciably; 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to human access or the potential for trapping mortality would be anticipated.

Cumulative Effects of the Action Alternative on Fishers

Since no changes in riparian habitats would occur, no changes in the amount of the preferred riparian fisher cover types meeting structural requirements for fishers at the cumulative-effects analysis area would occur. Following the proposed treatments, the State Coal Cyclone cumulative-effects analysis area *(TABLE III-20 - CHANGES IN FISHER HABITATS)* would exceed the 75-percent threshold for riparian habitats established in *ARM 36.11.440(1)(b)(i)*. Roughly 105 acres of potential upland fisher foraging and travel *(TABLE III-19 - CHANGES IN FISHER HABITATS)* habitats would be harvested; upland foraging and travel habitats would continue to be present in the cumulative-effects analysis area. These reductions would be additive to the losses associated with past timber harvesting and recent wildfires in the cumulative-effects analysis area. Landscape connectivity in the cumulative-effects analysis area has been compromised with past timber harvesting, recent wildfires, and open roads; the proposed harvesting would further reduce landscape connectivity, but would avoid riparian areas commonly used by fisher. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, minor adverse cumulative effects would be anticipated that would affect fisher in the cumulative-effects analysis area since: 1) harvesting would remove upland fisher habitats, but considerable upland habitats would persist; 2) moderate reductions in landscape connectivity would be anticipated, but connectivity in riparian areas would not be altered; 3) harvesting in a relatively small portion of the cumulative-effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 4) no appreciable changes to motorized human access would occur.

TABLE iii-20 –CHANGES IN FISHER HABITATS. Comparison by alternative of changes in fisher habitats, preferred cover types, and percentage of the cumulative-effects analysis area in fisher habitats by riparian and upland zones.

	NO-ACTION ALTERNATIVE		ACTION ALTERNATIVE	
	RIPARIAN	UPLAND	RIPARIAN	UPLAND
Acres of Fisher habitats removed	0	0	0	80
Acres of Fisher habitats modified	0	0	0	25
Acres of Preferred cover types modified	0	0	0	105
Percentage of fisher habitats [a]	80.8 percent	63.9 percent	80.8 percent	62.1 percent

[a] *Fisher habitats are those lands in preferred cover types that are sawtimber size class in moderate to well-stocked density.*

Pileated Woodpecker

Issue

The proposed activities could remove canopy cover and snags needed by pileated woodpeckers for foraging and nesting and/or displace pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

Introduction

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

Analysis Area

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the contiguous Coal Creek State Forest. This scale includes enough area to support many pairs of pileated woodpeckers *(Bull and Jackson 1995)*.

Analysis Methods

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

Existing Environment

In the project area, potential pileated woodpecker nesting habitat exists on approximately 219 acres that are dominated by western larch/Douglas-fir and mixed conifers. Additionally, 761 acres of sawtimber stands dominated by Engelmann spruce, subalpine fir, Douglas-fir/western larch, and mixed conifers exist in the project area that may be functioning as lower-quality foraging stands. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers.

Removal of large western larch and western white pine by past timber-harvesting activity and recent wildfires has reduced the quality of habitat for pileated woodpeckers. Large live and dead trees are less common than would occur naturally due to these past timber-harvesting activities in portions of the project area. Black cottonwood occurs in some riparian areas in the project area. During field visits, numerous feeding sites and approximately 2.2 large (greater than 21 inches dbh) snags per acre were observed (range 0 to 13.2 large snags per acre); these provide foraging and nesting opportunities for pileated woodpeckers. Additionally, roughly 2.2 medium-sized snags (15 to 21 inches dbh) per acre were observed (0 to 13.2 snags per acre), which are likely suitable foraging habitats. Pileated woodpeckers and associated large cavities were detected in the project area.

In the cumulative-effects analysis area, potential pileated woodpecker nesting habitat exists on approximately 1,225 acres, with at least an additional 4,888 acres of sawtimber-sized stands that may be suitable foraging habitats. Similar to the project area, these nesting habitats are dominated by Douglas-fir/western larch, Engelmann spruce, subalpine fir, and mixed conifers. In the cumulative-effects analysis area, recent wildfires, past timber harvesting, and open roads have fragmented the contiguous forested habitats; however, harvested stands have been managed for mature western larch and western white pine, snags, and snag-recruit trees, which benefit pileated woodpeckers in the long-term. No other ongoing harvesting is occurring in the cumulative-effects analysis area that is altering pileated woodpecker habitats.

Environmental Effects

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

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

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities *(Bull and Jackson 1995)*, but might be temporarily displaced by the proposed harvesting. Harvesting 150 acres would reduce continuously-forested habitats for pileated woodpeckers. None of the potential nesting habitat would be removed, but approximately 28 acres of potential nesting habitats would be altered with the proposed old-growth maintenance treatment. Meanwhile, an additional 122 acres of potential foraging habitats would be modified, most to the point of being unusable by pileated woodpeckers following proposed treatments. Where regeneration harvests are proposed, potential pileated woodpecker nesting and foraging habitats would be removed for 30 to 100 years, depending on the density of trees retained. Where old-growth

maintenance treatments are proposed, potential use by pileated woodpeckers could continue, but likely at a reduced rate. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags greater than 21 inches dbh per acre where they exist and would be expected to persist if they are not lost due to firewood gathering), coarse woody debris (10 to 15 tons per acre), numerous leave trees, and snag recruits (a minimum of 2 trees per acre greater than 21 inch dbh where they exist) would be retained in the proposed harvest areas. Some areas currently lack sufficient large snags, while other areas are close to open roads where snag loss could continue due to legal and illegal firewood and forest-product gathering. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand *(McClelland 1979)*, pileated woodpecker densities in the project area would be expected to be reduced on 150 acres, and at least 122 of those acres would be too open to be considered pileated woodpecker habitats following proposed treatments. The silvicultural prescriptions would retain healthy western larch, western white pine, and Douglas-fir while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Through time, shade-intolerant stands resulting from recent wildfires would eventually develop into suitable pileated woodpecker habitats. Thus, minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous-forested habitats available; 2) no potential nesting habitats would be removed and a small amount of potential nesting habitats would be modified while potential foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included, and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Through time, shade-intolerant stands resulting from recent wildfires would eventually develop into suitable pileated woodpecker habitats. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected. No other harvesting is occurring in the cumulative-effects analysis area that is altering potential pileated woodpecker habitats. Thus, negligible adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related changes in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Minor changes in pileated woodpecker habitats would be expected and further reductions in the amount of continuously forested habitats available for pileated woodpeckers would occur. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. In the project area, the canopy on at least 122 acres proposed for regeneration treatments would likely be too open for appreciable pileated woodpecker use. Use of the remaining 28 acres by pileated woodpeckers would likely be reduced due to increasing openness of the stand. Recently harvested stands and recently burned stands in the cumulative-effects analysis area reduced pileated woodpecker habitats as well. No other harvesting is occurring in the cumulative-effects analysis area that is altering potential pileated woodpecker habitats. The loss of pileated woodpecker habitats under this alternative

would be additive to habitat losses associated with past harvesting and recent wildfires; continued use of the cumulative-effects analysis area would be expected. Additionally, continued maturation of stands across the cumulative-effects analysis area is increasing suitable pileated woodpecker habitats. Thus, minor adverse cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative-effects analysis area since:
1) harvesting would reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but forested habitats would persist;
2) potential nesting and foraging habitats would be reduced, but habitats would persist in the cumulative-effects analysis area; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in several of the harvest areas; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

Elk Security Habitat

Issue

The proposed activities could remove elk security cover, which could affect hunter opportunity and local quality of recreational hunting.

Introduction

Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during hunting season *(Hillis et al. 1991)*. As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and the subsequent decrease in hunter opportunity. The presence of fewer males at the beginning of the hunting season reduces the odds of a hunter seeing or harvesting such an animal throughout the remainder of the season.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects to elk security were analyzed on the contiguous Coal Creek State Forest. This cumulative-effects analysis area should provide enough area for an elk herd to avoid hunting pressure during the general hunting season and is at least double the size of an elk herd's fall home range.

Analysis Methods

Given that areas within 0.5 mile of an open road do not provide elk security habitat *(Hillis et al. 1991)*, existing open roads were buffered 0.5 mile and identified as areas not meeting the criteria for elk security habitat. Areas that were recently harvested in the cumulative-effects analysis area were not expected to provide security habitat and were removed from potential security cover. Additionally, elk security habitat patches need to be somewhat larger forested blocks (greater than 250 acres) with adequate cover to afford elk security during the general big game hunting season. Therefore, areas failing to meet this criteria were also removed, leaving patches that were distant enough from open roads, large enough to meet the minimum criteria, and had adequate cover to provide elk security habitat *(Hillis et al. 1991)*. Factors considered in the analysis include the amount of available security habitat and the level of human access for recreational hunting.

Existing Environment

A sizable portion of the project area is in close proximity to open roads. Areas that are within 0.5 mile of an open road do not provide elk security habitat. Additionally, recent wildfires and past timber harvesting has further reduced potential elk security habitats in the project area. However, approximately 247 acres in the project area are part of a 2,423-acre contiguous patch of security habitat that exists in the cumulative-effects analysis area and beyond. Additionally, hiding cover, which is inherently a component of elk security habitat, exists in the project area. Moderate levels of hunter access exist in the project area, with a couple of open roads and non-motorized access on closed roads.

In the cumulative-effects analysis area, approximately 2,099 forested acres meets the distance, cover, and size requirements of elk security across ownerships on Coal Creek State Forest. This represents approximately 14-percent of the cumulative-effects analysis area, which is below the 30-percent minimum threshold recommended by *Hillis et al. (1991)*, largely due to the existing network of open roads and the recent wildfires that have altered elk security habitats in the area. Additionally, moderate levels of hiding cover exist in the cumulative-effects analysis area. Moderate levels of hunter access in the cumulative-effects analysis area exists, with several open roads and considerable nonmotorized access on closed roads. No other timber harvesting is occurring on DNRC-managed lands in the cumulative-effects analysis area that is altering elk security habitats. Evidence of non-winter use by elk was noted throughout the project area during field reviews

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Elk Security Habitats

No changes in elk security cover would be expected as there are no areas that meet the distance and cover requirements that are large enough to serve as elk security habitat in the project area. Existing cover would continue to contribute to blocks of security habitat in the larger landscape. Timber stands would continue advancing to climax plant species. Recently harvested stands and recently burned stands would gradually start contributing to elk security habitats. No alterations in cover would occur that would increase elk vulnerability during the hunting season. No changes would be anticipated in disturbance, human access, and potential mortality due to hunting. Thus, no adverse indirect effects to elk security habitats in the project area would be expected since: 1) no changes in existing elk security habitats would be anticipated and continued maturation of forest cover would improve elk security habitats; 2) the level of human access would not change; and 3) no appreciable changes to big game survival would be anticipated.

Direct and Indirect Effects of the Action Alternative on Elk Security Habitats

No changes in open roads or motorized access for the general public would occur. During all phases of the project, any roads opened with project activities would be restricted to the public and closed with the same closure device as presently exists after the completion of project activities. The southernmost 4.2 acres in Unit 6 are contributing to elk security habitats; otherwise all the rest of the proposed units would be close enough to the open roads that they are not providing for elk security habitats. Therefore, any proposed harvesting in units 2, 7, 8, as well as most of Unit 6 would not reduce available elk security cover, but the proposed harvesting of the 4.2 acres in the southernmost portion of Unit 6 would decrease elk security. Meanwhile, proposed units with seedtree treatments would likely be too open to provide elk hiding cover, while those areas receiving old-growth maintenance treatments would likely continue to provide some cover that could benefit elk during the hunting season. The retention of structure and pockets of cover in the proposed units, including riparian areas and reserve areas would further contribute to big game security and hiding cover. Efforts to retain visual screening along open roads would benefit elk and other big game during the hunting seasons. Reductions in suitable hiding cover would be additive to past harvesting and recent wildfires in the project area. Overall, increased sight distances and the reduction in hiding cover may increase elk vulnerability risk in the project area. Collectively, minor adverse effects to elk security habitat would be anticipated that would affect elk vulnerability risk in the project area since: 1) no changes in open roads or motorized access for the general public would be anticipated that would increase hunter access; 2) minor increases in non-motorized access could increase hunter access; 3) negligible amounts of elk security habitats would be altered; and 4) negligible changes in big game survival would be anticipated.

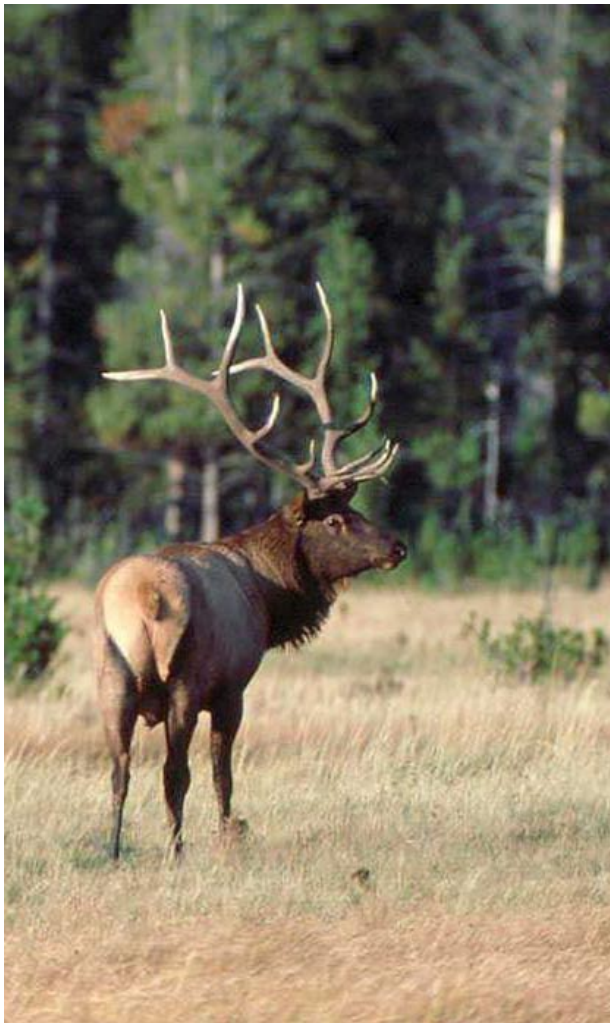
Cumulative Effects of the No-Action Alternative on Elk Security Habitats

No changes in elk security habitat would be anticipated. Approximately 14 percent of the

cumulative-effects analysis area would continue providing elk security habitat, which would not exceed the 30-percent minimum threshold recommended by *Hillis et al. (1991)*. Past harvesting and recent wildfires on Coal Creek State Forest reduced elk security habitats and allowed increased human access; continued maturation in previously harvested stands in the cumulative-effects analysis area would improve hiding cover in those older units. No other changes in disturbance and potential mortality due to hunting would be anticipated. Ongoing harvesting would continue to alter hiding cover, with minor reductions in elk security habitats. Thus, minor positive cumulative effects to elk security habitats would be anticipated that would benefit elk since: 1) no changes in open roads, motorized access, or human access would be anticipated; 2) no further reductions in elk security habitat would occur; and 3) modest levels of security habitat and hiding cover would persist within the cumulative-effects analysis area.

Cumulative Effects of the No-Action Alternative on Elk Security Habitats

No changes would be anticipated in open roads or motorized access for the general public that would influence elk vulnerability, but project-level alterations of cover could reduce elk hiding cover. Increased sight distances could reduce elk survival in the project area and proposed activities could facilitate an increase in nonmotorized traffic. Moderate levels of motorized access on open roads and nonmotorized access via closed roads exists in the cumulative-effects analysis area. Portions of the cumulative-effects analysis area have been harvested in the past, reducing hiding cover and elk security habitat. A reduction in elk hiding cover caused by the proposed harvesting would be additive to the recently harvested or burned areas on Coal Creek State Forest. Continued maturation in previously harvested and burned stands in the cumulative-effects analysis area would improve hiding cover in those areas and partially offset these current losses. Since there would be negligible reductions in elk security habitats, negligible changes to the amount of Coal Creek State Forest would be anticipated; roughly 14 percent of the cumulative-effects analysis area would continue providing elk security habitats, which would continue to be below the 30-percent minimum threshold recommended by *Hillis et al. (1991)*. Negligible impacts to big game survival would be anticipated. Thus, minor adverse cumulative effects to elk security would be anticipated that would affect elk using the cumulative-effects analysis area since: 1) no changes in open roads or motorized access for the general public would be expected; 2) changes to nonmotorized access would be minor; 3) negligible amounts of elk security habitat would be altered; and 4) some security habitat and hiding cover would persist in the cumulative-effects analysis area.



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Environmental Assessment

APPENDIX A
Stipulations and Specifications

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Stipulations and Specifications

Introduction

Stipulations and Specifications are binding and enforceable terms of the Timber Sale Contract or Forest Improvement contracts and are designed to avoid, minimize, and/or mitigate environmental effects of the project activities.

Stipulations and Specifications originate from laws, administrative rules or project-specific mitigations.

This section is organized by resource.

Aesthetics

- Damaged residual vegetation visible from open roads would be slashed.
- The size and number of landings would be limited.
- In areas where cable logging is required, the width of the cable corridor would be limited, and a minimum distance between corridors would be required to reduce the amount and visibility of corridors in the harvest areas.
- Disturbed soil sites along road right-of-ways would be grass-seeded.
- Leave trees are to be left with both even and clumpy distributions.
- The temporary roads into Units 2, 6 and 7 and all jump-ups would be reclaimed after harvesting.
- A higher concentration of trees would be left within 100-foot buffers in units along the Cyclone Creek Road FS 909 and the Cyclone Lake Road.
- A leave buffer exceeding 200 feet in places would be left along the Cyclone Creek Road FS909 below unit 2. This buffer combined with the proposed old-growth maintenance treatment in 75% of unit 2 would minimize impacts to the aesthetics of the view from Cyclone Lake.

Air Quality

- To minimize cumulative effects during burning operations, burning would be done in compliance with the Montana Airshed Group, reporting regulations and any burning restrictions imposed in Airshed 2. This would provide for burning during conditions of acceptable ventilation and dispersion.
- Dozer, excavator, landing, and roadwork debris would be piled clean to allow ignition during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be covered so the fuels are drier, ignite easier, burn hotter, and extinguish sooner.
- Dust abatement may be applied on some road segments, depending on the seasonal conditions and level of public traffic.

Archaeology

- A contract clause provides for suspending operations if cultural resources were discovered; operations in that area may only resume as directed by the Forest Officer following consultation with a DNRC Archeologist.
- If cultural resources were discovered, the Confederated Salish-Kootenai Tribe would be notified.

Fisheries

- Apply all applicable Forestry Best Management Practices (BMPs), including the Streamside Management Zone (SMZ) Law and Rules, and Forest Management Rules for fisheries, soils, and watershed management *(ARMs 36.11.425 and 36.11.426)*.

• Apply the SMZ Law and Rules to all streams and lakes.

• Monitor all road-stream crossings for sedimentation and deterioration of road prism.

• Only allow equipment traffic at road-stream crossings when road prisms have adequate load-bearing capacity, thus reducing the potential for rutting.

• The Coal Ridge Road and Unit 6 Road would be brushed and have improvements made to the surface and ditches to meet BMP's.

Noxious Weed Management

• All off road equipment would be cleaned of noxious weeds prior to beginning project operations. The Forest Officer would inspect equipment periodically during project implementation.

• The timber sale purchaser would be required to spray weeds on restricted roads that will be used for log hauling in the project area.

• Disturbed roadside sites would be promptly revegetated with a native grass seed mix. Roads used and closed as part of this proposal would be reshaped and reseeded.

Recreation

• Current road restrictions would continue to apply for the general public.

Soils

Soil Compaction and Displacement

• Logging equipment would not operate off forest roads unless:

• Soil moisture is less than 20 percent, frozen, or snow-covered, to minimize soil compaction and rutting, and maintain drainage features,

• Soil is snow covered to a depth that would prevent compaction, rutting, or displacement.

• Existing skid trails and landings would be used where their design is consistent with prescribed treatments and meets current BMP guidelines.

• To reduce the number of skid trails and the potential for erosion, designated skid trails would be required where moist soils or short steep pitches (less than 300 feet) would not be accessed by other logging systems.

• Skid trail density in a harvest area would not exceed 20 percent of the total area in a cutting unit.

• Conventional ground-based skidding equipment would not be operated on steep slopes (greater than 40 percent). Soft-tracked yarders are suitable on slopes up to 55 percent with less impact than conventional tractor skidding. Cable yarding would be used on steeper slopes.

• Piling and scarification may be completed with an excavator where slopes are gentle enough to permit this process. A majority of all feasible fine litter and 10 to 15 tons of large woody debris would be retained following harvesting *(ARM 36.11.410 and 36.11.414)*.

Erosion

• Ground-skidding machinery would be required to be equipped with winchline to limit equipment operations on steeper slopes.

• Roads used by the purchaser would be reshaped and the ditches redefined following use, thereby reducing surface erosion.

• Drain dips and gravel would be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.

• Some road sections would be repaired to upgrade the roads to meet design standards that reduce erosion potential and maintenance needs.

• Certified weed-free grass seed and fertilizer would be applied in a prompt and timely manner to all newly constructed road surfaces, cutslopes,

and fillslopes. These applications would also be applied to any existing disturbed cutslopes, fillslopes, and landings immediately adjacent to open roads. Seeding to stabilize soils and to reduce or prevent the establishment of noxious weeds would include:

- Seeding all road cuts and fills concurrent with construction.
- Applying "quick-cover" seed mix within 1 day of work completion at culvert installation sites involving stream crossings.
- Seeding all road surfaces and reseeding culvert installation sites when the final blading is completed for each specified road segment.
- Based on ground and weather conditions, water bars, logging-slash barriers and, in some cases, temporary culverts would be installed on skid trails where erosion is anticipated, and as directed by the Forest Officer. These erosion-control features would be inspected periodically and maintained throughout the contract period or extensions thereof.

Vegetation

All harvest areas shall have a minimum of 2 snags and 2 snag-recruits over 21 inches dbh, or the next largest size class available. Additional large-diameter recruitment trees may be left if sufficient large snags are not present. These snags and recruitment trees may be clumped or evenly distributed throughout the harvest units.

Watershed

- **Planned erosion-control measures include:**
  - grade breaks on roads,
  - surface water-diverting mechanisms on roads,
  - slash-filter windrows, and
  - grass seeding.
- Details for these control measures would be included in *ATTACHMENT B* of the *TIMBER SALE AGREEMENT*.
- Streamside Management Zones and Riparian Management Zones (RMZs) would be defined along those streams and/or wetlands where they occur within, or adjacent to, harvest areas. This project would meet or exceed SMZ and RMZ rules.
- Brush would be removed from existing road prisms to allow for effective road maintenance. Road maintenance can help reduce sediment delivery.
- The contractor would be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.,) that may affect water quality.
- Leaking equipment would not be permitted to operate at stream-crossing construction sites.

Wildlife

- If a threatened or endangered species is encountered, a DNRC biologist will be consulted to determine if additional mitigations, that are consistent with the administrative rules for managing threatened and endangered species *(ARM 36.11.428 through 36.11.435)*, are needed.
- Motorized public access would be restricted at all times on restricted roads that are opened for harvesting activities and all new temporary roads; signs would be used during active periods; and a physical closure (gate, barriers, equipment, etc.) would be used during inactive periods (nights, weekends, etc.).
- A closure would be installed on the Coal Ridge Road above the switchback at Unit 2, using existing vegetation or other barrier types to prevent motorized access beyond the proposed unit.
- To mitigate potential adverse effects to grizzly bear security habitats, a barrier to prevent motorized access would be placed on both ends of the Winona Road on DNRC-managed lands (S30 T34N R20W & S11 T34N R21W) prior to removing the earthen berm on the Coal Ridge Road (S22 T34N R21W). Following completion of the project, the earthen berm

on the Coal Ridge Road would be replaced in its previous location.

- Motorized use on all temporary roads and the existing road located to the south of Unit 8 would be restricted to the denning period (November 16- March 31) or limited to short-duration, high intensity periods of less than 30 days during the non-denning period.

- Roads and skid trails that may be opened with the proposed activities would be reclosed to reduce the potential for unauthorized motor vehicle use.

- A combination of topography, group retention of trees, and roadside vegetation would be used to reduce views into harvest units along open roads.

- When possible, forested corridors would be retained to maintain landscape connectivity, and patches of dense vegetation would be retained to provide security cover.

- Seed tree units have been designed to provide visual screening for bears by ensuring that vegetation or topographic breaks are no greater than 600 feet in at least one direction from any point in the unit.

- Snags, snag recruits, and coarse woody debris would be managed according to *ARM 36.11.411* through *36.11.414*, favoring western larch and western white pine. Clumps of existing snags could be maintained where they exist, to offset areas without sufficient snags.

- Contractors and purchasers conducting contract operations would be prohibited from carrying firearms while operating on restricted roads.

Environmental Assessment

APPENDIX B
References

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Environmental Assessment

APPENDIX C
Glossary

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Glossary

Abandoned road
A road that is impassable due to effective closure but has drainage structures that have not been removed. An abandoned road will not receive motorized use for low-intensity forest management activities or commercial forest management activities.

Administrative road use
Road use that is restricted to DNRC personnel and contractors for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed
An area defined by a certain set of air conditions; typically, a mountain valley in which air movement is constrained by natural conditions such as topography.

Alternative effects
The impacts or effects of the alternatives within a project on the natural and human environment.

Anthropogenic
Of human origin or influence.

Basal area
A measure of the number of square feet of space occupied by the stem of a tree.

Best Management Practices (BMPs)
Guidelines to direct forest activities, such as logging and road construction, for the protection of soils and water quality.

Biodiversity
The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

Blading
The smoothing of a road surface or skid trail; roads are usually bladed with a piece of equipment called a grader.

Board foot
144 cubic inches of wood that is equivalent to a piece of lumber 1 inch thick by 1 foot wide by 1 foot long.

Canopy
The foliar cover in a forest stand consisting of one or several layers.

Canopy closure
The percentage o f a given area covered by the crowns, or canopies, of trees.

Cavity
A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Coarse down woody material
Dead trees within a forest stand that have fallen and have begun decomposing on the forest floor.

Coarse-filter
An approach that supports diverse wildlife habitat by managing for a variety of forest structures and compositions, instead of focusing on habitat needs for individual species.

Co-dominant tree
A tree whose crown helps form the general level of the main canopy, receiving full sunlight from above and comparatively little from the sides.

Compaction
Increased soil density caused by force exerted on the soil surface, modifying aeration and nutrient availability.

Connectivity
The quality, extent, or state of being joined; unity; the opposite of fragmentation.

Cover
See Hiding cover and/or Thermal cover.

Cover type
A classification of timber stands based on the percentage of tree species composition.

Crown cover or crown closure
The percentage of a given area covered by the crowns of trees.

Crown scorch
The portion of the tree crown that has been scorched.

Cull
A tree of such poor quality that it has no merchantable value in terms of the product being cut.

Cumulative effect
The impact on the environment that results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor actions, but collectively they may compound the effect of the actions.

Cutting unit
Area of timber proposed for harvesting.

Cutslope
This is the slope created during road construction, the cutslope is the area above the road where soil or rock material is removed in order to construct the road.

Deposition
Site where a river lays down or drops the sediment or material that it is carrying.

Desired future conditions
The land or resource conditions that will exist if goals and objectives are fully achieved. It is considered synonymous with appropriate conditions.

Direct effect
Effects on the environment that occur at the same time and place as the initial cause or action.

Ditch relief
A method of draining water from roads using ditches and corrugated metal pipe. The pipe is placed just under the surface of the road.

Dominant tree
A tree whose crown extends above the general level of the main canopy receiving full sunlight from above and partial light from the sides.

Drain dip
A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem
An interacting system of living organisms, and the land and water that make up their environment; the home place of all living things, including humans.

Edge
The border between two or more habitats such as a wetland and mature forest.

Equivalent clearcut acres (ECA)
This method equates the area harvested and the percent of crown removed with an equivalent amount of clearcut area.

ECA, Allowable
The estimated number of acres that can be clearcut before stream channel stability is affected.

ECA, Existing
The number of acres that have been previously harvested, taking into account the degree of hydrologic recovery that has occurred due to revegetation.

ECA, Remaining
The calculated amount of harvesting that may occur without substantially increasing the risk of causing detrimental effects to the stability of the stream channel.

Excavator piling
The piling of logging residue using an excavator.

Fillslope
This is the slope created during road construction, the fillslope is the slope below the road where soil or rock material is pushed or placed in order to construct the road.

Fire regime
Describes the characteristic frequency, extent, intensity, severity and seasonality of fires within an ecosystem. Examples include: frequent nonlethal; frequent or infrequent mixed-severity; and stand-replacement or lethal burn.

Forage
All browse and herbage available to wildlife for grazing.

Forest improvement
Activities that aide the establishment and growing of trees after a site has been harvested. Associated activities include:

- site preparation,
- planting,
- survival checks,
- regeneration surveys, and
- stand thinnings.

Forest Management Rules
Administrative Rules for Forest Management

Fragmentation (forest)
A reduction of connectivity and an increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (stand-replacement fire, timber harvesting, etc.).

Habitat
The place where a plant, animal, or population naturally or normally lives and develops.

Habitat type
An aggregation of units of land capable of producing similar plant communities at climax.

Hazard reduction
The reduction of fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.

Headcutting
An erosion process of some intermittent streams and perennial streams where an abrupt vertical drop in the streambed occurs. Generally associated with erosion from moving water.

Hiding cover
Vegetation capable of hiding some specified portion of a standing adult mammal from human view at a distance of 200 feet.

Historical forest condition
The condition of the forest prior to settlement by Europeans.

Homogeneous
Of uniform structure or composition throughout.

Hibernacula
A shelter occupied during the winter by dormant animals, such as bats.

Indirect Effects
Secondary effects that occur in locations other than the initial action or significantly later in time.

Interdisciplinary team (ID Team)
A team of resource specialists brought together to analyze the effects of a project on the environment.

Intermediate trees
A tree whose crown extends into the lower portion of the main canopy receiving little direct light from above and none from the sides.

Land Board
Board of Land Commissioners

Landing
Any place on or adjacent to the logging site to which logs are yarded or skidded for loading onto trucks for transport.

Landscape
An area of land with interacting ecosystems.

Landtype
A unit of land with similar designated soil, vegetation, geology, topography, climate, and drainage.

Live crown ratio
The percentage of the length of tree having live limbs divided by the tree's height.

Macroinvertebrate
An invertebrate animal (animal without a backbone) large enough to be seen without magnification.

Mass-wasting locations (hydrology)
Dislodgement and downslope transport of loose rock and soil material under the direct influence of gravity.

Meter
A measurement equaling 39.37 inches.

Mitigation measure
An action or policy designed to reduce or prevent detrimental effects.

Multistoried stands
Timber stands with 3 or more distinct stories.

Nest-site area (bald eagle)
The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. This area is either mapped for a specific nest based on field data, or, if that is impossible, is defined as the area within a quarter-mile radius of all nest sites in the breeding area that have been active within 5 years.

No-action Alternative
The option of maintaining the status quo and continuing present management activities; the proposed project would not be implemented.

Nonforested area
A naturally-occurring area where trees do not establish over the long term, such as bogs, natural meadows, avalanche chutes, and alpine areas.

Old Growth
For this analysis, old growth is defined as stands that meet the minimum criteria (number of trees per acre that have a minimum dbh and a minimum age) for a given site (old-growth group from habitat type). These minimums can be found in the Green et al Old Growth Forest Types of the Northern Region *(see REFERENCES)*.

Open-Road Densities
Percent of the grizzly bear subunit exceeding a density of 1 mile per square mile of open roads.

Overstory
The portion of the forest canopy forming the upper or uppermost canopy layer including the crowns of dominant, codominant, and intermediate trees.

Patch
A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Phloem
The living cells of the tree just beneath the bark that conducts food from the leaves to the stem and roots.

Project file
A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Coal Ridge Timber Sale EA is located at the Stillwater State Forest office near Olney, Montana.

Redds
The spawning ground or nest of various fish species.

Reclaimed Road
A road that is impassable due to effective closure. It has been stabilized, and culverts and other drainage structures, if present, have been removed, but the road prism may remain. A reclaimed road will not receive motorized use for low-intensity forest management activities or commercial forest management activities.

Regeneration
The replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods.

Residual stand
Trees that remain standing following any harvesting operation.

Road-construction activities
In general, the term 'road construction activities' refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. The activities may include any or all of the following:

- road construction;
- right-of-way clearing;
- excavation of cut/fill material;
- installation of road surface and ditch drainage features;
- installation of culverts at stream crossings;
- burning right-of-way slash;
- hauling and installation of borrow material; and
- blading and shaping road surfaces.

Road improvements
Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Saplings
Trees 1 to 4 inches in diameter at breast height.

Sawtimber trees
Trees with a minimum dbh of 9 inches.

Scarification
The mechanical removal of competing vegetation and debris to expose mineral soil and enhance the establishment of natural regeneration.

Scoping
The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed and the depth of assessment that will be required. It also includes a review of other factors, such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

Scour
Scour is the erosion of soil and/or sediment by flowing water.

Security
For wild animals, the freedom from the likelihood of displacement or mortality due to human disturbance or confrontation.

Seedlings
Live trees less than 1 inch dbh.

Sediment
In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield
The amount of sediment transported by a stream in a given time.

Seral
Refers to a biotic community that is in a temporal and intermediate stage in the process of ecological succession.

Shade intolerant
Describes the tree species that generally can only reproduce and grow in the open, or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that are replaced by more shade-tolerant species during succession. In Stillwater State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant
Describes tree species (also referred to as late successional) that can reproduce and grow under the canopy in poor sunlight conditions. These species replace shade intolerant (seral) species during succession. In Stillwater State Forest, shade-tolerant species generally include subalpine fir, grand fir, Engelmann spruce, and western red cedar.

Siltation
The process of very fine particles of soil (silt) settling. This may occur in streams or from runoff. An example would be the silt build-up left after a puddle evaporates.

Silviculture
The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Site preparation
A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired species.

Slash
Branches, tree tops, and cull trees left on the ground following a harvest.

Snag
A standing dead tree or the portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept
The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Sporulation pattern
The pattern in which spores are released from the fruiting body.

Spur roads
Low-standard roads constructed to meet minimum requirements for harvest-related traffic.

Stand
An aggregation of trees occupying a specific area and sufficiently uniform in composition, age arrangement, and condition so as to be a distinguishable unit.

Stand density
The quantitative measure of stocking expressed either absolutely in terms of number of trees, basal area, or volume per unit area or relative to some standard condition.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees, and as compared to a stocking standard, which is an estimate of either the basal area or the number of trees per acre required to fully use the growth potential of the land.

Stream gradient
The slope of a stream along its course, usually expressed in percentage indicating the amount of drop per 100 feet.

Streamside Management Zone
A stream, lake, or other body of water and an adjacent area of varying width where management practices that might affect wildlife habitat or water quality, fish, or other aquatic resources need to be modified. The streamside management zone encompasses a strip at least 50 feet wide on each side of a stream, lake, or other body of water, measured from the ordinary high-water mark, and extends beyond the high-water mark to include wetlands and areas that provide additional protection in zones with steep slopes or erosive soils.

Stumpage
The value of standing trees in the forest; sometimes used to mean the commercial value of standing trees.

Succession
The natural series of replacement of one plant (and animal) community by another over time.

Suppressed
The condition of a tree characterized by a low growth rate and low vigor due to competition.

Temporary road
Roads built to the minimal standards necessary to prevent impacts to water quality and provide a safe and efficient route to remove logs from the timber sale area. Following logging operations or site preparations, reclamation would incorporate the following concepts to discourage future motorized use of the roads:

- Segments near the beginning of the new temporary road systems would be reshaped to their natural contours and reclaimed for approximately 200 feet by grass seeding and strewing slash and debris.

- The reclamation of the remaining road may include a combination of ripping or mechanically loosening the surface soils on the road, removing culverts or bridges that were installed, spreading forest debris along portions of the road, and allowing the surface to revegetate naturally.

Texture
A term used in visual assessments indicating distinctive or identifying features of the landscape depending on distance.

Thermal cover
Vegetation that provides wildlife protection against the weather and elements.

For white-tailed deer, thermal cover has 70 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities
In general, the term timber-harvesting activities refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- felling and bucking standing trees into logs;

- skidding logs to a landing;

- processing, sorting, and loading logs onto trucks at the landing;

- hauling logs by truck to a mill;

- slashing and sanitizing residual vegetation damaged during logging;

- machine piling logging slash;

- burning logging slash;

- scarifying and preparing the site for planting; and

- planting trees.

Understory
All forest vegetation growing under an overstory.

Uneven-aged stand
A stand with trees of three or more distinct age classes, either intimately mixed or in small groups.

Ungulates
Hoofed animals, such as mule deer, white-tailed deer, elk, and moose, that are mostly herbivorous; many are horned or antlered.

Vigor
The degree of health and growth of a tree or stand of trees.

Watershed
The region or area drained by a river or other body of water.

Water yield
The average annual runoff for a particular watershed expressed in acre-feet.

Water-yield increase
An increase in the average annual runoff over natural conditions following a reduction of vegetative cover.

Windthrow
A tree pushed over by wind. Windthrows (blowdowns) are common among shallow-rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so individual trees remain unprotected from the force of the wind.

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Environmental Assessment

APPENDIX D
Preparers and Contributors

Acronyms

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Acronyms

ARM	Administrative Rules of Montana
BMP	Best Management Practices
BMU	Bear Management Unit
CEAA	Cumulative Effects Analysis Area
cmp	corrugated metal pipe
CWD	Coarse Woody Debris
dbh	diameter at breast height
DEQ	Department of Environmental Quality
DFWP	Montana Department of Fish, Wildlife, and Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
FIA	Forest Inventory and Analysis group
FI	Forest Improvement
FNF	Flathead National Forest
FRTA	Federal Roads and Trails Act
FOGI	Full Old-Growth Index
GIS	Geographic Information System
HCP	Habitat Conservation Plan
ID Team	Interdisciplinary Team
MCA	Montana Codes Annotated
MEPA	Montana Environmental Policy Act
Mbf	Thousand Board Feet
MMbf	Million Board Feet
MNHP	Montana Natural Heritage Program
NAICS	Northwestern Land Office
NCDE	Northern Continental Divide Ecosystem
NWLO	Northwestern Land Office
RL	Random Lengths
RMZ	Riparian Management Zone
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
STW	Stillwater Unit
TLMD	Trust Land Management Division
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WFP	Washington Forest Practices Board
WMZ	Wetland Management Zone
WYI	Water Yield Increases

124 Permit	Stream Protection Act Permit
318 Authorization	A Short-Term Exemption from Montana's Surface Water Quality and Standards

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