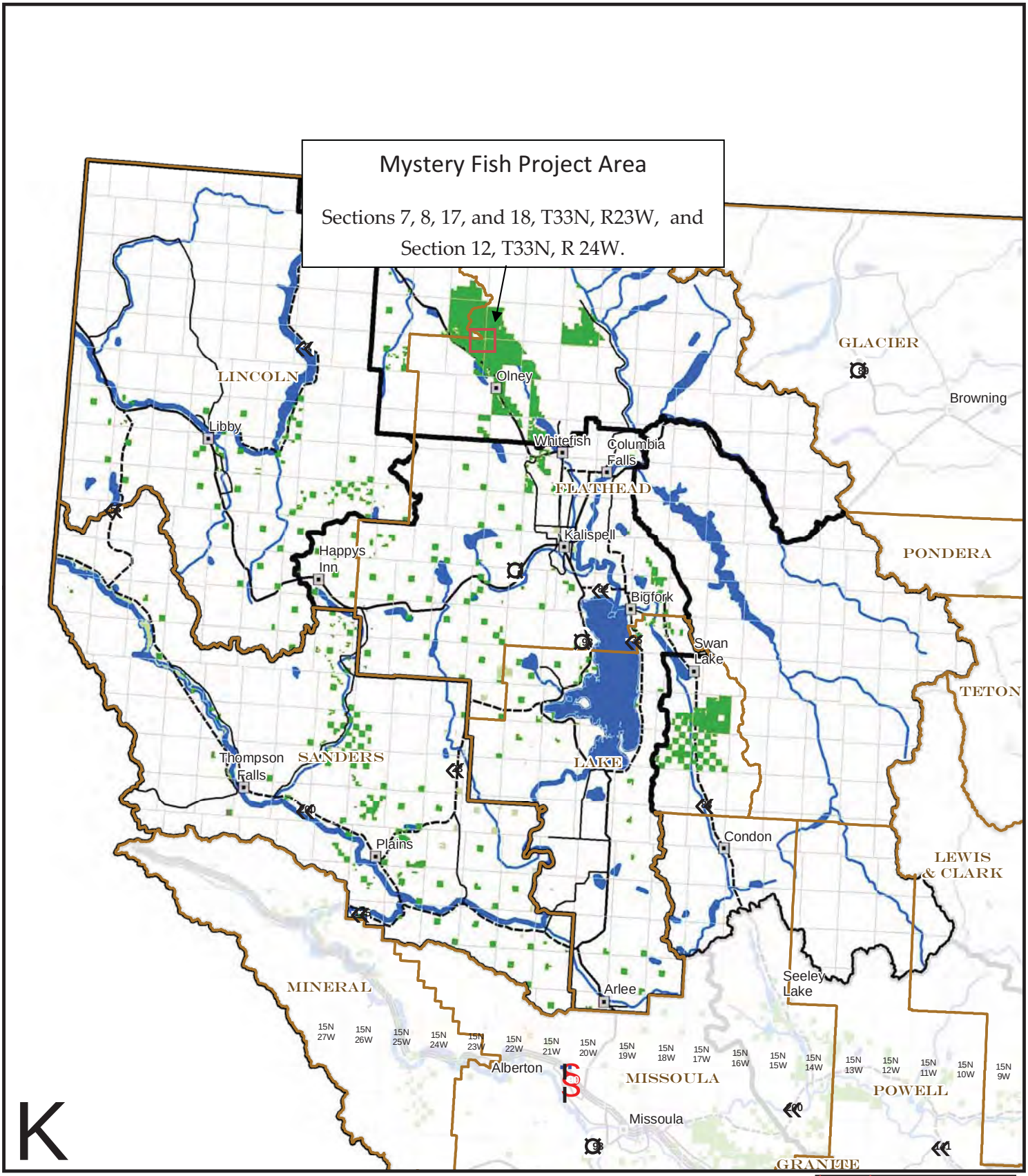
Mystery Fish Timber Sale Project

Final Environmental Assessment

April 2012

Department of Natural Resources and Conservation
Northwest Land Office—Stillwater Unit



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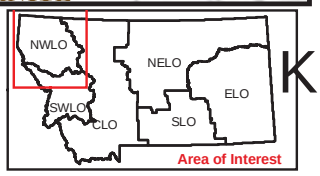

6 December 2010
Montana DNRC
Technical Services Section/dr

FINDING

Proposed Mystery Fish Timber Sale Project

Montana DNRC

A Department of Natural Resources and Conservation (DNRC) Interdisciplinary Team (ID Team) has completed the Environmental Assessment (EA) for the proposed Mystery Fish Timber Sale Project. The project area encompasses 1,915 acres and is located 5 miles north of Olney in portions of sections 7, 8, 16, 17, 18, 20, and 21 of T33N, R23W and Section 12 of T33N, R24W. The Common Schools trust (kindergarten through grade 12) would be the beneficiary of income generated by this project.

The Stillwater Unit staff and the ID Team conducted extensive data collection and reconnaissance of the project area. The ID Team is comprised of a wildlife biologist, a hydrologist, a fisheries biologist, a silviculturist, and several foresters. DNRC initiated the public scoping process for this project with notices in the Whitefish Pilot and Daily Interlake, and by sending an Initial Proposal Letter with maps to individuals, agencies, industry representatives, and other organizations that have expressed interest in Stillwater Unit's management activities.

The scoping period was open for 30 days. Public input received consisted of (3) emails. The issues and concerns identified through public scoping were summarized and used to further refine the project. The Draft EA was then distributed for a 30-day public review, during which we received (2) emails which were addressed and considered in the Final Environmental Assessment.

The information provided to the public allowed interested parties to become familiar with the proposed project and provide input and recommendations *(Chapter I- pgs. 1-3, 5-7 and Chapter II- pgs. 1-3).*

After a thorough review of the EA, project file, public correspondence, Montana Statutes, Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP), State Forest Land Management Plan (SFLMP), and adopted rules, I have made the following 3 decisions:

1. Alternative Selected

Two alternatives are presented and were fully analyzed in the EA:

- The *No-Action Alternative* allows for existing activities, but does not include this timber harvest.
- The *Action Alternative* involves harvesting 5 million board feet (MMbf) of timber from approximately 456 acres. This alternative includes 11 harvest units. Approximately 212

acres would be harvested using conventional ground-based equipment while the remaining 244 acres would be treated using cable equipment. The prescribed harvest treatment over approximately 323 acres is a seed tree with reserves. In areas that are proposed for harvest but do not currently have 6 to 10 quality seedtrees occupying the site (approximately 133 acres), a clear cut with reserves harvest is prescribed. These prescriptions are described in detail in Table II-1 (*Chapter II-pg.12-14*). Approximately 2.4 miles of new system road would be built which is part of the transportation plan that was developed for the Montana DNRC Forested State Trust Lands HCP. In addition, approximately 2 miles of temporary road would be constructed to a minimum standard and reclaimed after harvest activities. Twelve to 18 miles of existing road would be maintained or have minor drainage improvements installed as necessary to protect water quality and to ensure compliance with Best Management Practices (BMPs).

On behalf of the DNRC I have selected the Action Alternative.

Rationale for Decision

I have selected the Action Alternative with considerations to the following rationale:

- The Action Alternative meets the *PURPOSE OF PROPOSED ACTION (Chapter I-pgs. 1-2)* and *OBJECTIVES OF PROPOSED ACTION (Chapter I- pg.2);* 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 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 $568,500 in revenue would be earned for the Common School trust. In addition, approximately $125,650 would be deposited in the Forest Improvement account, and improvements and additions to the DNRC's transportation system worth an estimated $98,850 will be completed. This amounts to a total timber -dollar value of $793,000 *(Chapter III-pg. 112).*
- On March 13, 2003, DNRC adopted *Administrative Rules for Forest Management (Forest Management Rules ARM 36.11.401 through 456).* This project is designed in accordance with these rules.
- In December 2011, the Land Board approved the Record of Decision (ROD) for the Montana DNRC Forested State Trust Lands HCP. This project was designed to be in compliance with the HCP.
- 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,and HCP;
  - adding erosion-control measures that will reduce sediment delivery to streams over the long-term *(Chapter II-Table 2, Chapter III-pgs.39-41);*
  - excluding timber harvest within 300 feet of any fish-bearing, Class 1 streams. Timber harvest would also not occur within the entire SMZ and Riparian Management Zone (RMZ) of any non-fish-bearing, Class 1 streams. No SMZ timber harvest would occur adjacent to Class 2 or 3 streams, except in the Rock Creek analysis area, where SMZ harvest would occur adjacent to one Class 3 stream for approximately 400 feet.; and
  - minimizing the area of adverse soil impacts through the implementation of BMPs that include planning skid-trail systems and limiting the landing size. Woody debris would be retained for nutrient cycling and long-term soil productivity (*Chapter III-pgs.19-27*).

This alternative was designed to retain important wildlife habitat components such as snags, coarse woody debris, visual screens, and seasonal security (*Chapter II-pg.8-9*). In reference to connectivity of mature forested habitats, roughly 766 acres of mature, closed-canopy forest in the project area would remain unharvested and could provide suitable habitat for species utilizing smaller patches of mature forest (mean patch size 59 acres). Forest retention along streams and the crest of Stryker Ridge would maintain connectivity. In consideration of grizzly bear habitat, visual screening along open roads would be maintained (where present) and reduce the likelihood of bear detection or accidental/intentional bear mortality. Overall levels of hiding cover would improve over time as shrub and tree regeneration proceeds. Existing riparian cover along 7.9 miles of Class 1 and 2 streams would be largely protected and offer movement corridors as well as hiding cover for bears in this preferred habitat. Each of 4 harvest units in the western half of the project area (totaling 67 acres) would be harvested in 30 days or less to decrease disturbance to grizzly bears, should any be present in the area.

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 by:

- Large, phenotypically-superior western larch, Douglas-fir, and western white pine will be retained to provide seed for natural regeneration in harvest units. Western larch and rust-resistant western white pine seedlings will be interplanted in the harvest units to ensure that a component of those species is perpetuated (*Chapter II-pgs.10-14).*
- Trend both age class and cover type towards desired future conditions by increasing western larch/Douglas fir covertypes and the amount of stands in the 0-39 year age class.
- Noxious weed spread will 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 (*Chapter II-pg. 7*).

Approximately 12,528 acres or 10.6% of the forest stands on the Stillwater Unit will remain old growth following the implementation of this project. Old-growth forest stands identified for proposed harvest were generally stands with lower abundance of large trees (>21″ dbh) and higher levels of disease/insect mortality compared to other old-growth stands within the project area. Old growth stands dropped from the proposed project are expected to persist in old growth status longer on the landscape than those proposed for harvesting would have and contain higher quality wildlife habitat.

2. Significance of Impacts

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

- no impacts are regarded as severe, geographically widespread, or frequent;
- 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;
- there is no precedent for future actions that would cause significant impacts; and
- there is 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. In December 2011, the Land Board approved the Record of Decision (ROD) for the Montana Forested State Trust Lands Habitat HCP. Approval of the ROD was followed by the issuance of an Incidental Take Permit (Permit) by the U.S. Fish and Wildlife Service (USFWS).

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 required decisions.
- Evaluation of the potential impacts of the proposed Mystery FishTimber 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 19, 2012

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PLEASE NOTE: Changes from the Draft Environmental Assessment are indicated as a strikethrough (~~deleted~~) for items that have been deleted, and as a yellow highlight for items that have been added.

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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 Mystery Fish Timber Sale Project in the Stillwater State Forest. The project area encompasses 1,915 acres and is located 5 miles north of Olney in portions of sections 7, 8, 16, 17, 18, 20, and 21 of T33N, R23W and Section 12 of T33N, R24W (see *Vicinity Map* on the inside of the front cover). The Common Schools Trust (kindergarten through grade 12) would be the beneficiary of income generated by this project.

An action and a no-action alternative are being analyzed. If the Action Alternative is selected, 5 million board feet (MMbf) of timber would be harvested from approximately 456 acres. Under the Action Alternative, 11 harvest units totaling approximately 456 acres would be commercially harvested. Approximately 212 acres would be harvested using conventional ground-based equipment while the remaining 244 acres would be treated using cable equipment. Approximately 323 acres would be harvested using a seedtree-with-reserves prescription and 133 acres with a clear cut with reserves prescription. Approximately 2.4 miles of new road within the project area and 2 miles of temporary road would be constructed, and 12 to 18 miles of existing road would be maintained or have minor drainage improvements installed as necessary to protect water quality and to ensure compliance with Montana Best Management Practices (BMPs) for Forestry.

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*]).

In 1996, the Land Board approved the Record of Decision (ROD) for the State Forest Land Management Plan (SFLMP). The SFLMP provides philosophical basis, consistent policy, technical rationale, and guidance for the management of forested state trust lands. In 2003, DNRC adopted the Administrative Rules for Forest Management (Forest Management Rules;

ARM 36.11.401 through 456). The Forest Management Rules are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program.

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

This project was developed in compliance with the SFLMP, the Forest Management Rules, and conservation commitments contained in the Selected Alternative in the Final EIS of the Montana DNRC Forested State Trust Lands HCP and associated ROD, as well as other applicable state and federal laws.

Objectives of Proposed Action

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

- Harvest 3 to 8 MMbf of sawtimber to generate revenue for the Common Schools trust and to contribute to the sustainable yield for the DNRC timber-management program, as mandated by *State Statute 77-5-222, MCA*.
- Promote biodiversity by managing for appropriate stand structures and species compositions.
- Regenerate new stands of healthy trees, improve the growth and vigor of retained trees, and reduce fire hazards.
- Improve existing transportation infrastructure and construct new roads to provide long-term access to the project area consistent with the Stillwater Block Transportation Plan.
- 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

Environmental Assessment Development

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 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 2011, DNRC initiated the public scoping process for this project by placing notices in the Whitefish Pilot and Daily Interlake, and sending the Initial Proposal Letter with maps to individuals, agencies, industry representatives, and other organizations that have expressed interest in Stillwater Unit's management activities.

The scoping period was open for 30 days. Public input received consisted of (3) emails. The issues and concerns identified through public scoping were summarized and used to further refine the project. See *Issues and Concerns* for a summary of issues raised by the public, and an explanation on how DNRC considered those issues during project development.

The Draft EA ~~will be~~ was distributed for a 30-day public review period during which time interested individuals had the opportunity to review the document and send comments to the Interdisciplinary Team (ID Team).

Public input received consisted of (2) emails. This Final EA is a revision of the Draft EA that incorporated necessary changes based on public comments received during the 30-day public review period.

The Decision Maker reviewed public comments, the Draft EA, the Final EA, and information contained in the project file. The Decision Maker considered and determined the following:

- which alternative presented in the Final EA meets the project's purpose and objectives;
- which alternative (or combination/modification of alternatives) should be implemented and why;
- if issues and concerns have been adequately addressed; and
- if there is a need for further environmental analysis or to prepare an EIS.

These determinations will be published and all interested parties will be notified. The decisions presented in the Decision Notice will become recommendations from DNRC to the Land Board. Ultimately the Land Board will make the final decision to approve or not approve the alternative selected by the Decision Maker.

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, a fisheries biologist, a silviculturist, and several foresters. In July of 2011, the team began compiling public and internal issues and gathering information related to the existing environmental conditions.

Other EAs/EISs or Plans That Influence the Project Proposal

- Highway 93 Corridor Timber Sale Checklist EA. DNRC. November 2011.
- Coal Ridge Timber Sale EA. DNRC. April 2011.
- Lupfer III Timber Sale Checklist EA. DNRC. April 2010.
- Southeast Stryker Timber Sale EA. DNRC. March 2010.
- Beaver/Swift/Skyles Timber Sale EA. DNRC. April 2009.
- Chicken-Antice Timber Sale EA. DNRC. December 2008.
- Olney Urban Interface Timber Sale Checklist EA. DNRC. March 2009.
- Final HCP EIS. DNRC. September 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 (DEQ)

A short-term Exemption from Montana's Surface Water Quality Standards (318 Authorization), issued by the DEQ, may be required if temporary activities (such as removing a culvert in a stream) would introduce sediment in amounts above natural levels into streams, and if Montana Department of Fish Wildlife and Parks recommends it.

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

Montana Department of Fish, Wildlife and Parks (DFWP)

A *Stream Protection Act Permit (124 Permit)* would be required from the DFWP for activities that may affect the natural shape and form of a stream's channel, banks, or tributaries. Such activities include the installation and/or replacement of two stream crossing culverts.

U.S. Fish and Wildlife Service (USFWS)

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

Issues and Concerns

Through the scoping process, resource specialists of DNRC and other agencies and the public raised concerns about the project's potential impacts on the environment. These concerns 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 III: pages 4-7*
	Timber harvesting and road building in old-growth timber stands may affect the amount and distribution of old growth remaining on the Stillwater Unit.	*CHAPTER II: pages 4 & 8* *CHAPTER III: pages 8-12*
	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 III: pages 13-14*
Forest fuels	Forest fuel loadings are at a high level, causing many areas to be susceptible to intense fires.	*CHAPTER III: pages 14-17*
Noxious weeds	Soil disturbances and logging equipment could increase the amount and distribution of noxious weeds in the project area.	*CHAPTER II: page 7* *CHAPTER III: pages 17-18*
Soils and geology	Timber harvesting and associated activities may affect soil conditions in the proposed project area through harvesting 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.	*CHAPTER III: pages 19-28*
	Soil compaction caused by timber harvesting activities can reduce the infiltration capacity of impacted soils that can increase runoff and overland flow and off-site erosion. Surface erosion can affect vegetation growth and water quality.	*CHAPTER III: pages 19-28*
	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).	*CHAPTER III: pages 19-28*
Hydrology and fisheries	Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production, and stream channel stability. Water yield increases can also affect the timing, distribution, and amount of water yield in a harvested watershed.	*CHAPTER II: page 8* *CHAPTER III: pages 30-44*
	Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality.	*CHAPTER III: pages 29-42*
	Timber harvesting and road construction may adversely affect fisheries habitat features, including channel forms, stream temperature, and connectivity.	*CHAPTER III: pages 45-56*

RESOURCE AREA	ISSUE	WHERE ADDRESSED IN EA PACKAGE
Wildlife	The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.	*CHAPTER III: pages 59-64*
	The proposed activities could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.	*CHAPTER III: pages 69-72*
	The proposed activities could alter grizzly bear cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats and/or increasing risk of human-caused bear mortality.	*CHAPTER II: page 8* *CHAPTER III: pages 76-80*
	The proposed activities could result in the modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.	*CHAPTER III: pages 80-84*
	The proposed activities could decrease habitat suitability for fishers by decreasing canopy cover and snag/coarse woody abundance, and by increasing risk of trapping mortality through greater road access.	*CHAPTER III: pages 84-89*
	Timber harvesting and associated activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.	*CHAPTER III: pages 89-93*
	Timber harvesting and associated activities could negatively affect pileated woodpecker habitat suitability by removing canopy cover and snags used for foraging and nesting and by creating disturbance.	*CHAPTER III: pages 93-96*
	Timber harvesting and associated activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons.	*CHAPTER III: pages 96-100*
Aesthetics	Activities associated with the proposed Action may affect the visual quality as seen from U.S. Highway 93 and roads within the project area.	*CHAPTER II: page 7* *CHAPTER III: pages 103-106*
Economics	The proposed Action may affect revenue generated for Common School Trust funds, funding for Forest Improvement (FI) projects, timber-related employment, and revenue generated in the regional economy. The economic analysis is one criteria used by the decision maker as guidance for formulating a decision.	*CHAPTER III: pages 107-113*

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 ENVIRONMENT AND ENVIRONMENTAL EFFECTS.*

Alternative Development

Introduction

The Mystery Fish Project Area was initially listed on the *2008 List of Upcoming Timber Sales for the Northwestern Land Office*. The project area was identified for timber harvesting for several reasons which include: 1) reducing the stocking densities of shade-tolerant trees in a historically shade-intolerant area, 2) promoting seral tree species such as western larch and western white pine, and 3) fulfilling revenue and sustainable yield requirements.

This proposed action has been designed to provide revenue to the Common Schools Trust while maintaining a healthy, productive forest. As noted in *CHAPTER I- PURPOSE AND NEED*, timber sales are designed under the management philosophy of the State Forest Land Management Plan (SFLMP*)*, which includes managing for biodiversity at the landscape level. The Forest Management Rules *(ARM 36.11.401* through *36.11.456, 36.11.470,* and *36.11.471)* and conservation commitments contained in the Selected Alternative in the Final EIS of the Montana DNRC Forested State Trust Lands Habitat Conservation Plan (HCP), as well as other applicable state and federal laws, provide direction for conducting the analyses and designing and implementing the project.

The project area, comprised of 1,915 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 Interdisciplinary (ID) Team members began work on the project in the spring/summer of 2011. 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 2011, 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;
- 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, Forest Management Rules, and the HCP, an Initial Proposal was developed.

Public scoping consisted of an announcement in the *Whitefish Pilot* and the *Daily Interlake*. Additionally, an Initial Proposal letter was sent to interested parties in June 2011 with a 30-day comment period. Public input received consisted of 3 e-mails. The issues and concerns received are summarized in Chapter I, *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 2011. The ID team decided to drop one proposed unit from the Initial Proposal. The largest proposed unit in sections 16 and 17, T33N, R23W, (152 acres) was dropped because this was discovered to be high attribute old growth with minimal forest health issues; therefore, an old-growth maintenance harvest treatment was not warranted at this time. Acreages in sections 7, 8, 17, and 18, T33N, R23W were reduced due to riparian management concerns, operability, economic concerns, and to minimize effects to old-growth stands currently exhibiting high attribute old-growth conditions with minimal forest health issues similar to those stands in sections 16 and 17. Old-growth stands dropped from the proposed project are expected to persist in old-growth status longer on the landscape than those proposed for harvesting. Old-growth forest stands identified for proposed harvest were generally stands with lower abundance of large trees (>21″ dbh) and higher levels of disease/insect mortality compared to other stands within the project area.

The Draft EA was distributed for a 30-day public review period on March 6, 2012 during which time interested individuals had the opportunity to review the document and send comments to the Interdisciplinary Team (ID Team).

Public input received consisted of 2 e-mails. This Final EA is a revision of the Draft EA that incorporated necessary changes based on public comments received during the 30-day public review period.

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: 72 percent western larch/Douglas-fir, 8 percent western white pine, 19 percent subalpine fir, and 1 percent non-forest.

  Currently, the project area is comprised of the following cover types and percentages: 10 percent western larch/Douglas-fir, 3 percent western white pine, 61 percent subalpine fir, 24 percent mixed conifer, 1 percent lodgepole pine, 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 and white bark pine to scattered individuals; Douglas-fir beetle is attacking and killing Douglas-fir trees in some areas; and dwarf mistletoe is prominent in several 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.

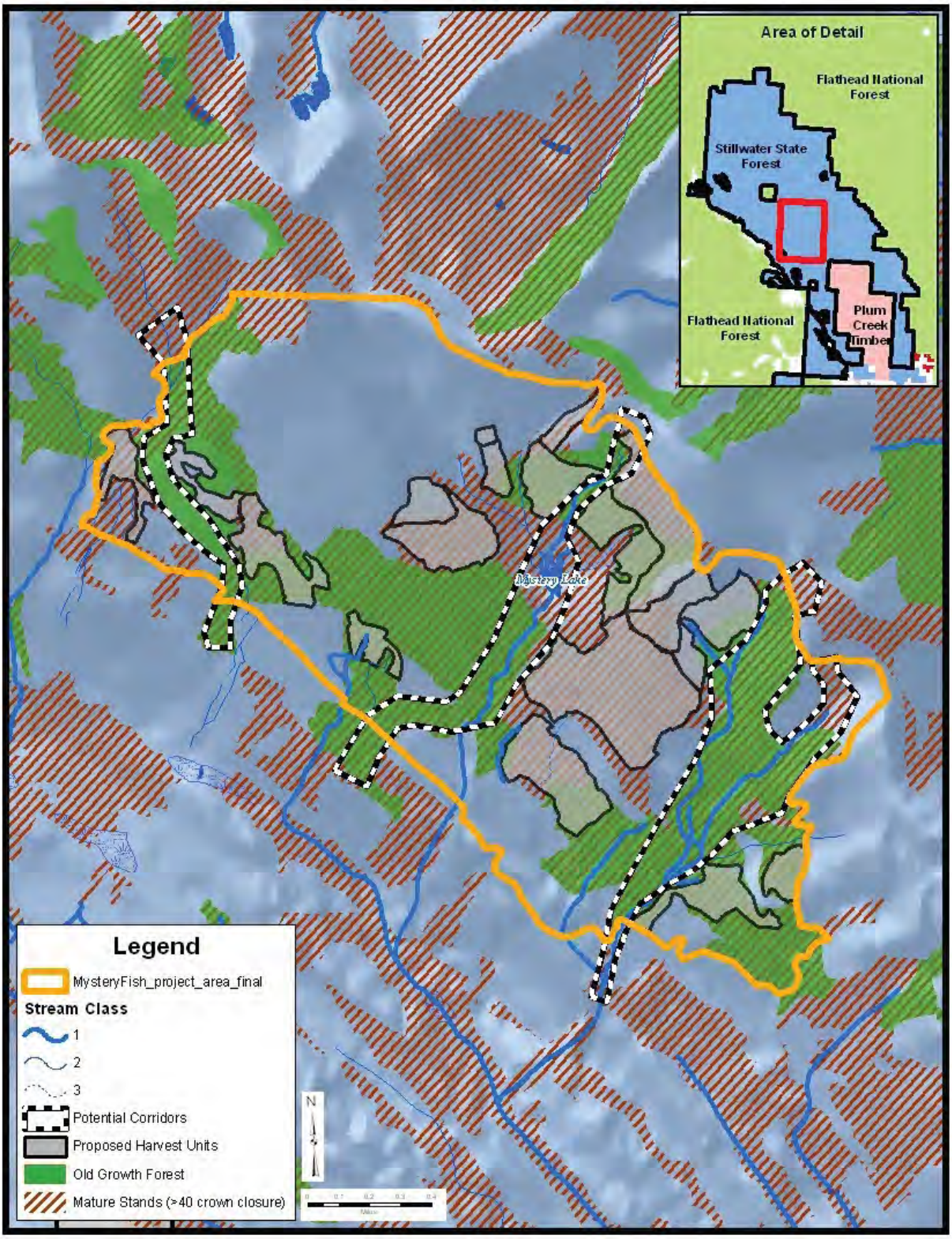
- **Old Growth**

  During the course of field reconnaissance, 321 acres of old growth were verified that had not previously been confirmed, and 44 acres that had been classified potential old growth by Stand Level Inventory (SLI) were found to not meet the minimum requirements for old-growth classification under Green *et.al (1992).* The high attribute old-growth stands that do not have insect and disease problems and are likely to persist as old growth for the foreseeable future were not considered for treatment. The stands where western larch is heavily infested with dwarf mistletoe and the Douglas-fir shows the presence of *Armillaria* root rot and Douglas-fir bark beetle activity were proposed for treatment because at the current rate of mortality in large-diameter trees, these stands of old growth would likely not meet the criteria for old growth within the next 10 years. Other low attribute old-growth stands were proposed for harvest where 1) the dominant trees are primarily Engelmann spruce and subalpine fir (many of which exhibit such things as broken tops, insect and disease damage, and bole damage), 2) crown cover averages 8 to 39%, 3) there are very few intermediate trees, and 4) there is a proliferation of brush (fool's huckleberry and alder) which has limited tree regeneration.

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

  Mature forested stands are well-connected within the proposed project area, functioning as one forest patch. The location of old growth and mature timber stands *(Figure II-1 MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY CORRIDORS)* within the project area was analyzed in order to help assess connectivity for wildlife.

Figure II-1: MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS.
Relationship of the project area and proposed units to mature forested stands and identified potential connectivity corridors.



- **Transportation Development**

The development of a long-term transportation plan within this area has been identified as an objective for the Mystery Fish Timber Sale Project. Transportation planning for this project includes:

- **Assessment of Existing Road Locations and Standards**
  Roads have been reviewed to see where BMPs are met, whether or not the standard of road is suitable for this proposal and future uses, and what improvements or road abandonments would be required in order to meet safety standards, BMPs, applicable HCP commitments and Forest Management Rules associated with Road Management *(ARM 36.11.421).*

- **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 currently accessible by road. DNRC would minimize the number of roads, plan for longer skids, 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 projects. For a more complete list of mitigation measures, refer to *ATTACHMENT A– STIPULATIONS AND SPECIFICATIONS*. The following is a brief list of mitigation measures that address some issues involved in this project:

Access and Roads

- The Stillwater Unit would implement the Stillwater Block Transportation Plan with the construction of 2.4 miles of the Mystery Road (*USFWS & DNRC HCP/EIS 2010*) (see Figure *II-2 – PROPOSED MYSTERY FISH PROJECT MAP).*
- 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 and all jump-ups would be reclaimed following management activities with high visibility cut and fill portions recontoured to near-natural slope.
- Sites of disturbed soil along road right-of-ways would be grass seeded.
- A higher concentration of trees in the proposed units would be left within 100 feet of the Upper Stryker Ridge Road and the Middle Stryker Ridge Road.
- The proposed new road location and the temp road locations would be located to minimize cut and fill sections of the road and use terrain features to reduce the road's visibility from the Highway 93 corridor.
- Locations on these roads that have potentially higher visibility would leave a larger component of sapling and overstory trees below the cut and fill sections to help mask those sections.

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 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.

Old Growth and Timber Stand Structural Diversity

- 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, Streamside Management Zones (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 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*, HCP, and *Forest Management 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.
- Snags, snag recruits, and coarse woody debris would be managed according to *ARM 36.11*.411 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 decision maker may select a modification or combination of these alternatives.

- ***No-Action Alternative***

  No timber harvesting, improvements to existing roads, or revenue generation for Common Schools Trust would take place in the area of the Mystery Fish 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.

  Current levels of sediment delivery from roads within and accessing the project area that do not fully meet BMPs may continue to 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,* HCP commitments, 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*.

  FIGURE II-2 – MYSTERY FISH PROPOSED PROJECT MAP displays the proposed harvest locations, harvest treatments, and roads.

Timber-Management Activities

Under this alternative, approximately 5.0 MMbf would be harvested from an estimated 456 acres using a combination of harvest treatments and both skyline and ground-based harvest systems. The two primary harvest treatments are Seedtree with Reserves and Clearcut with Reserves.

Harvest Treatments

Seedtree with Reserves (323 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, 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.

Clearcut with Reserves (133 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.

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.

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.

This alternative proposes to harvest approximately 27 acres of the *high attribute old growth*, 49 acres of the *medium attribute old growth,* and 83 acres of the *low attribute old growth* with regeneration treatments. Old-growth forest stands identified for proposed harvest were generally stands with lower abundance of large trees (>21" dbh) and higher levels of disease/insect mortality compared to other stands within the project area. Thus, old-growth stands not considered for harvest treatments contain higher habitat quality and are expected to persist in old-growth status longer on the landscape than those proposed for harvesting.

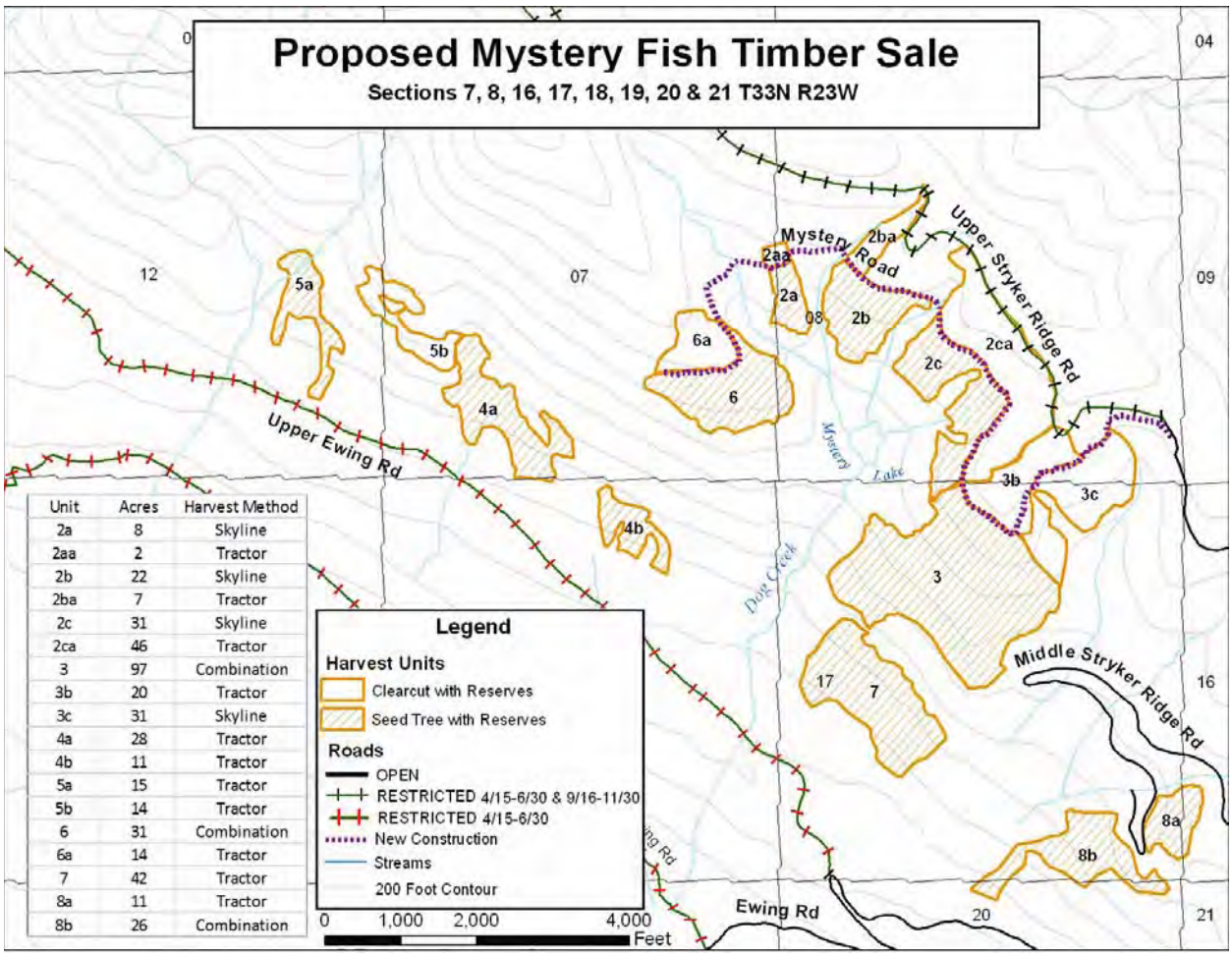
In areas planned for regeneration, sapling-sized trees of low vigor that remain after the harvesting of sawlogs would be felled or cut. These trees and excess logging slash would be piled or trampled. On the units being piled or trampled, a maximum of 30 percent of the area would be disturbed with an 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 2a, 2b, 2c, 3a, 3c 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-1 - PROPOSED PRESCRIPTIONS FOR THE MYSTERY FISH TIMBER SALE PROPOSAL displays the harvest areas and their associated harvest treatments and harvest systems.

Figure II-2: PROPOSED MYSTERY FISH PROJECT MAP



Unit	Acres	Harvest Method
2a	8	Skyline
2aa	2	Tractor
2b	22	Skyline
2ba	7	Tractor
2c	31	Skyline
2ca	46	Tractor
3	97	Combination
3b	20	Tractor
3c	31	Skyline
4a	28	Tractor
4b	11	Tractor
5a	15	Tractor
5b	14	Tractor
6	31	Combination
6a	14	Tractor
7	42	Tractor
8a	11	Tractor
8b	26	Combination

Table II-1: PROPOSED PRESCRIPTIONS FOR THE MYSTERY FISH TIMBER SALE PROPOSAL

PROPOSED HARVEST AREA	HARVEST TREATMENT	TOTAL ACRES HARVESTED/ ESTIMATED VOLUME (Mbf)	HARVEST PARTICULARS	FOLLOW-UP TREATMENTS
2aa	Clearcut with Reserves.	2/6.5 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 larch. .
2a	Seedtree with Reserves.	8/83 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western white pine, western larch and Douglas-fir. - Leave 6-10 TPA. - Cable yarding	- Pile and burn slash. - Mechanically site-prep. .
2ba	Clearcut with Reserves.	7/49 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 larch
2b	Seedtree with Reserves.	22/190 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western white pine, western larch and Douglas-fir. - Leave 6-10 TPA. - Cable yarding and ground based.	- Broadcast burn.
2ca	Clearcut with Reserves.	46/294 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 larch
2c	Seedtree with Reserves.	31/482 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western white pine, western larch and Douglas-fir. - Leave 6-10 TPA. - Cable yarding	- Broadcast burn. .

PROPOSED HARVEST AREA	HARVEST TREATMENT	TOTAL ACRES HARVESTED/ ESTIMATED VOLUME (Mbf)	HARVEST PARTICULARS	FOLLOW-UP TREATMENTS
3a	Seedtree with reserves.	97/1405 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch,western white pine, and Douglas-fir. - Leave 6-10 TPA. - Combination cable yarding and ground based.	- Pile and burn slash. - Mechanically site-prep open areas in tractor portion of unit - Broadcast burn skyline portion of unit.
3b	Clearcut with Reserves.	20/158 Mbf	- Utilize a harvest prescription of clear cut with reserves; favoring western larch and Douglas-fir for the reserve trees. - Tractor log.	- Pile and burn slash. - Mechanically site-prep. - Plant with western larch.
3c	Clearcut with Reserves.	31/236 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Cable yarding.	- Broadcast burn - Plant with western larch.
4a	Seedtree with reserves.	28/360 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Tractor log.	- Pile and burn slash. - Mechanically site-prep.
4b	Seedtree with reserves.	11/202 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Tractor log.	- Pile and burn slash. - Mechanically site-prep.
5a	Seedtree with reserves.	15/174 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. Tractor log.	- Pile and burn slash. - Mechanically site-prep. - Plant with western larch.
5b	Clearcut with Reserves.	14/99 Mbf	- Utilize a harvest prescription of clear cut with reserves; favoring western larch and Douglas-fir for the reserve trees. - Tractor log.	- Pile and burn slash. - Mechanically site-prep. - Plant with western larch.

PROPOSED HARVEST AREA	HARVEST TREATMENT	TOTAL ACRES HARVESTED/ ESTIMATED VOLUME (Mbf)	HARVEST PARTICULARS	FOLLOW-UP TREATMENTS
6a	Clearcut with Reserves.	14/71 Mbf	- Utilize a harvest prescription of clear cut with reserves; favoring western larch and Douglas-fir for the reserve trees. - Tractor log.	- Pile and burn slash. - Mechanically site-prep. - Plant with western larch.
6	Seedtree with reserves.	31/300 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch,western white pine, and Douglas-fir. - Leave 6-10 TPA. - Combination cable yarding and ground based.	- Pile and burn slash. - Mechanically site-prep open areas in tractor portion of unit - Broadcast burn skyline portion of unit. - Plant rust resistant western white pine.
7	Seedtree with reserves.	42/308 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Tractor log.	- Pile and burn slash. - Mechanically site-prep.
8a	Seedtree with reserves.	11/155Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Tractor log.	- Pile and burn slash. - Mechanically site-prep .
8b	Seedtree with reserves.	26/353 Mbf	- Utilize a harvest prescription of seedtree with reserves; favoring western larch and Douglas-fir. - Leave 6-10 TPA. - Combination cable yarding and ground based.	- Pile and burn slash. - Mechanically site-prep.

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 – MYSTERY FISH ROAD MAP* and *TABLE II-2 - ROADS* show an overall plan for roads, but several specific actions include:

- Mystery Road would be opened for roadwork and harvesting activities, as well as administrative use related to the sale.
- Two currently brushed-in roads would be re-opened for harvesting and administrative use only.
- Seven temporary roads would be built and reclaimed after management activities.

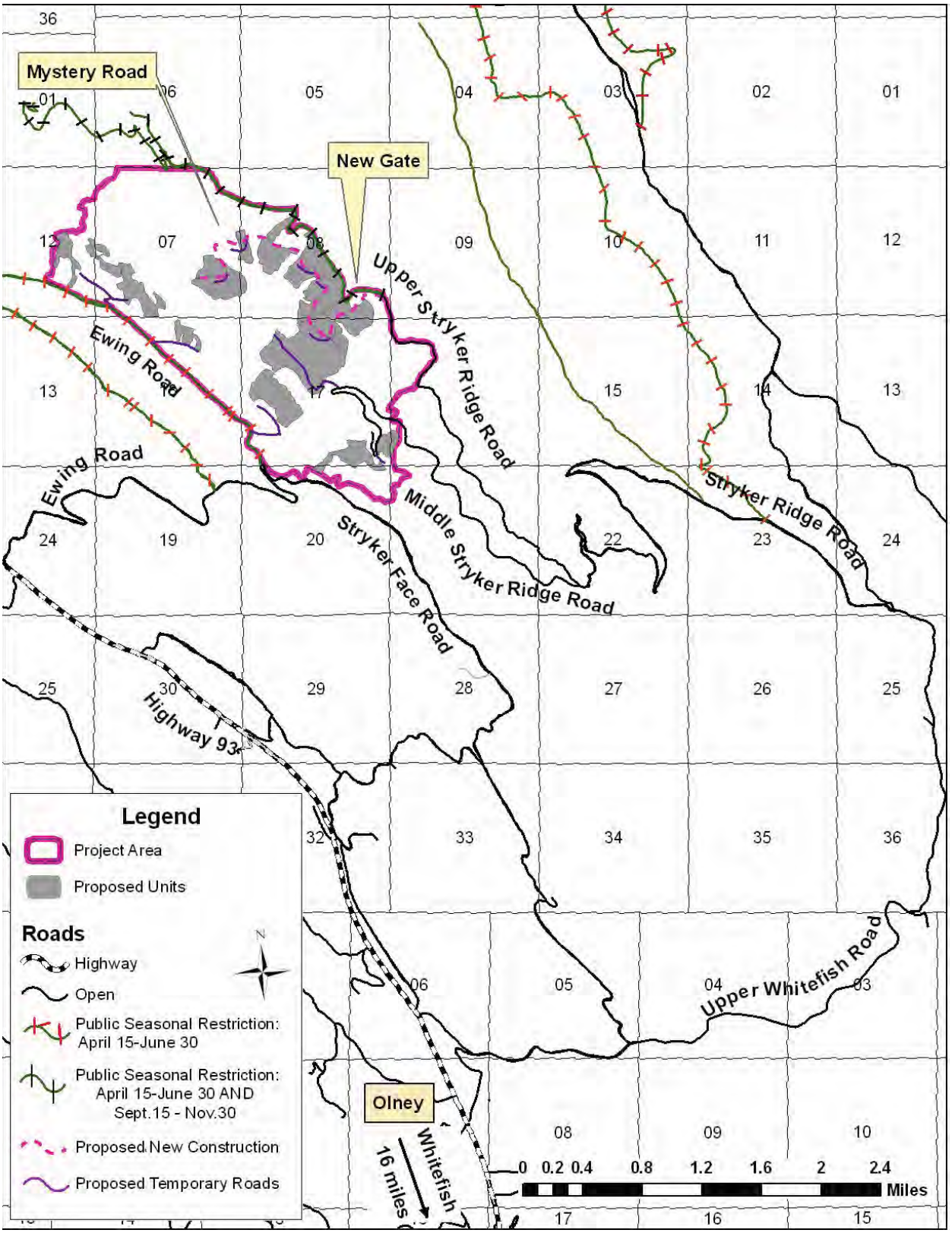
TABLE II-2 - ROADS displays the roads accessing this proposal, amount of road, standard of road, and a discussion about the roads.

Table II-2: ROADS

ROAD	ROAD LENGTH (miles)	STANDARD OF ROAD	ROAD CLASS	USE/TREATMENT
Upper Whitefish Rd.	7	Primary – Existing Road	Open	Maintenance and/or have minor drainage improvements installed.
Stryker Ridge Rd.	5.3	Secondary – Existing Road	Open	Maintenance and/or have minor drainage improvements installed.
Upper Stryker Ridge Rd.	4.05	Secondary – Existing Road	Open	Maintenance and/or have minor drainage improvements installed. Weed spraying required.
Middle Stryker Ridge Rd.	3.4	Secondary – Existing Road	Open	Maintenance and/or have minor drainage improvements installed. Weed spraying required.
Mystery Rd.	2.4	Secondary – New Construction	Closed to public year-round with a gate.	New construction. Gated.
Ewing Road	4.2	Secondary – Existing Road	Open	Maintenance and/or have minor drainage improvements installed.
	2.1	Secondary – Existing Road	Restricted April 1-July 1	Maintenance and/or have minor drainage improvements installed.
Stryker Face Road	0.5	Secondary – Existing Road	Open	Maintenance.
Temporary Spur 2a	0.1 (526′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.

ROAD	ROAD LENGTH (miles)	STANDARD OF ROAD	ROAD CLASS	USE/TREATMENT
Temporary Spur 2b	0.16 (862′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
Temporary Spur 2c	0.08 (401′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
Temporary Spur 3	0.16 (827′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
Temporary Spur 3a	0.66 (3477′) 1200′ full bench ,1000′half, 1300′ flat ground	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
Temporary Spur 5	0.28 (1458′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
Temporary Spur 4a	0.23 (1232′)	Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.
~~Temporary~~ Spur 4b	0.32 (1689′)	Secondary – Existing Road ~~Brush out road and install 2-18″x 26′ cmps~~	Closed year-round	Road would be closed following forest management activities.
Temporary Spur 7	0. 45 (1024′- brushed in existing road: 1340′ temp on excavated skid trail prism)	Secondary – Existing Road Temporary Road	Closed year-round	New construction of low-standard temporary road. Road would be reclaimed following forest management activities.

Figure II-3: MYSTERY FISH ROAD MAP



Environmental Effects Summary

TABLE II–3- SUMMARY OF ENVIRONMENTAL EFFECTS contains a summary of the information found in *CHAPTER III – EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS.* The following table compares the direct, indirect, and cumulative effects between the Action and No-Action alternatives. The current, or existing condition, can be viewed as a baseline condition, which can be used to make comparisons with the predicted changes that may result from the selection of either alternative.

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 175 acres of mixed conifer and 145 acres of subalpine fir cover type would be converted to the western larch/Douglas-fir cover type. Approximately 22 acres of the western larch/Douglas-fir cover type and 97 acres of the subalpine fir cover type would remain the same. Approximately 17 acres of the mixed conifer type would be converted to the western white pine cover type. Of the 456 acres proposed to be harvested, there would be a change in age class from 150+ to 0-39 years on approximately 133 acres. On the remaining 323 acres, no notable changes in age class would occur due to DNRC's methodologies for determining age class, but the areas being treated with regeneration harvests would introduce a new age class into the harvested units.	The cumulative effects would be the same as under the No-Action Alternative.
OLD-GROWTH	***No-Action Alternative***	
	In the short-term, no changes would be expected.	Old-growth acres would be maintained at 12,528 acres; the amount of old-growth on Stillwater Unit would remain at 10.7 percent.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
OLD-GROWTH	***Action Alternative***	
	Approximately 27 acres of the high attribute old growth, 49 acres of the medium attribute old growth, and 83 acres of the low attribute old growth would be harvested with regeneration treatments. The post-treatment timber stand would no longer meet DNRC's criteria for old growth.	Old-growth acres would be reduced to 12,369 acres; the amount of old-growth on Stillwater Unit would change to 10.6 percent.
INSECTS AND DISEASES	***No-Action Alternative***	
	Mortality would likely continue causing loss of timber volume and value.	Untreated forest stands would continue to contribute to the spread of insects and diseases. Salvage harvesting on other projects would reduce losses caused by insects and diseases.
	Action Alternative	
	Mortality would likely continue, but at a reduced level when compared to results of the No-Action Alternative. DNRC would also capture some volume and value from the harvested products.	Salvage harvesting would reduce losses caused by insects and diseases. Regenerated stands would have a species composition more resilient to insects and diseases, and would be more in line with historic conditions.
FOREST FUELS	***No-Action Alternative***	
	No direct effects would take place under this alternative. Fuel loads and distribution would increase.	With the levels of shade-tolerant species and down woody debris that are present, 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.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
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.	~~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.~~ The open roads in the project area receive traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These disturbances, as well as illegal motorized use, increase exposure to weed establishment. The weed management program at Stillwater Unit, including cooperation with the USFS and weed departments of Flathead and Lincoln counties, has improved over time and more weed control is taking place. Noxious weed populations on some restricted roads would likely not receive herbicide treatment, therefore there would be limited control on existing weed populations on these roads. There would also be minimal increases to the establishment of new populations on uninfected areas that are located away from open roads.
	Action Alternative	
	Mechanized equipment and ground disturbance could increase or introduce noxious weeds along roads and throughout forested areas. Mitigation measures have been designed for the project to minimize effects. FI money would be collected to help the weed-spraying program and site-specific weed spraying would continue.	~~Cumulative effects would be the same as under the No-Action Alternative.~~ The open roads in the project area receive traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These disturbances, as well as illegal motorized use, increase exposure to weed establishment. The weed management program at Stillwater Unit, including cooperation with the USFS and weed departments of Flathead and Lincoln counties, has improved over time and more weed control is taking place. A limited number of noxious weed populations on restricted roads would likely receive herbicide treatment, potentially slowing the rate of spread of existing weed populations and minimizing establishment of weeds on currently uninfected areas that are located away from open roads.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SOILS		
	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. No soil would be disturbed and no ground based equipment operation would occur as a result of this project. All impacts from past management activities would continue to improve or degrade as dictated by natural and pre-existing conditions.
	Action Alternative	
	Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts to soil physical properties would be expected on up to 50 of the total 456 acres proposed for harvesting in the proposed project area. 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). There would be a moderate risk of direct and indirect effects to slope stability from the proposed action alternative on approximately 15 acres. These acres are where proposed harvest units are located on slopes greater than 60%, and as a result are an elevated risk for slope stability. The risk would remain until re-vegetation begins on these units.	Due to mitigation measures and the limited area of reentry, the cumulative effects from compaction, erosion, and displacement would be low.
WATER RESOURCES		
SEDIMENT DELIVERY AND WATER YIELD	***No-Action Alternative***	
	No direct effects to sediment delivery are expected beyond those currently occurring. Indirect effects of the No-Action Alternative to sediment delivery would be an increased risk of sediment delivery to streams from crossings that do not meet applicable BMPs. 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.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SEDIMENT DELIVERY AND WATER YIELD	***Action Alternative***	
	There is a low risk of direct or indirect effects to sediment delivery to streams from the timber harvesting activities proposed. Direct and indirect effects to sediment delivery from use of the Upper Stryker Ridge and Upper Whitefish Lake roads from the Action Alternative are expected to be similar to the existing conditions. Erosion control and BMPs would be improved on up to 10 miles of existing road in the Dog Creek watershed. This work would reduce the estimated sediment delivery to Dog Creek and its tributaries by approximately 7.3 tons of sediment per year. This alternative would construct approximately 2.4 miles of new road and approximately 2.0 miles of temporary road to access proposed harvest units. The action alternative would also replace 2 failed existing stream crossings on an unnamed tributary to Dog Creek in Section 18 of the proposed project area with properly sized structures. Direct and indirect effects of the Action Alternative to water yield in the Dog Creek watershed would include an increase in annual water yield by an estimated 3.0 percent over the current level. These changes have a low risk of low impacts to the stream channels in the Dog Creek watershed.	The annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber-harvesting and road-construction operations. As a result, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low. The estimated cumulative water-yield increase in the Swift Creek-Antice Creek watershed would be 5.9 percent; the larger Swift Creek-Hemlock Creek watershed would experience an estimated cumulative annual water-yield increase of 5.7 percent. This level would remain below the threshold set in accordance with ARM 36.11.425(g), therefore, a low degree of risk to water quality would result from the implementation of this alternative.
FISHERIES RESOURCES	***No-Action Alternative***	
	No additional direct or indirect effects to fisheries resources would occur within all analysis areas.(Lower Swift, Meadow, Middle Swift, Rock Creek, and Upper Dog creek analysis areas)	Existing adverse cumulative effects to fisheries resources in the Lower Swift, Meadow, and Middle Swift creek analysis areas are likely low. Existing adverse cumulative effects are likely moderate in the Rock Creek analysis area and high in the Upper Dog Creek analysis area. The primary mechanism for the elevated existing impacts in the Rock and Upper Dog creek analysis areas is the displacement of native fisheries by non-native fisheries.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
FISHERIES RESOURCES	***Action Alternative***	
	The proposed actions do not include any timber harvest within 300' of a fish-bearing stream. Also as part of the proposed actions, two road-stream crossings would be constructed in the Upper Dog Creek analysis area to mitigate existing impacts to the sediment and channel form components of fisheries resources. Short-term impacts to sediment are expected as a result of the construction of the two road-stream crossings, but long-term impacts at the affected areas are expected to be low. A risk of additional low, direct and indirect long-term impacts to fisheries resources is expected in all analysis areas as a result of implementing the Action Alternative.	The overall cumulative effects to fisheries resources in all five analysis areas are expected to generally be the same as those described under Existing Conditions.
WILDLIFE		
MATURE 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.	Ongoing and proposed forest management projects not associated the proposed Mystery Fish Timber Sale within the cumulative effects analysis area could alter mature forest wildlife habitat in the present and future. 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	
	Under the action alternative, approximately 373 acres (19.5%) of mature canopy forest would undergo harvesting. Crown closure on these 373 acres would be reduced from >40% to 5-15%. Species that rely on mature canopy forested habitats would experience a reduction in habitat for 50 to 80 years. Roughly 766 acres of mature, closed-canopy forest in the project area would remain unharvested and could provide suitable habitat for species utilizing smaller patches of mature forest (mean patch size 59 acres). In general, under this alternative, habitat conditions would improve for species adapted to more open forest conditions, while reducing habitat quality for species that prefer dense, mature forest habitats.	Reductions in mature, closed canopy forested habitats associated with this alternative (13% of available mature habitat in cumulative area) would be additive to losses associated with past harvesting activities and any ongoing activities within the CEAA (e.g. SE Stryker Ridge Timber Sale). Across the CEAA, a considerable percentage (49.8%) of mature, closed-canopy forested habitats would exist (average patch size = 62 acres) and landscape connectivity would be minimally altered given the existing condition of the surrounding forested landscape.

OLD-GROWTH WILDLIFE HABITAT	***No-Action Alternative***	
	No changes to the amounts, quality, or spatial arrangement of old growth would occur under this Alternative. Old-growth-associated wildlife species would not be affected.	Ongoing and proposed forest management projects not associated the proposed Mystery Fish Timber Sale within the cumulative effects analysis area could alter mature forest wildlife habitat in the present and future. Existing stands of old growth would remain in their current state and no additional cumulative effects to old-growth associated wildlife species would be anticipated.
	Action Alternative	
	159 acres of old-growth forest would be removed from the 1,915-acre project area (4.3% of the project area; 20.0% of the existing old growth in the project area), resulting in 619 acres (32.3%) of old-growth forest remaining. Old-growth forest stands identified for proposed harvest were generally stands with lower abundance of large trees (>21" dbh) and higher levels of disease/insect mortality compared to other stands within the project area. Old-growth stands selected for retention contain higher habitat quality that are expected to persist in old-growth status longer on the landscape than those proposed for harvesting. A moderate level of adverse direct and indirect effects to wildlife associated with old-growth forests would be expected under the Action Alternative as a result of reduced availability of habitat and increases in old-growth fragmentation habitat parameters, such as reduced overall average patch size and reduced average size of large patches.	A moderate level of adverse cumulative effects to wildlife associated with old-growth forests would be expected under the Action Alternative as a result of reduced availability of habitat and increases in old-growth fragmentation habitat parameters, such as reduced average size of large patches. Effects to old-growth and associated wildlife species that would be likely under this alternative would be in addition to those that have occurred in CEAA over the last several decades on DNRC lands (e.g. ongoing SE Stryker Timber Sale).
SNAGS AND COARSE WOODY DEBRIS	***No-Action Alternative***	
	Negligible effects would be anticipated because no harvesting would alter present or future snag or coarse woody debris concentrations, and no changes to access for firewood gathering would occur.	Ongoing and proposed forest management projects not associated the proposed Mystery Fish Timber Sale within the cumulative effects analysis area could alter snag and downed wood wildlife habitat in the present and future. Snags and coarse woody debris would not be furthered altered under this No-Action Alternative. Wildlife species relying on snags and coarse woody debris would be expected to persist across the analysis area.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SNAGS AND COARSE WOODY DEBRIS	***Action Alternative***	
	Minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect habitat suitability of wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris on 456 acres (23.8%), but levels of these habitat attributes in unharvested areas (67.2%) would remain high 2) snags and future recruitment trees would be retained in all proposed treatment areas, and 3) open road access for firewood gathering would be unchanged in the long-term.	Lands within the cumulative effects analysis area have experienced different management rules through time, and snags and coarse woody debris have received different levels of consideration; however, harvesting (1,052 acres, 18.3% of the CEAA) has reduced these attributes. The losses of snags associated with this alternative would be additive to the losses associated with past harvesting and any ongoing harvesting on within the CEAA (SE Stryker Ridge Timber Sale). However, the project requirements to retain 2 large snags and snag recruits per acre (greater than 21 inches dbh or next largest size class), and 10 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Approximately 4,314 acres (75.2%) within the CEAA have not been harvested and likely contain moderate to high levels of snags and coarse woody debris.
GRIZZLY BEAR	***No-Action Alternative***	
	No direct effects to grizzly bears would be expected. No changes in road densities or hiding cover would be anticipated.	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could alter grizzly bear habitat and/or disturb bears in the present and future. Since no additional changes in available habitats or level of human disturbance would be anticipated as a result of the No-Action Alternative, no cumulative effects to grizzly bear diplacement or effects involving mortality risk would be anticipated.
	Action Alternative	
	Minor to moderate adverse direct or indirect effects to grizzly bears in the project area would be expected since: 1) minor to moderate levels of temporary (1 to 4 years) disturbance and displacement would be anticipated; 2) hiding cover on 456 acres (23.8%) would be lost in the short term, but would be expected to recover fairly rapidly; 3) commercial harvest and motorized activities would be restricted during the spring period; and 4) short-term increases in open road densities would be anticipated, but no changes to long-term open-road densities would occur and visual screening would be maintained along open roads.	Reductions in forest cover on 456 acres (1.1%) and disturbance levels would be additive to past timber harvesting that have affected approximately 3,993 acres. (9.8%), and currently proposed harvest projects (i.e. Fish Bull Face Timber Sale). 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 in each of the cumulative-effects analysis areas. 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) No changes to security habitats would be expected. 4) No changes in long-term open-road densities would be anticipated.

CANADA LYNX	***No-Action Alternative***	
	No changes in lynx habitat elements would be expected in the project area and landscape connectivity would not be altered. Thus, no direct or indirect effects influencing lynx habitat suitability would be expected to occur in the project area.	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could alter lynx habitat in the present and future. No additional cumulative effects to suitable lynx habitat are expected to result from the No-Action Alternative that could affect lynx habitat suitability in the CEAA.
	Action Alternative	
	Minor adverse direct and indirect effects to habitat suitability for Canada lynx would be expected since: 1) the amount of existing suitable lynx habitat in the project area would be reduced by 24.1%, but the majority (75.1%) would remain suitable, 2) suitable lynx habitats would likely develop in the next 15 to 30 years in the project area, 3) coarse woody debris and patches of regenerating conifers would be retained to increase forest structural complexity in harvest units when they grow back into suitable lynx habitat, and 4) moderate levels of landscape connectivity would persist despite an overall minor reduction in landscape connectivity.	Approximately 456 acres (1.2%) of the 39,240-acre cumulative effects analysis area would be altered and converted to temporary nonsuitable habitat. Within the cumulative effects analysis area, considerable amounts of suitable lynx habitats (85.5%) would continue to persist. Reductions in suitable lynx habitat and increases in temporary nonsuitable habitat in the proposed harvest units would not be expected to appreciably alter lynx use of the cumulative effects analysis area given that surrounding habitat suitability is high. Suitable lynx habitat within the CEAA is being altered by the ongoing Duck to Dog and Highway 93 timber sales, and could be altered within next 5 years by the proposed Fish Bull Face timber sale.
FISHER	***No-Action Alternative***	
	No change to the stands providing fisher denning and foraging habitats would be expected as no timber harvesting activities would occur under this alternative. Also, no changes in landscape connectivity would occur.	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could alter fisher habitat in the present and future. No additional cumulative effects to suitable fisher habitat are expected to result from the No-Action Alternative that could affect fisher habitat suitability in the CEAA.
	Action Alternative	
	Minor adverse direct and indirect effects would be anticipated that would affect fisher habitat suitability in the project area since: 1) harvesting would remove a minor amount of suitable riparian (2.1%) and upland (14.6%) fisher habitat, 2) minor reductions in habitat connectivity would occur and riparian fisher habitats maintained, and 3) long-term motorized access would remain the same.	Approximately 283 acres (3.0%) of 9,362 acres of suitable fisher habitat in the DNRC-owned cumulative effects analysis area would be harvested. This reduction would be additive to the losses associated with past and current timber harvesting in the cumulative effects analysis area, including the Duck to Dog and proposed Fish Bull Face timber sales. Future harvest operations or natural disturbance on non-DNRC ownerships could affect fisher habitat on the larger landscape. Negligible reductions in landscape connectivity within the cumulative effects analysis area would occur; suitable forest stands along the majority of riparian areas would persist.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
GRAY WOLF	***No-Action Alternative***	
	No effects would be expected because there would be no change in human disturbance levels, nor any changes to prey availability for wolves.	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could displace wolves and/or alter wolf prey availability in the present and future. No additional cumulative effects to wolf displacement risk or prey availability are expected to result from the No-Action Alternative that could affect wolves in the CEAA.
	Action Alternative	
	Minor adverse direct and indirect effects to wolf prey availability and minor adverse direct and indirect effects affecting gray wolf displacement risk would be expected since: 1) no known wolf den and/or rendezvous sites are within the project area, 2) there would be minimal reductions in habitat quality of big game winter range that could alter wolf prey availability, and 3) there would be short-term increases in motorized disturbance, and potential for slight long-term increases in non-motorized access.	Disturbance associated with the Action Alternative would be additive to ongoing and proposed forest management activities within the CEAA (i.e. Highway 93 Timber Sale, Duck to Dog Timber Sale, proposed Fish Bull Face Timber Sale). Reductions in cover may cause slight decreases in use by deer, moose, and elk; however, no appreciable changes in deer and elk distribution or abundance would be expected at the scale of the CEAA. The reductions that would occur under this alternative to big game winter range would not be expected to affect the overall use of the cumulative effects analysis area by wolves.
PILEATED WOODPECKER	***No-Action Alternative***	
	Negligible adverse effects to pileated woodpecker habitat suitability would be anticipated, as no timber harvesting would occur..	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could serve as a disturbance to pileated woodpeckers and/or alter habitat suitability in the present and future. No additional cumulative effects to pileated woodpecker disturbance risk or habitat suitability are expected to result from the No-Action Alternative.
	Action Alternative	
	Minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) 28.3% of available suitable habitat would be harvested; 2) the majority of current pileated woodpecker habitat would remain unharvested (602 acres, 71.7%); 3) some snags and snag recruits would be removed, however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in harvest areas would be included; 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas where pileated habitat is currently not present; and 5) temporary levels of potential disturbance would increase, but long-term disturbance would be unchanged.	Minor cumulative effects to habitat suitability for pileated woodpeckers would be anticipated since: 1) a minor amount (12.8%) of suitable pileated woodpecker habitat currently present within the CEAA would be altered; 2) 28.3% of suitable pileated woodpecker habitat would remain; 3) some snags and snag recruits per acre would be removed in the proposed harvest areas for operational and human safety purposes; however, mitigation measures would retain some snags and recruitment trees in harvested areas; and 4) disturbance and firewood gathering would not appreciably change in the long-term. These effects would be additive to habitat modification and disturbance levels from ongoing (SE Stryker Timber Sale) and proposed (Fish Bull Face Timber Sale) timber harvesting.

BIG GAME HABITAT	***No-Action Alternative***	
	No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing cover would continue to contribute to winter range quality and security habitat would not be altered.	Ongoing and proposed forest management projects not associated with the proposed Mystery Fish timber sale could alter big game habitat quality in the present and future. No additional cumulative effects to big game habitat quality are expected to result from the No-Action Alternative.
	Action Alternative	
	Minor adverse direct and indirect effects to big game security habitat and winter range habitat quality would be expected. Approximately 456 acres (23.8%) of big game habitat would be harvested. Of these acres, roughly 85 acres of elk security habitat and 447 acres of mature canopy forest currently providing thermal cover would be harvested. Harvest prescriptions in all harvest units would result in areas that are currently too open to effectively function as security cover, thermal cover or snow intercept. Proposed tree removal would increase sight distances in harvest units and could increase risk of hunting mortality. Proposed broadcast burning on 175 acres of harvest units could improve ungulate forage and long-term habitat quality. Some short-term (1-4 years) displacement of big game would be expected as a result of the proposed motorized logging disturbance.	Minor adverse cumulative effects to big game winter range and elk security habitat would be expected. Forest stands providing suitable thermal cover and snow intercept would be removed from approximately 447 acres (1.1%) of winter range within the CEAA (40,860 acres). Elk security cover across 85 acres (0.4%) would also be reduced within the CEAA. Short-term displacement of big game associated with this alternative would be additive to any displacement associated with ongoing and proposed timber harvesting (Duck to Dog Timber Sale, proposed Fish Bull Face Timber Sale).

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
AESTHETICS		
	No-Action Alternative	
	Timber harvesting and road construction would not take place at this time.	Timber harvesting and road construction would not take place at this time. Effects to the visual resource include activities such as firewood gathering and recreational use, which are presently taking place. Natural processes on the landscape, such as wildfire, blowdown events, insect infestations or disease infections, would continue to alter the visual resource over time. Cumulatively there would not be additional harvest units visible from Highway 93.
	Action Alternative	
	When viewing the proposed harvest units from roads within the project area, the viewing distance into the harvest units would be increased due to the reduction in tree densities. These new harvest areas would primarily be open stands with scattered overstory trees. Vegetative screens along roadways would reduce the number of vantage points potentially available. The background views of the treated areas, as seen from Highway 93, would have an open appearance with scattered overstory trees retained. Some openings would not be visible due to their position on the face; while others would add to the number of existing openings now visible. This would change the texture from the surrounding untreated forest canopy and would define boundary lines along adjacent timber stands. The irregular edges on the proposed harvest units would help reduce the visual impact. When available, additional "reserve" trees would be retained around harvest unit perimeters to provide a transition into the adjacent untreated forests. Construction of 2.4 miles of new road and up to 2.0 miles of temporary roads would be built, and segments of these roads would be noticeable from Highway 93. The proposed new road and the temporary roads would be located to minimize cut and fill sections of the road and use terrain features such as locating the road on benches to reduce the road's visibility. There would be a larger component of sapling and overstory trees retained below the cut /fill sections to help mask the road.	Cumulative effects to the background view seen from Highway 93 are that these proposed units and roads would be additive to the more open views associated with the SE Stryker Ridge and Stryker Ridge II Timber Sale units.

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. 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 $568,500 in project revenue would be deposited into the Common School trust account and approximately $125,650 would be put into the FI account. Approximately $98,850 of road development and maintenance work would be accomplished. An estimated $69,700, or $185.37 per acre, would be spent from the FI budget to reduce fire hazards and prepare harvested areas for natural and planted regeneration. This sale would provide work for approximately 50 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 proposed action 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.

Chapter III

Existing Conditions and Environmental Effects

Introduction

This chapter presents both the existing environment of the project and potential consequences to that environment by implementing the Action Alternatives 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 *CHAPTER II – ALTERNATIVES – MITGATIONS AND APPENDIX A – STIPULATIONS AND SPECIFICATIONS*). The proposed Action Alternative is limited to the specific timber harvest, fuel treatments, reforestation activities, and road work in the Mystery Fish Timber Sale Project area, although some components are analyzed across the Stillwater Unit's landscape.

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 SLI and other project documents. The project files for the Mystery Fish Timber Sale Project include all project-specific information, including resource reports and 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 taking place over a period of time.

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Vegetation Analysis

Introduction

This section describes conditions of the existing vegetation on Stillwater Unit as a whole, and in the project area specifically, and 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 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 landtype, climatic section, habitat type, disturbance regime, and other unique characteristics, 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 the goal of promoting biodiversity.

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

The current cover type distribution was compared to DNRC's desired future conditions. The Stillwater SLI, specifically *STW SLI_2009,* was used to describe current cover types. DNRC's desired future conditions refer to the cover type that DNRC attempts to manage toward in a forest stand. Desired future conditions are determined according to the model described in *ARM 36.11.405*. 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 the 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, Coal Ridge, Swedish Chicken, Lazy Swift 2, and Butcher Stewart timber sales, and this proposed project.

Analysis Areas

The direct, indirect, and cumulative effects for cover types and age classes consider historic conditions from Climatic Section 333c for the Stillwater Unit (*Losensky 1997*). The current and desired future forest conditions and old growth amounts and distribution will be analyzed separately on forested lands that are administered by the Stillwater Unit. The Stillwater Unit administers Stillwater State Forest, Coal Creek State Forest, most of the scattered State lands north of Coal Creek State Forest in Flathead County and the northeastern portion of Lincoln County. The assessment of direct and indirect effects to old growth attributes, timber stand health (insect and disease conditions), forest fuels, and noxious weeds were conducted on the project area. The cumulative effects analysis area (CEAA) for timber stand health 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.

***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	1.5
Subalpine fir	27.0	17.7
Lodgepole pine	11.0	10.2
Ponderosa pine	0.7	1.7
Mixed conifer	26.8	6.6
Western larch/Douglas-fir	24.8	47.1
Western white pine	2.0	14.9
Hardwoods	0.3	3.1
Area that does not have a cover type designated in the SLI*	3.7	

**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 harvests, reconnaissance shows that many areas are regenerating to the early successional cover type of primarily lodgepole pine or western larch/Douglas-fir.*

Data indicates, as illustrated by *TABLE III-1 (above)* that mixed-conifer and subalpine fir stands are currently overrepresented compared to DNRC's desired future conditions. Many of the species that comprise the mixed-conifer and subalpine cover types are shade-tolerant, and stand structure tends to be multi-storied. The multi-storied 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 underrepresented on the forest compared to the desired future condition cover type distribution. Western larch and western white pine are not shade-tolerant and have, historically, been perpetuated through fairly intensive disturbances such as wildfires. These disturbances most often created single and two-storied stands of primarily 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. The white pine blister rust infection has drastically affected the western white pine cover type over several decades by substantially reducing the number of healthy western white pine that occupy the canopy as an overstory dominant species. Additionally, in 1988, a weather event occurred that caused western white pine to become susceptible to bark beetle mortality.

Age-class distributions delineate another characteristic important 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 in the 0-to-39-year (seedling/sapling stands) and 100-to-150-year age classes, and higher proportions of areas in the 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.

***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	11.4
40-to-99-year	12	17.9	24.0
100-to-150-year	22	24.7	13.4
150+-year	29	32.8	47.4
No age provided in SLI			3.7

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-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	25	466	635	2, 534	621	4281
Hardwoods	100	122	69	64	0	355
Lodgepole pine	2,532	8,843	444	408	1,003	13,230
Mixed conifer	2,460	7,011	4,339	16,417	304	30,531
Ponderosa pine	371	0	491	242	0	1,104
Subalpine fir	2,599	7,627	3,646	17,372	357	31,601
Western larch/ Douglas-fir	510	3,888	5,881	16,427	2,076	28,782
Western white pine	325	234	256	2,087	0	2,902
Nonstocked	4,437	0	0	0	0	4,437
Total acres (total percent)	13,359 (11.4)	28,191 (24.0)	15,761 (13.4)	55,551 (47.4)	4,361 (3.7)	117,223

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 and proportions of older age classes would increase.

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

Within the areas where treatment is proposed, the following results would be expected:

- Approximately 175 acres of mixed conifer and 145 acres of subalpine fir cover type would be converted to the western larch/Douglas-fir cover type.
- Approximately 22 acres of the western larch/Douglas-fir cover type and 97 acres of the subalpine fir cover type would remain the same.
- Approximately 17 acres of mixed conifer cover type would be converted to the western white pine cover type.
- 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 towards a greater representation of western larch/Douglas-fir cover type.

Due to the amount of older-aged trees being retained and DNRC's SLI methodologies used in determining age class, no notable change in age class would occur on 323 of the 456 acres that would be harvested under this alternative. 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, none of the areas of seedtree harvests would change to the 0-to-39 year age class because at least 10% canopy will be retained. Clearcuts with reserves are proposed on 133 acres of the preferred alternative. In this 133 acres, the age class would move from 150+ years old to the 0-39 years age class.

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

The cumulative effects of timber-stand management on 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 data has not yet been compiled. The timber sale projects that have been implemented since the *STW 2006 SLI* increase 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 also 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.

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 *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 the Stillwater Unit, approximately 10.7 percent (12,528 acres) of the Stillwater Unit analysis area can be classified as old growth. *FIGURE III - 1 – OLD GROWTH WITHIN THE PROPOSED MYSTERY FISH PROJECT AREA* shows the old-growth stands in the project area.

TABLE III-4 – OLD-GROWTH ACRES BY COVER TYPE ON STILLWATER UNIT 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.

***TABLE III-4** – OLD-GROWTH ACRES BY COVER TYPE ON STILLWATER UNIT**

PONDEROSA PINE	DOUGLAS-FIR	LODGEPOLE PINE	MIXED CONIFER	SUBALPINE FIR	WESTERN LARCH/ DOUGLAS-FIR	WESTERN WHITE PINE	TOTAL
12	531	408	4,052	4,394	2,292	840	12,528

**This information comes from 2009 SLI and field reconnaissance done during 2009, 2010, and 2011, and accounts for harvest treatments in all current timber sale projects on Stillwater Unit.*

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,
- number of snags,
- amount of coarse woody debris,
- amount of decadence,
- multistoried structures,
- gross volume, 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.

There are 775 acres of old growth within the project area. Currently, SLI and field reconnaissance shows approximately 450 acres (58 percent) of the old-growth stands are in the *high attribute* category, 116 acres (15 percent) of the old-growth stands are in the *medium attribute* category, and 209 acres (27 percent) are in the *low attribute* category.

High Attribute Old Growth:

- Western larch and Douglas-fir are the dominant overstory species. Both species average 200 years+ in age. There are from 15-30 trees per acre (TPA) within the 21-inch or greater dbh class.
- The stand structures are all two-storied or multi-storied, with tree sizes from seedlings to large sawtimber.
- Vigor is average to poor in all stands.
- 2 to 4 large diameter snags per acre (21"+ dbh) are present.
- Subalpine fir and Englemann spruce are the dominant tree species within the intermediate stories or canopy level. Most of these two species are heavily infested with western spruce budworm. Subalpine fir ranges from 60 to 120 years old; Englemann spruce ranges between 120 and 200 years old.
- Large downed trees in varying stages of decay are distributed throughout each of the high attribute old-growth stands.
- Canopy cover averages >70%.

Medium Attribute Old Growth:

- Engelmann spruce and subalpine fir are the dominant overstory species with a smaller component of Douglas-fir and western larch. All of the overstory species average 200 years+ in age and there are from 10-15 trees per acre (TPA) within the 21-inch or greater dbh class.
- The stand structures are all two-storied or multi-storied, with tree sizes from seedlings to large sawtimber.
- Large downed trees in varying degrees of decay are not present.
- An average of 2 large diameter snags per acre (21"+) are present.
- Canopy Cover averages 40-70%.

Low Attribute Old Growth:

- Engelmann spruce and subalpine fir are the dominant overstory species with a smaller component of Douglas-fir and western larch. All of the overstory species average 200 years+ in age and there are approximately 10 -12 trees per acre within the 21-inch or greater dbh class. The Engelmann spruce and subalpine fir are showing signs of declining health through rot in the bole, broken tops, and reduced vigor (dying and thinning primarily due to spruce budworm) in the foliage. The western larch has dwarf mistletoe present at an endemic level in most of the stands but heavier in proposed Unit 3c (risk ratings 5-6).
- The stand structures are single and two storied with the understory comprised of Englemann spruce and subalpine fir sawtimber or advanced regeneration (saplings).
- There is a large component of fool's huckleberry and alder brush present which is a limiting factor in regeneration of tree species in these stands.
- The downed woody component is either entirely missing or present at very low levels.
- Older, large diameter trees have a clumpy distribution within most of the stands, characterized by pockets of whitewoods and pockets of older large diameter trees.
- Canopy Closure averages approximately 8-39%.

Environmental Effects to Old Growth

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

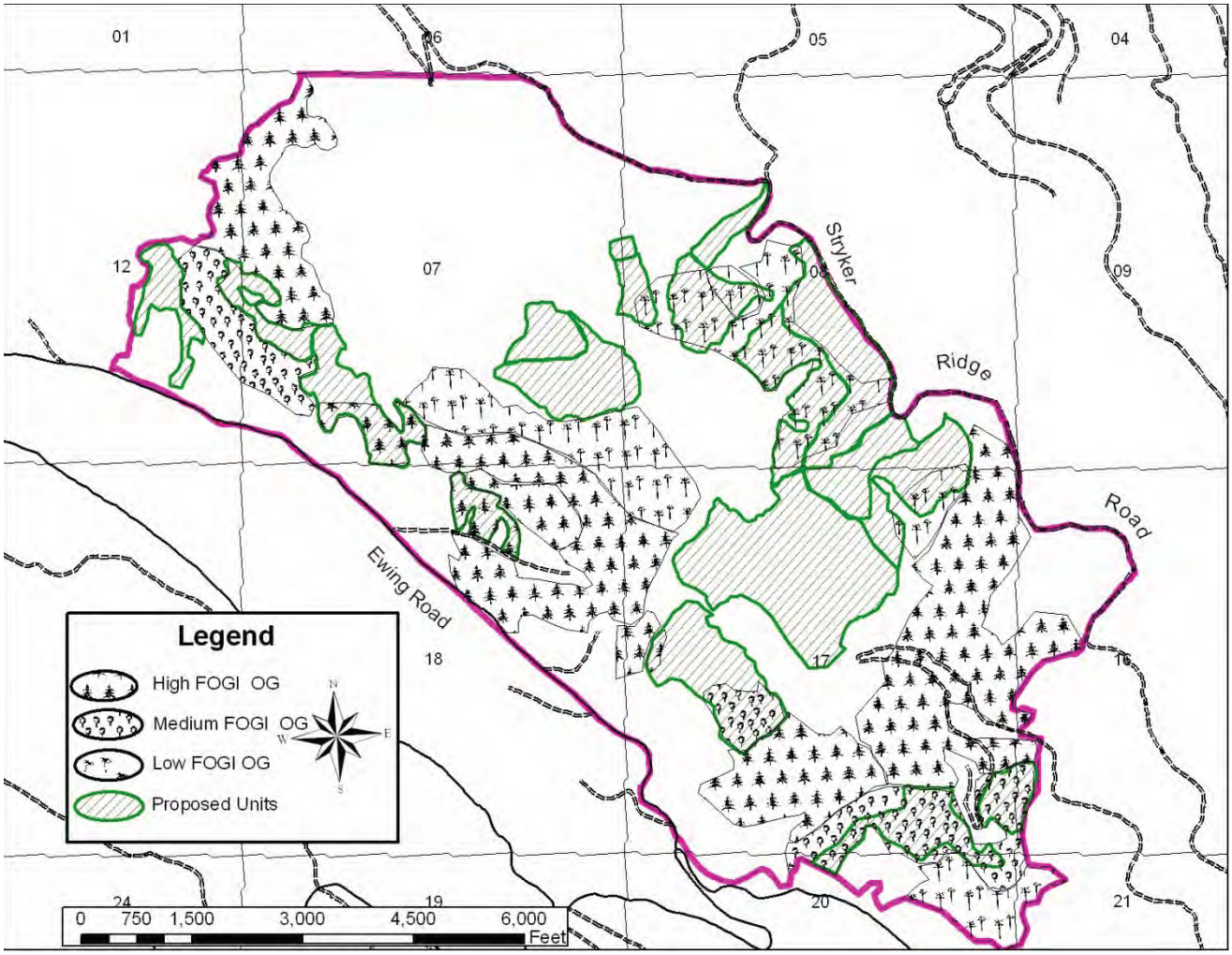
In approximately 43 acres of the *high to medium attribute old growth*, the western larch is heavily infested with dwarf mistletoe and the Douglas-fir shows the presence of *Armillaria* root rot and Douglas-fir bark beetle activity. At the current rate of mortality in large-diameter trees, these 43 acres of old growth would likely not meet the criteria for old growth within the next 10 years.

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

Approximately 27 acres of the *high attribute old growth*, 49 acres of the *medium attribute old growth,* and 83 acres of the *low attribute old growth* would be harvested with regeneration treatments. The post-treatment timber stand would no longer meet DNRC's criteria for old growth. Future SLI updates would be made on the portions of the timber stands where old growth would be harvested.

FIGURE III-1 shows the distribution of old growth within the project area.

FIGURE III-1 *– OLD GROWTH WITHIN THE PROPOSED MYSTERY FISH PROJECT AREA*



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

Stands that currently meet DNRC*s* old growth definition 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.

189 acres of old growth have been or are planned to be treated using old growth maintenance treatments (89 acres in Swedish Chicken Timber Sale, 25 acres in the Coal Ridge Timber Sale, 24 acres in Butcher Stewart Timber Sale, and 51 acres in the Upper Whitefish Timber Sale). This would not affect the distribution of old growth, since all 189 acres would retain old-growth status, but it would affect the attributes, such as stand volume and species composition, by removing much of the shade-tolerant components of the existing stands. Post-harvest planting of western white pine within portions of these stands would, over time, move these stands towards desired cover types in the future.

An estimate of 12, 528 acres or 10.7% of the forest stands on the Stillwater Unit would remain old growth.

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

In addition to the general effects to old growth described in the Cumulative Effects section of the No-Action Alternative, 159 acres of old growth would be harvested with regeneration treatments in the proposed Mystery Fish Timber Sale. The estimated amount of old growth on the Stillwater Unit would be reduced to 12, 369 acres or 10.6%.

Timber-Stand Health

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.

Existing Condition

Damage and mortality from insects and diseases are limited to small portions of the project area, but there is an increasing incidence of various damaging agents. A rise has occurred in the incidence of western spruce budworm, mountain pine beetle, white pine blister rust, and Douglas-fir beetle. Indian paint fungus is not uncommon in grand fir and subalpine fir throughout this area. Larch mistletoe is found in several areas of the project area. The root disease *Armillaria* (affecting Douglas-fir) is found primarily in the lower elevation units.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative to Timber Stand Health

In general, insect populations would continue to rise or fall based on natural disturbances or climatic conditions. As mortality and stem decay occurs in the project area, there would be loss of sawlog volume and value. 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. Diseases and parasites such as Armillaria root rot and dwarf mistletoe would continue to exist and may increase in susceptible species, resulting in mortality over time. Western white pine populations would continue to die from beetle damage and pine blister rust until possibly disappearing from the area all together, and Douglas-fir beetles may continue killing large diameter Douglas-fir.

Direct and Indirect Effects of the Action Alternative to Timber Stand Health

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

This project would reduce susceptibility to western spruce budworm on 456 acres through the use of harvest treatments that would reduce the amounts of whitewoods, which are the preferred food source of spruce budworm. Harvest treatments would also reduce stand density, thereby improving the vigor of the residual stands and providing trees with greater resources to support survival of cyclic defoliation.

This project would include the planting of approximately 5,500 rust-resistant western white pine seedlings on 17 acres after harvesting has been completed, thereby providing the continued presence of western white pine in the project area. Approximately 20,000 western larch would be

planted on 134 acres after the harvesting has been completed to help move those acres from the subalpine fir covertype to the desired future condition of western larch/Douglas-fir covertype.

Individual larch heavily infected with dwarf mistletoe would be harvested, resulting in the reduced spread of mistletoe and improved vigor of the residual stands, and increased resources for individual trees to live with or possibly resist mistletoe infection.

Cumulative Effects of the No-Action Alternative to Timber Stand Health

In the project area no harvesting of live, dead, dying, or high-risk trees would occur. Some salvage harvesting of insect-infested and disease-infected trees may occur under a separate environmental review document if an outbreak permit is requested. Western white pine populations would continue to die from beetles and pine blister rust until possibly disappearing from the area all together. Incidence of dwarf mistletoe would likely increase, infecting increasing numbers of western larch through seed dispersion from the larger dominant trees to the saplings and intermediate story trees. Douglas-fir beetles may continue killing large diameter Douglas-fir. 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.

Elsewhere on the Stillwater Unit, silvicultural prescriptions have generally been implemented that would reduce losses and recover mortality caused by insects and disease.

Cumulative Effects of the Action Alternative to Timber Stand Health

On the Stillwater Unit silvicultural 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

Fire Regimes

The fire regimes across Stillwater Unit are variable. The forest, as a whole, has a mosaic pattern that developed from different fire frequencies and intensities. Areas of frequent fires have produced Douglas-fir and western larch cover types. As the intervals between fires become longer, cover types of shade-tolerant species (Engelmann spruce, subalpine fir, grand fir, western hemlock, and western red cedar) begin to develop. The Stillwater Unit's higher elevations have longer fire intervals and the stands tend to be multistoried with a dominant shade-tolerant cover type. Where fire frequencies are short, the stands are open, single-storied, and occasionally, two-storied. With the arrival of aggressive wildfire-suppression efforts, cover types and wildfire frequencies were altered.

Stands of western larch and/or Douglas-fir have become multistoried with shade-tolerant species. Stands that were once open now have a dense understory of predominantly Douglas-fir, grand fir, Engelmann spruce, and subalpine fir. Due to fire-suppression efforts, forest fires are generally smaller, limiting natural fire effects. If a large-scale fire were to 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 Mystery Fish project area are summarized in *TABLE III-5– CHARACTERISTICS OF FIRE GROUPS OCCURRING WITHIN THE MYSTERY FISH TIMBER SALE PROJECT.*

***TABLE III-5** – CHARACTERISTICS OF FIRE GROUPS OCCURRING WITHIN THE MYSTERY FISH TIMBER SALE PROJECT.*

	FIRE GROUP		
	8	**9**	**11**
Habitat type group	Dry lower subalpine habitat types	Moist lower subalpine habitat types	Moist grand fir, western red cedar, and western hemlock habitat types
Percent of the project area	4	59	37
Fire return interval/ Severity *(Fischer and Bradley)*	Frequent to Infrequent/Mixed	Infrequent/ Low or High	Infrequent/ Low to Moderate
Average fuel loading (tons/acre) *(Fischer and Bradley)*	18	25	25
Postharvest fuel loading (tons/acre)	10 to 15	10 to 15	10 to 15

Timber Sale Project Fire Groups

The Mystery Fish Timber Sale project is represented primarily by Fire Groups 9 and 11. Fire Group 9 represents moist, lower subalpine habitat types and Fire Group 11 represents moist grand fir, western red cedar, and western hemlock habitat types where fires are infrequent, and either very low intensity or severe, with long lasting effects. Under typical conditions, high soil moisture and lush understory vegetation hamper most fires before

they have a chance to grow. However, 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 when fires do occur. 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).*

During field reconnaissance, 12 transects were used to estimate coarse woody debris in the project area, with emphasis on proposed unit locations. The method for quantifying the coarse woody debris is described in the Handbook for Inventorying Downed Woody Material *(Brown, 1974).* The average tonnage per acre was 18.9 with a wide range of 1.2 to 46.9 tons per acre.

These results are on the high end of recommendations described in Managing Coarse Woody Debris in Forests of the Rocky Mountains *(Graham et al, 1994)* on similar habitat types, post timber harvest. Subalpine fir habitat types are recommended to have a level of coarse woody debris in the range of 7.3 to 22.8 tons per acre to maintain forest productivity. Grand fir habitat types are recommended to have a range of 7 to 14 tons per acre to maintain forest productivity. Currently, 58% of the transects were in the recommended range, 21% were below the recommended range and 21% of the transects were above the minimum recommendation.

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 a prescribed or natural 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

Although the potential for ignition would continue to exist following treatment, ladder fuels to crowns would be removed in the proposed harvest units, and fuel treatments would limit the fire intensity under most circumstances. The success of aerial and ground attacks on wildfires would potentially be improved because fires would most likely burn through and remain in the understory, rather than climbing into the overstory and moving through the upper canopy.

Areas treated with the regeneration treatments would emulate a stand-replacement fire without the risk of burning the seed trees of desired seral species, or overheating 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 fuel loading and continuity, as well as the difficult terrain and limited access, potentially occurring wildfires would likely be stand-replacing events and 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 non-native 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 as 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 leucanthemum*)
- orange hawkweed (*Hieracium aurantiacum*)

Spotted knapweed and oxeye daisy are listed as Category 1 weeds, which are established weeds with high disbursement; orange hawkweed is a Category 2 weed, which is established, but has 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—the most widely distributed noxious weeds in the project area and on Stillwater Unit are found in areas where ground disturbances such as landings, skid trails, powerlines, 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 via motor vehicle use. Established infestations of noxious weeds are being addressed with an ongoing program of site-specific herbicide spraying along roads and in small areas of infestation.

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 and inspecting equipment before entering the site,
- sowing grass seed on roads after harvesting has been completed, and
- applying herbicide along roadsides and on spots of weed outbreaks.

Cumulative Effects of the ~~Action and~~ No-Action Alternative~~s~~ to Noxious Weeds

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

Noxious weed populations on some restricted roads would likely not receive herbicide treatment, therefore there would be limited control on existing weed populations on these roads. There would also be minimal increase to the establishment of new populations on uninfected areas that are located away from open roads.

Cumulative Effects of the Action Alternative to Noxious Weeds

The open roads in the project area receive traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These disturbances, as well as illegal motorized use, increase exposure to weed establishment. The weed-management program at Stillwater Unit, including cooperation with the USFS and weed departments of Flathead and Lincoln counties, has improved over time and more weed control is taking place.

A limited number of noxious weed populations on restricted roads would likely receive herbicide treatment, potentially slowing the rate of spread of existing weed populations and minimizing establishment of weeds on currently uninfected areas that are located away from open roads.

Soils Analysis

Introduction

Landform Description

The landform and parent materials in the project area are generally quartzite and argillite bedrock soils with small areas of glacial till or glacial drift influence. Volcanic ash surface layers are common above 5000 feet, especially on northern aspects. The majority of the bedrock consists of slightly metamorphosed sedimentary rocks formed from sand, silt, clay, and carbonate materials deposited in an ancient shallow sea during the Precambrian period.

Soil Physical Properties

Analysis of soil physical properties addresses the issue that timber harvesting and associated activities may affect soil conditions in the proposed project area through ground-based and cable yarding activities, and through repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore space in soil, reduces its ability to absorb and retain water, and can increase runoff and overland flow. These conditions can also lead to a decrease in vegetation growth. Surface erosion can also affect vegetation growth and water quality. Sheet and rill erosion can remove fertile surface layers of soil, and also make re-vegetation difficult.

Nutrient Cycling

Nutrient cycling, microbial habitat, moisture retention and protection from mineral erosion are provided by coarse and fine woody debris in forested environments (Harmon et al, 1986). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to potentially available nutrients for long-term forest production.

Slope Stability

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

Analysis Methods

Soil Physical Properties

Impacts to soil physical properties will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field review and aerial photo review of existing and proposed harvest units. Percent of area affected is determined through pace transects, measurement, aerial photo interpretation, and 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 ground-based and cable yarding activities will be assessed based on findings of DNRC soil monitoring. Soil erosion potential will be measured using the K-value as determined by the NRCS (1996). A description of the K-value and its associated interpretations is found in *Table III-7 Soil Map Unit Descriptions.*

Nutrient Cycling

Nutrient cycling will be analyzed by disclosing existing levels of coarse woody debris from transects conducted during field reconnaissance. The method for quantifying the coarse woody debris is described in the *Handbook for Inventorying Downed Woody Material* (Brown, 1974). Potential impacts to nutrient cycling will be assessed by evaluating risks to nutrient pools and long-term site productivity from timber sale contract requirements and mitigation measures.

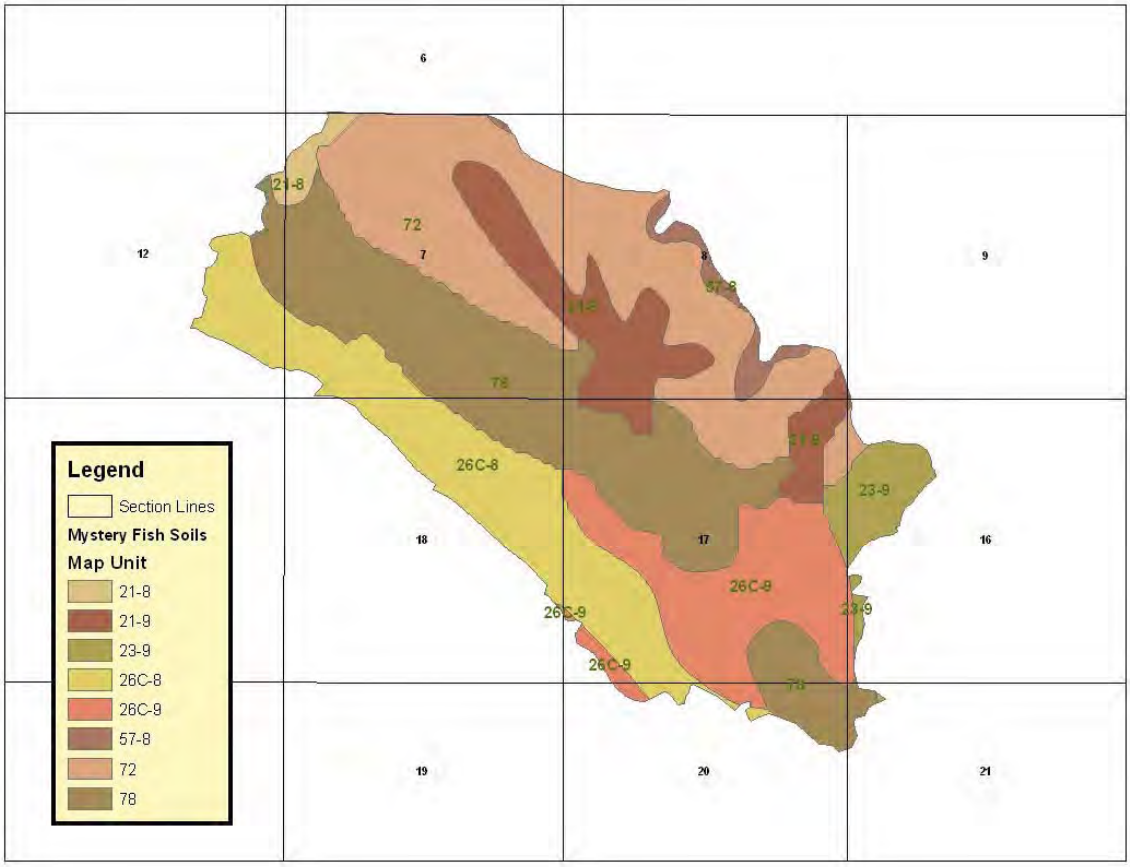
Slope Stability

Slope stability risk factors will be analyzed by reviewing the Web Soil Survey 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, nutrient cycling and slope stability will include DNRC owned land within the Mystery Fish project area. A map of the Landtypes in the Mystery Fish project area is found below in *Figure III-2 Mystery Fish Landtype Map*.

FIGURE III-2 – Mystery Fish Landtype Map



Existing Environment

Soil Physical Properties

In the gross project area, DNRC has conducted timber harvesting since the 1960s. Timber sale records dating back to the 1960s indicate most of the proposed project area has been harvested using primarily ground-based yarding methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Existing skid trails are spaced at between 60 and 120 feet apart, and none were identified as erosion or sediment sources. Trails are still apparent, but most are well vegetated and past impacts are beginning to ameliorate from freeze-thaw cycles and root penetration. In some areas, excavated skid trails were constructed to skid logs across steeper slopes. In some cases, these excavated trails have intercepted springs and sub-surface water. These springs generally become sub-surface prior to reaching other water sources, but excavated trails with surface water are considered unsuitable for continued use. Based on pace transects of trail spacing, knife penetration tests for compaction, and ocular estimates of re-vegetation, approximately 10% of previously ground-skidded harvest units are in an impacted condition in the proposed project area.

Nutrient Cycling

Nutrient cycling was assessed in the proposed project area by completing 12 transects to estimate the current levels of coarse woody debris. These transects were focused on proposed harvest units. The average coarse woody debris is 18.9 tons/acre, with a range of 1.2 to 46.9 tons/acre and a median of 14.3 tons/acre. These results are generally within the recommended range discussed in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) on similar habitat types. Subalpine fir habitat types in Montana are recommended to have a range of 12 to 24 tons/acre to maintain forest productivity and nutrient cycling.

Slope Stability

Soil types in the project area are primarily moderately steep (40-60%) and steep (>60%) glacially scoured ridges and hillsides. The Web Soil Survey reports the findings in the *Flathead National Forest Area, Montana (MT619)* (NRCS, 1998) soil survey. This survey identified no areas of soils at high risk for mass movements in the project area. Although many steep slopes exist in the project area, site-specific field reconnaissance identified no slope failures in the proposed project area. As a result, slope stability will not be analyzed further for this project since there is a low risk of impacts to slope stability in the project area. A list of soil map units found in the Mystery Fish project area and their associated management implications is found in *Table III-7 Soil Map Unit Descriptions for the Mystery Fish Project Area.*

Environmental Effects

Soil Physical Properties

DIRECT AND INDIRECT EFFECTS

DIRECT AND INDIRECT EFFECTS OF NO-ACTION ALTERNATIVE TO SOIL PHYSICAL PROPERTIES

The No Action Alternative would have no direct or indirect effects on soil physical properties. No ground-based activity would take place under this alternative, which would leave the soil in the gross project area unchanged from the description in the Existing Conditions portion of this analysis. Current impacts from past management would continue to recover as dictated by natural and pre-existing conditions.

DIRECT AND INDIRECT EFFECTS OF THE ACTION ALTERNATIVE TO SOIL PHYSICAL PROPERTIES

Based on DNRC soil monitoring on soils and sites similar to those found in the project area, direct impacts to soil physical properties would be expected on up to 48 of the total 456 acres proposed for harvesting in the proposed project area. 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 7.2 to 9.7 percent of the acres treated, with an average disturbance rate of 8.3% (DNRC, 2009). These impacts include operations on dry soils in non-winter conditions. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with cable yarding equipment had a range of impacts from 2.3 to 11.4 percent of the acres treated, with an average disturbance rate of 6.2% (DNRC, 2009). As a result, the extent of impacts expected would likely be similar to those reported by DNRC soil monitoring (DNRC, 2009), or approximately 7.2 to 9.7 percent of ground-based harvested acres, and approximately 2.3 to 11.4 percent of cable harvest acres. The proposal includes 272 acres of ground-based mechanical harvesting.

Ground-based site preparation would be done on tractor units, and prescribed fire would be used for site preparation on portions of cable harvest units. These activities would also generate direct impacts to the soil physical properties. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. **Table III-6** summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave approximately 10.4 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-6 *– Summary of Direct Effects of Alternatives on Soil Physical Properties*

Description of Parameter	**No Action**	**Action Alternative**
Acres of Harvest	0	456
Acres of ground based yarding	0	272
Acres of ground based impacts[1]	0	**23**
Acres of skyline yarding	0	184
Acres of skyline impacts[2]	0	**11.4**
Miles of new roads	0	4.4
Acres of new roads[3]	0	**13.2**
Total estimated acres of impacts	0	**47.6**
Percent of harvest area with impacts	0%	10.4%

1) 8.3% of tractor units based on average impacts found on similar soils and sites by DNRC soil monitoring

2) 6.2% of skyline units affected by corridors

3) Assuming an average width of 25 feet, roads are approximately 3 acres per mile

CUMULATIVE EFFECTS

CUMULATIVE EFFECTS OF THE NO ACTION ALTERNATIVE TO SOIL PHYSICAL PROPERTIES

This alternative would have no cumulative impacts to soil physical properties 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 TO SOIL PHYSICAL PROPERTIES

Cumulative effects to soil physical properties may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. None of the proposed units in this alternative have had any past harvesting activity. As a result, the cumulative effects to soil physical properties 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).

Nutrient Cycling

DIRECT AND INDIRECT EFFECTS

DIRECT AND INDIRECT EFFECTS OF NO-ACTION ALTERNATIVE TO NUTRIENT CYCLING

The No Action Alternative would have no direct or indirect effects on nutrient cycling. No harvesting activity would take place under this alternative, which would leave the woody debris levels in the project area unchanged from the description in the Existing Conditions portion of this analysis. Nutrient cycling from coarse woody debris would stay near current levels as dictated by natural and pre-existing conditions.

DIRECT AND INDIRECT EFFECTS OF THE ACTION ALTERNATIVE TO NUTRIENT CYCLING

Direct and indirect effects to nutrient cycling may include a slight decrease in coarse woody debris from the Action Alternative by removing standing timber. Some stands where woody debris levels are low may see an increase in large woody debris as a result of the proposed harvesting. In addition, this alternative would lead to an increase in fine woody material in the form of limbs and tree tops being left after harvest. Through the timber sale contract, approximately 10-15 tons of coarse woody material would be left on the ground following harvesting activities, as well as fine material for nutrient retention.

CUMULATIVE EFFECTS

CUMULATIVE EFFECTS OF THE NO ACTION ALTERNATIVE TO NUTRIENT CYCLING

This alternative would have no cumulative impacts to nutrient cycling in the project area. The impacts of this alternative would be similar to those described in the Existing Conditions portion of this analysis. Nutrient cycling from coarse woody debris would stay near current levels as dictated by natural and pre-existing conditions.

CUMULATIVE EFFECTS OF THE ACTION ALTERNATIVE TO NUTRIENT CYCLING

Risk of cumulative effects to nutrient cycling from nutrient pool loss would be low. This alternative would follow research recommendations found in Graham (1994) for retention of coarse and fine woody debris through contract clauses and site-specific mitigation measures.

***TABLE III-7** – Soil Map Unit Descriptions for the Mystery Fish Project Area*

Map Unit	Name	Soil & Vegetation Descriptions	Management Considerations			
			K_w**/ erosion potential*	Timber	Roads	Comments
21-8	Cirque Basins, 20-40%	Soils of this map unit are glacial till formed from metasedimentary rocks. Vegetation is upper subalpine forest with forbs/shrub understory.	K_w = 0.17-0.55 Erosion risk is moderate	Potential Prod: Low Equipment: Tractor Regen: Harsh climate	Roads perform well with standard location, construction and maintenance practices. Rock may limit excavation.	Rock outcrops may limit tractor operation.
21-9	Rock Outcrops, Shal-low Glacial Till, 40-60%	Soils of this map unit are glacial till formed from metasedimentary rocks. Vegetation is upper subalpine forest with forbs/shrub understory.	K_w = 0.17-0.55 Erosion risk is moderate	Potential Prod: Low Equipment: Cable Regen: Harsh climate	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Rock outcrops may require ripping/blasti ng for roads.
23-9	Glaciated Mountain Slopes, 40-60%	Soils of this map unit are glacial till formed from metasedimentary rocks. Vegetation is moist mixed forest and dry mixed forest with forbs/shrub understory.	K_w = 0.17-0.64 Erosion risk is moderate	Potential Prod: Moderate/high Equipment: Cable Regen: Can be limited by grass competition	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Road cuts and fills may be difficult to re-vegetate
26C-8	Glacial Moraines, 20-40%	Soils of this map unit are glacial till. Vegetation is a moist mixed forest with forbs/shrub understory.	K_w = 0.20-0.64 Erosion risk is moderate	Potential Prod: High Equipment: Tractor Regen: Can be limited by frost pockets	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Season of use important (compaction & displacement).

26C-9	Glacial Moraines, 40-60%	Soils of this map unit are glacial till. Vegetation is a moist mixed forest with forbs/shrub understory.	K_w = 0.20-0.64 Erosion risk is moderate	Potential Prod: High Equipment: Cable Regen: None	Roads perform well with standard location, construction and maintenance practices. Cutslopes may ravel.	Season of use important (compaction & displacement).
57-8	Glaciated Mountain Ridges, 20-40%	Soils of this map unit glacially scoured metasedimentary rocks. Vegetation is lower subalpine forest with forbs/shrub understory.	K_w = 0.15-0.49 Erosion risk is moderate	Potential Prod: Moderate Equipment: Tractor Regen: Can be limited by moisture stress	Roads perform well with standard location, construction and maintenance practices.	Season of use important (compaction & displacement).
72	Glacial Cirque Wall, 60-90%	Soils of this map unit glacially scoured metasedimentary rocks. Vegetation is upper subalpine forest with forbs/shrub understory.	K_w = 0.32-0.55 Erosion risk is moderate	Potential Prod: Low Equipment: Cable Regen: Can be limited by harsh climate	Rock may limit excavation, Slope steepness may increase cost.	Cliffs and rock outcropping may affect feasibility of operation.
78	Glacial Trough Wall, 60-90%	Soils of this map unit glacially scoured metasedimentary rocks. Vegetation is a dry mixed forest with grass/shrub understory.	K_w = 0.02-0.10 Erosion risk is moderate	Potential Prod: Low Equipment: Cable Regen: Can be limited by moisture stress & grass	Rock may limit excavation, Slope steepness may increase cost.	Cliffs and rock outcropping may affect feasibility of operation.

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

***Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. (NRCS, 19).*

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Watershed and Hydrology

Introduction

Project Area and Project Activities

The gross project area (see Chapter 1 for project area) includes 1,915 acres within the Stillwater State Forest. Affected watersheds include Dog Creek, portions of Swift Creek where the haul route passes and a small portion of Rock Creek in the Stillwater River drainage. Each of these watersheds includes small amounts of non-industrial private lands. Rock Creek has a small parcel of land managed by the Flathead National Forest and a small portion of the Dog Creek watershed contains land managed by Plum Creek Timber Company. The majority of each of these watersheds is managed by the DNRC. The proposed Action Alternative would include a combination of ground based and cable yarding methods to harvest timber on approximately 456 acres within the project area. Infrastructure for the proposed action would require the construction of new temporary and permanent roads to access proposed harvest areas. All proposed road construction would be done outside of the Streamside Management Zones (SMZs), except to cross a stream.

Resource Description

Water resources in and around the project area include perennial streams, some of which support fish populations. In general, water resources are in good, stable condition. Water yield and sediment delivery 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.

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

Sediment delivery and subsequent water quality impacts can be affected by timber harvesting and related activities, such as road construction, by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and deliver 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. Other aspects of sediment analysis can also be found in the fisheries analysis portion of this document.

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. Large woody debris in streams will be discussed qualitatively based on findings during field reconnaissance.

Water Yield

Water yield increases can result from timber harvesting and associated activities, which 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.

Analysis Area

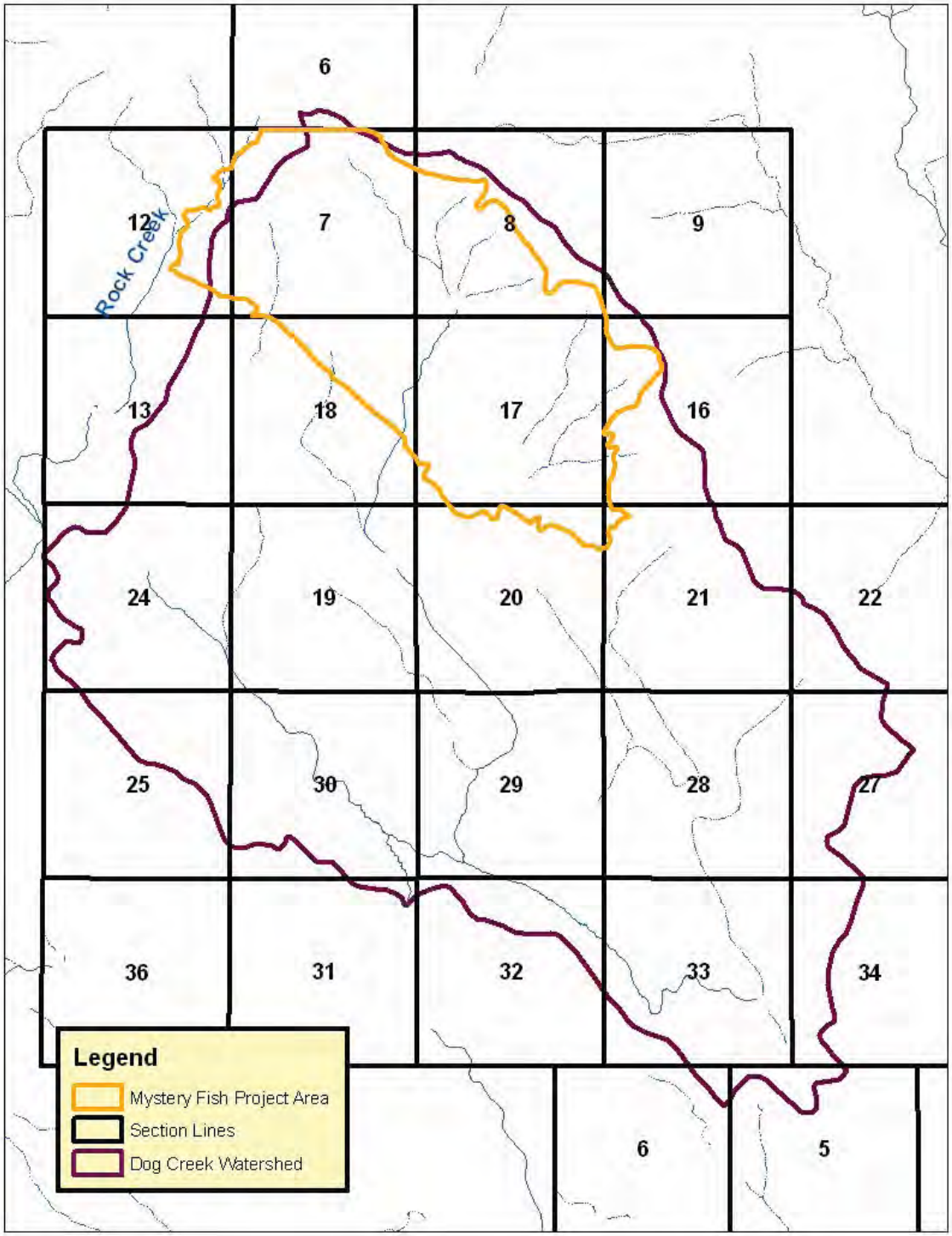
Sediment Delivery

Direct, indirect and cumulative effects to sediment delivery will be analyzed in the Dog Creek watershed. All existing and proposed road construction activities related to the Mystery Fish project on all ownership within the Dog Creek watershed will be analyzed using procedures adapted from the WFP Board (Callahan 2000). This watershed 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 Dog Creek watershed, some in Rock Creek, Meadow Creek and some in the Swift Creek watershed, 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 Dog Creek watershed. A map of the Dog Creek watershed and its relation to the proposed project area is found below in ***Figure H-1***. All existing activities on all ownership and proposed activities related to the Mystery Fish project, including road construction within the Dog Creek watershed, 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. A qualitative assessment of water yield will be done for the small portion of the proposed project area found in the Rock Creek watershed.

FIGURE III-3 – Project Area Watershed



Analysis Methods

Each of the analyses below was conducted on a watershed basis, and included activities on roads and parcels, 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 within the project area, main haul roads used to access the proposed project area, and associated stream crossings in the Swift Creek and Meadow Creek watersheds were evaluated to determine sources of introduced sediment. Data were collected in 2011 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*). Potential sediment sources found in the Rock Creek, Meadow Creek and Swift Creek watersheds were analyzed by visual inspection to determine risk of sediment delivery. These analyses were conducted in 2011 by a DNRC hydrologist. Sediment delivery from in-channel sources is analyzed qualitatively based on field reconnaissance to determine areas of eroding banks, down-cut channels and woody debris to act as sediment traps.

Water Yield

The water-yield increase for the watershed in the project area was determined using the ECA method as outlined in *Forest Hydrology Part II* (*Haupt 1976*). ECA is a function of total area roaded and harvested, percent of crown removal in harvesting, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees begin to grow and move toward pre-harvest 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, (1) acceptable risk level, (2) resource value, and (3) watershed sensitivity are evaluated according to *Young (1989)*. The watershed sensitivity is evaluated using qualitative assessments, as well as procedures outlined in *Forest Hydrology Part II* (*Haupt 1976*). The stability of a stream channel is an

important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water-yield increases (*Rosgen 1996*). Assessment of water yield impacts in Rock Creek will be done through a qualitative risk assessment of increased runoff and channel adjustments.

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 the Montana Surface Water Quality Standards found in ARM 17.30.608 (1)(a), this portion of the Stillwater River drainage, including Dog 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 operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of activities that could create impacts.

Designated beneficial water uses within the project area include cold-water fisheries and recreational use in the streams, wetlands, and lakes in the surrounding area. There are 5 existing surface water rights on Dog Creek that include commercial, domestic, industrial and lawn & garden. Domestic use refers to water rights assigned to individual property owners for uses such as eating, drinking, laundering, bathing, lawn watering and watering a household garden. All of these surface water rights are located well downstream of the proposed project area, and are located below Dog Lake.

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 (DEQ, 2010).

Portions of the Stillwater River located downstream from the proposed project area and portions of the main stem Swift Creek watershed to the east of the proposed project area are currently listed as a water quality limited water body in the 2010 303(d) list. The 303(d) list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, or where beneficial uses are threatened or impaired. These water bodies are then characterized as "water quality limited" and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a water body of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

The Montana Water Quality Act (MCA 75-5-701-705) also directs the DEQ to assess the quality of state waters, insure that sufficient and credible data exists to support a 303(d) listing, and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. Total Maximum Daily Loads have not been completed for the Stillwater River. DNRC will comply with the Law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including Best Management Practices and Forest Management Rules (ARM 36.11.401 through 36.11.456 and 36.11.470 & 471).

The current listed causes of impairment in the Stillwater River are: alteration in stream-side or littoral vegetative covers, unknown impairment, nitrates, phosphorus (total), and sedimentation/siltation. The probable sources for the Stillwater River are: site clearance (land development), unknown sources, and loss of riparian habitat.

The current listed cause of impairment in the main stem of Swift Creek is total phosphorus, and the probable source of impairment is listed as silviculture activities.

Montana SMZ Law

By the definition in ARM 36.11.312 (3), the majority of the stream reaches in the Dog Creek watershed are Class 1 streams. All of these streams and many of their tributaries have flow for more than 6 months each year. Many 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.

Habitat Conservation Plan

In 2011, DNRC adopted a Habitat Conservation Plan (HCP) in coordination with the United States Fish and Wildlife Service. All applicable HCP riparian timber harvest and aquatic conservation strategies (*USFWS and DNRC, 2010*) would be implemented if they are relevant to activities proposed with this project.

Existing Environment

Introduction

The watershed draining most of the proposed project area is Dog Creek. A small portion of the proposed project area is found in the Rock Creek watershed. These drainages lie on the southwest slope of Stryker Ridge. Precipitation ranges from approximately 20 inches annually in the valley bottom to approximately 50 inches near ridge tops.

Sediment Delivery

Sediment delivery from in-channel sources was evaluated by a DNRC hydrologist in 2011. Stream channels in the proposed project area are primarily in good to fair condition (*Rosgen 1996*). No areas of down-cut channels were identified during field reconnaissance. Large woody debris was found 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. Large woody debris is also assessed for its ability to provide habitat for aquatic species. These issues are discussed further in the fisheries portion of this document.

Most reaches of Dog Creek, Rock Creek and the unnamed tributaries in the proposed project area were rated as B2, B3 and 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 B2 and B3 types are mainly boulder and cobble, respectively, and channel-bed materials in B4 types are mainly gravel. Given the cobble and gravel content and the gradient of these stream types, bed materials commonly move. Gravel bars have formed on point bars in these reaches (point bars are areas of natural deposition found on the inside of a meander bend). 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

Sediment delivery from the existing road system located within and leading to the proposed project area was reviewed in 2011 for existing and potential sources of sediment. The Upper Whitefish Lake and Stryker Ridge road systems run through portions of the main stem Swift Creek and Meadow Creek watersheds, and were evaluated qualitatively on the portions that would be used for hauling timber. These roads were analyzed quantitatively in the SE Stryker Ridge Timber Sale EA (DNRC, 2010) and the Olney Urban Ingerface EA (DNRC, 2009). All erosion control and BMP improvements made with the SE Stryker Ridge and Olney Urban Interface projects are functioning well, and all assessments from those projects are applicable to this analysis.

Sediment delivery was evaluated quantitatively from roads proposed for use with the proposed project in the Dog Creek watershed. Based on the sediment-source review, several existing sources of sediment were identified on the existing road system. Each of the sources identified in this analysis are found on DNRC ownership. Most of the delivery sites are located at stream crossings. The total estimated sediment delivery from roads in the project area to Dog Creek is displayed in Table III-8. These sediment-delivery values are estimates based on procedures outlined in the Analysis Methods portion of this analysis and are not measured values.

TABLE III-8 - Current Sediment Delivery*. Current estimated sediment delivery to Dog Creek*

	Dog Creek
Existing tons per year	8.1

Estimated sediment delivery occurs primarily at stream crossings, and sediment comes from a variety of sources. Approximately 2.7 of the 8.1 tons of delivery estimated in the Dog Creek

watershed come from 1 site in the proposed project area. This crossing is located on the Ewing road, which is open all year long to traffic. This site is a place where surface drainage features need to be improved. Currently, there are drain dips installed near the crossing, but they only function as grade breaks, allowing road runoff to continue down the road to the crossing site. One reach of an unnamed tributary to Dog Creek was found to have high levels of silt and fine material in the channel. This material was originally delivered to the stream from an old existing road. This road was de-commissioned and rehabilitated approximately 10 years ago, and is well vegetated with grass, forbs and shrubs. This site is no longer a source of sediment in the watershed.

Potential sediment delivery was identified on an existing road in Section 18 of the project area. This location has two existing stream crossings that have failed and are allowing water to flow down ditch lines and across the road surface. This road is well vegetated with grass, forbs, brush and trees, and the ditch and road surface are stable and not actively eroding. These sites are currently only minor sediment sources, but are a high risk of potential sediment delivery should an extreme runoff event cause flows to erode or migrate from their current location.

Potential sediment delivery was identified at one site in the Rock Creek watershed. This site is located along the approximately 0.25 miles of the Ewing Road that fall within the proposed project area and within the Rock Creek watershed. This site is estimated to deliver approximately 0.5 tons/year to an unnamed discontinuous tributary to Rock Creek.

Other sources of sediment delivery found during the 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.

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 Dog Creek watershed through recent past project work.

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 Dog Creek watershed has been set at 12 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This WYI would be reached approximately when the ECA level in Dog Creek reaches the estimated level of 2,568 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 Dog Creek watershed since the 1960s. In

addition, an assessment of past timber management on Plum Creek Timber Company (PCTC) land in the Dog Creek watershed was conducted using aerial photography, geographic information systems (GIS), and historical knowledge. These activities, combined with the vegetative recovery that has occurred, have led to an estimated 6.1 percent WYI over a fully forested condition in the Dog Creek watershed. Table III-9 summarizes the existing conditions for water yield and the associated ECA levels in the Dog Creek watershed. Estimated water yield and ECA levels are well below established thresholds in the project area watershed.

TABLE III-9 – Current Water Yield.
Water yield and ECA increases in the Dog Creek watershed

	Dog Creek
Existing % WYI	6.1
Allowable % WYI	12
Existing ECA	1,222
Allowable ECA	2,568

Environmental Effects

Sediment Delivery

DIRECT AND INDIRECT EFFECTS

DIRECT AND INDIRECT EFFECTS OF NO-ACTION ALTERNATIVE TO SEDIMENT DELIVERY

No direct effects to sediment delivery are expected from the No-Action Alternative 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.

Indirect effects of the No-Action Alternative to sediment delivery would 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

There is a low risk of direct or indirect effects to sediment delivery to streams from the timber harvesting activities proposed in the Action Alternative. The SMZ law, Administrative Rules for Forest Management, Riparian Management Zones (RMZ), channel migration zones (CMZ) on fish-bearing Class 1 streams, 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. During that time, 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 2010). Since 1996, effectiveness of the SMZ width has been rated over 99 percent (*DNRC 1990 through 2010*). 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.

ROAD SYSTEM

Direct and indirect effects to sediment delivery to portions of Swift Creek from use of the Upper Stryker Ridge and Upper Whitefish Lake roads from the Action Alternative are expected to be similar to the existing conditions. These roads are currently open year-round to traffic, and have been brought up to applicable BMPs through the SE Stryker Ridge Timber Sale. Use of these roads as a result of the Action Alternative would be similar to the analysis conducted on the SE Stryker Ridge EA (DNRC, 2010).

Direct and indirect effects to sediment delivery to Rock Creek from use of the Ewing road from the Action Alternative are expected to be a reduction of estimated sediment delivery from approximately 0.5 tons/year to less than 0.1 tons/year . This road is currently open year-round to traffic, however only approximately 0.25 miles of this road in the Rock Creek watershed is proposed for use. All applicable BMPs would be applied to this portion of road, but there is expected to be a very low risk of low impacts from the proposed use and BMP upgrades due to the small amount of road and the limited number of sites proposed for BMP upgrades. These impacts are very unlikely to be measurable due to the limited scope of activity relative to the watershed size.

Direct and indirect effects to sediment delivery from use of the road system in the Dog Creek watershed from the Action Alternative are displayed in ***Table III-10***. Erosion control and BMPs would be improved on up to 10 miles of existing road in the Dog Creek watershed. This work would reduce the estimated sediment delivery to Dog Creek and its tributaries by approximately 7.3 tons of sediment per year. These projected sediment reductions are net values. These values include the short term projected increases in sediment delivery from stream-crossing replacements and new road construction, as well as projected sediment reductions from BMP improvements and road and stream-crossing improvement activity.

Risk of direct and indirect effects to sediment delivery would increase with the Action Alternative. This alternative would construct approximately 2.4 miles of new road and approximately 2.0 miles of temporary road, all located in the Dog Creek watershed, to access proposed harvest units. The main impacts of proposed new roads are primarily associated with new stream crossings; however none of the proposed new roads (permanent or temporary) involves a stream crossing. The remainder of the impacts of new road construction is related to the risk of erosion resulting from exposure of bare soil. The risk of sediment delivery from new permanent roads is low because the proposed roads are located away from streams and do not contain new 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 roads.

The Action Alternative would also replace 2 failed existing stream crossings on an unnamed tributary to Dog Creek in Section 18 of the proposed project area with properly sized structures. The replacement of existing stream crossings would contribute sediment directly to the streams where work would be conducted. This sediment would be minimized through application of standard erosion-control measures. The sediment delivery anticipated from this project would be short term and would comply with all applicable permits and State water-quality laws. In addition, several sites would have additional erosion control added to lower the risk of sediment delivery to a stream or draw. In some cases, the addition of erosion-control measures may increase the risk of sediment delivery in the short term by creating bare soil. However, as these sites revegetate, the long-term risk of sedimentation to a stream would be reduced to levels lower than the existing condition.

CUMULATIVE EFFECTS

CUMULATIVE EFFECTS OF THE NO-ACTION ALTERNATIVE TO SEDIMENT DELIVERY

The cumulative effects of the No Action Alternative to sediment delivery 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 of the Action Alternative to sediment delivery would be primarily related to roadwork and stream-crossing replacements. Sediment generated from the replacement of existing stream crossings would result in a short-term increase in the total sediment load in streams flowing through the project area and proposed haul routes for the duration of activity. These increases would not exceed any State water-quality laws and would follow all applicable recommendations given in the 124 and 318 permits. In the long term, the cumulative effects to sediment delivery would be a reduction from approximately 8.7 tons of sediment per year to approximately 1.5 tons of sediment per year in Dog Creek. These values include projected increases from new road construction, potential increases from the replacement of existing stream crossing structures, 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-10*** at the end of this section. As the sites stabilize and revegetate, sediment levels resulting from stream crossing replacements would decrease further from projected levels as work sites are closed and bare soil revegetates and stabilizes. Over the long term, cumulative sediment loads would be reduced due to better design on the crossings. The improved design would reduce the risk of failure of the structures, which would reduce the risk of sediment delivery to downstream beneficial uses.

Risk of cumulative effects from the Action Alternative to sediment delivery would increase due to construction of new roads and stream crossings and installation and improvement of erosion control and surface drainage features on existing roads. 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 Dog Creek is projected to be lower than existing conditions. Projected increases in sediment delivery from new road and stream-crossing 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.

Risk of adverse cumulative impacts to sediment delivery and sediment loading from the Action Alternative in Dog Creek 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-10 – Projected Sediment Delivery. *Estimates of sediment delivery in Dog Creek.*

	ALTERNATIVE	
	No Action	**Action**
Existing delivery (tons/year)[1]	8.1	8.1
Post-project delivery (tons/year)	8.1	1.5
Reduction (tons/year)[1]	0	6.6
Percent reduction[2]	0	81%

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

Water Yield

DIRECT AND INDIRECT EFFECTS

DIRECT AND INDIRECT EFFECTS OF THE NO-ACTION ALTERNATIVE TO WATER YIELD

The No-Action Alternative would have 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

Direct and indirect effects of the Action Alternative to water yield in the Dog Creek watershed would include an increase in annual water yield by an estimated 3.0 percent over the current level. These levels of projected water-yield increase are incremental values that refer only to

water yield generated by this Action Alternative and do not include water yield increases from past activities. This level of water-yield increases 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 Dog Creek watershed because they are well below the established threshold of concern.

Direct and indirect effects of the Action Alternative to water yield in the Rock Creek watershed would be very low due to the limited acres of harvest proposed in this drainage. The proposed project would harvest approximately 15 acres in Rock Creek, which is less than 0.1% of the area of Rock Creek. As a result, there would be a very low risk of very low impacts to water yield from the proposed harvest in Rock Creek.

CUMULATIVE EFFECTS

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

Cumulative effects of the Action Alternative on water yield include increasing the annual water yield to an estimated 9.1 percent. The removal of trees proposed in the Action Alternative would increase the water yield in the Dog Creek watershed from its current level of approximately 6.1 percent over a fully forested condition to an estimated 9.1 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 Dog Creek watershed. The water-yield increase expected from this alternative 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 Dog Creek or its tributaries.

The Action Alternative 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 the Action Alternative to the Dog Creek drainage is found in Table III-11.

Table III-11 – Dog Creek Water Yield. ECA and percent WYI results for the Dog Creek watershed.

	ALTERNATIVE	
	No Action	Action
Allowable water-yield increase	12%	12%
Percent water-yield increase	6.1	9.1
Acres harvested(1)	0	442
Miles of new road(2)	0	4.4
ECA generated	0	447
Total ECA	1,222	1,669
Allowable ECA	2,568	2,568

(1) Does not include acres located outside of Dog Creek watershed boundary
(2) Includes both permanent and temporary roads

Cumulative effects of the Action Alternative to water yield in the Rock Creek watershed would be very low due to the limited acres of harvest proposed in this drainage. The proposed project would harvest approximately 15 acres in Rock Creek, which is less than 0.1% of the area of Rock Creek. As a result, there would be a very low risk of very low impacts to water yield from the proposed harvest in Rock Creek.

Fisheries Analysis

Introduction

The purpose of this assessment is the analysis of foreseeable environmental effects to fisheries and related habitat resources associated with the proposed Mystery Fish Timber Sale project area.

Project Area

The Mystery Fish Timber Sale project area includes proposed harvest on State Trust Lands within sections 7, 8, 16, 17, 18, 20 and 21, T33N, R23W and Section 12, T33N, R24W. Other project area lands include State Trust Lands and private lands that intersect forest road haul routes.

Fisheries Analysis Areas

Six separate analysis areas were identified to evaluate the existing and potential impacts to fisheries and fisheries resources associated with the proposed actions. The selected analysis areas include: Lazy Creek, Lower Swift Creek, Meadow Creek, Middle Swift Creek, Rock Creek and Upper Dog Creek (see Figure III-4).

The six analysis areas were chosen because they include: (1) the watershed of current or historic fish-bearing streams, and (2) the proposed harvest units and/or forest road haul routes that could have potential measurable or detectable impacts to those fish-bearing streams.

Lower and Middle Swift creeks are identified on the 2010 Montana 303(d) list as having impairments (phosphorous) to aquatic life and coldwater fisheries. Surface waters in all analysis areas are classified as either A-1 (Lower and Middle Swift creeks) or B-1 (Lazy, Meadow, Rock, and Upper Dog creeks) in the Montana Surface Water Quality Standards (ARM 17.30.610). For more details on these regulations, water quality standards, and beneficial uses please see the Hydrology analysis section.

Species

Current and historic fisheries distribution within the analysis areas are identified in Table III-12. The US Fish and Wildlife Service has listed bull trout as 'threatened' under the Endangered Species Act. Bull trout and westslope cutthroat trout are classified as S2 Montana Animal Species of Concern. Species classified as S2 are considered to be at risk due to very limited and/or potentially declining population numbers, range and/or habitat, making the species vulnerable to global extinction or extirpation in the state. The DNRC has also identified bull trout and westslope cutthroat trout as a sensitive species (ARM 36.11.436).

FIGURE III-4 – Fisheries resource analysis areas.

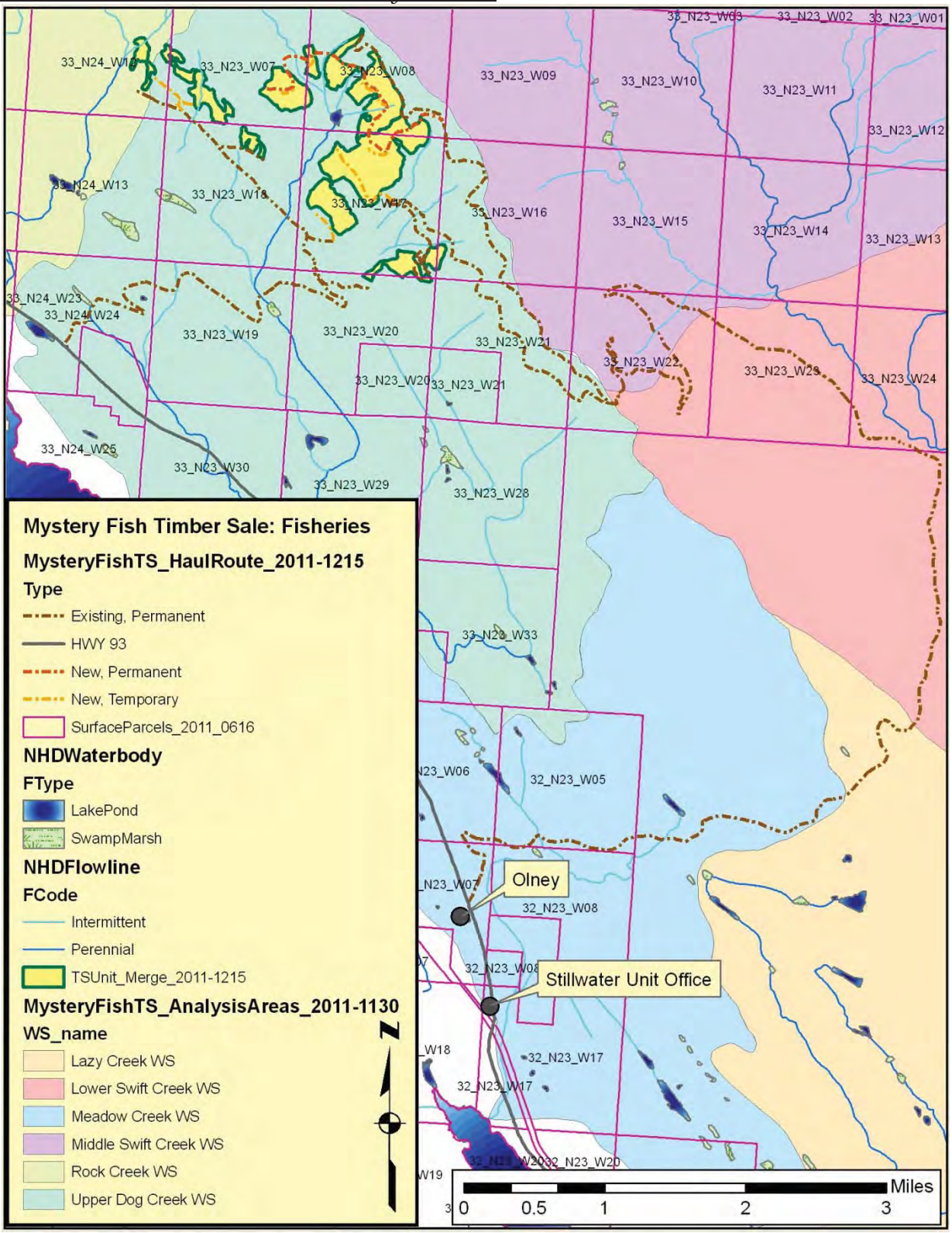


TABLE III-12 – Current and historic fish species distribution across analysis areas.

			ANALYSIS AREA					
			Lazy Creek	Lower Swift Creek	Meadow Creek	Middle Swift Creek	Rock Creek	Upper Dog Creek
SPECIES	Native species	bull trout		X		X		
		westslope cutthroat trout	X[1]	X	X	X	X[1]	X
		slimy sculpin		X		X	X[1]	X[1]
		mountain whitefish		X		X		
		longnose sucker						X[2]
	Non-native species	eastern brook trout	X	X		X	X	X
		rainbow trout		X				
		pumpkinseed			X			

[1] Recent surveys have not found species present in analysis area; analysis area is estimated to be within species' historic distribution.
[2] Recent surveys have not found species present in analysis area; the lowest reaches of mainstem Dog Creek are estimated to be within species' historic distribution.

Fisheries Issues Raised During Scoping

Issues, with respect to this environmental analysis, are not specifically defined by either the Montana Environmental Policy Act or the Council on Environmental Quality. For the purposes of this environmental analysis, issues will be considered actual or perceived effects, risks, or hazards as a result of the proposed alternatives. Issues raised internally include: (1) the proposed actions may adversely affect fisheries habitat features, including channel forms, (2) stream temperature, and (3) connectivity. Three issues statements related to fisheries resources were received during project scoping:

1. Timber harvest adjacent to streams may generally affect fisheries resources;
2. No-harvest zones adjacent to streams may cause increased blowdown, which may affect fisheries resources; and
3. Timber harvest in general may increase stream temperatures.

Analysis Methods

The *EXISTING CONDITIONS* of fisheries resources will be described for each analysis area. The *ENVIRONMENTAL EFFECTS* section will compare the existing conditions to the anticipated effects of the proposed No-Action and Action Alternatives to determine the foreseeable impacts to associated fisheries resources.

Analysis methods are a function of the types and quality of data available for analysis, which varies among the different analysis areas. The analyses may either be quantitative or qualitative. The best available data for both populations and habitats will be presented for the analysis area. In order to adequately address the issues raised in *Introduction - Fisheries Issues Raised during Scoping,* the existing conditions and foreseeable environmental effects to fisheries in the analysis area will be explored using the following outline of variables. Sedimentation will be addressed through an analysis of effects to channel forms.

- Fisheries Populations – Presence/Absence
- Fisheries Habitat – Channel Forms
    - Fisheries Habitat – Sediment
    - Fisheries Habitat – Flow Regimes
    - Fisheries Habitat – Woody Debris
- Fisheries Habitat – Stream Temperature
    - Fisheries Habitat – Stream Shading
- Fisheries Habitat – Connectivity
- Cumulative Effects

In terms of the risk that an impact may occur, a low risk of an impact means that the impact is unlikely to occur. A moderate risk of an impact means that the impact may or may not (50/50) occur. A high risk of an impact means that the impact is likely to occur.

A *very low impact* means that the impact is unlikely to be detectable or measurable, and the impact is not likely to be detrimental to the resource. A *low impact* means that the impact is likely to be detectable or measurable, but the impact is not likely to be detrimental to the resource. A *moderate impact* means that the impact is likely to be detectable or measurable, and the impact is likely to be moderately detrimental to the resource. A *high impact* means that the impact is likely to be detectable or measurable, and the impact is likely to be highly detrimental to the resource.

Cumulative impacts are those collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type (75-1-220, MCA). The potential cumulative impacts to fisheries in the analysis areas are determined by assessing the collective anticipated direct

and indirect impacts, other related existing actions, and future actions affecting the fish-bearing streams.

Alternatives

PROPOSED ACTION ALTERNATIVE AND RELATED MITIGATIONS

Up to 456 acres of total harvest area is proposed through 18 different harvest units. New, permanent road construction would total 2.4 miles, and new, temporary road construction would total an additional 2.0 miles. Two permanent road-stream crossings would be constructed on non-fish-bearing Class 1 streams in the Upper Dog Creek analysis area to improve water quality. Timber harvest would not occur within 300 feet of any fish-bearing, Class 1 streams. Timber harvest would also not occur within the entire SMZ of any non-fish-bearing, Class 1 streams; the harvest of up to 50 percent of merchantable timber between the edge of the SMZ and edge of the RMZ would occur adjacent to non-fish-bearing, Class 1 streams. No SMZ timber harvest would occur adjacent to Class 2 or 3 streams, except in the Rock Creek analysis area, where SMZ harvest would occur adjacent to one Class 3 stream for approximately 400 feet.

Fisheries-related resource mitigations that would be implemented with the proposed Action Alternative include: (1) applying all applicable Forestry BMPs, HCP commitments, and Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (RMZ) (ARMs 36.11.425 and 36.11.426) and (2) monitoring all road-stream crossings for sedimentation.

ANALYSIS AREAS DISMISSED FROM FURTHER ANALYSIS

After considering comments received during scoping, project-specific issue statements above in *Introduction-Fisheries Issues Raised During Scoping*, and the extent of the proposed actions in *Alternatives- Proposed Action Alternative and Related Mitigations*, the Lazy Creek analysis area is dismissed from further analysis. The Lazy Creek area is dismissed from the further analysis of fisheries resources due to: (1) no harvest would occur within the analysis area, and (2) no road-stream crossings in the analysis area would be utilized as part of the proposed actions. As no foreseeable direct or indirect impacts to fisheries resources would be expected to occur in the analysis area, no additional cumulative effects to fisheries resources would be expected in the analysis areas as a result of implementing the Action Alternative.

ISSUES DISMISSED FROM FURTHER ANALYSIS

After considering the extent of the proposed actions in *Alternatives- Proposed Action Alternative and Related Mitigations*, the resource variables of fisheries population presence/absence and fisheries habitat woody debris (including recruitment from blowdown), stream temperature and connectivity are dismissed from further analysis. For example, the proposed actions do not involve any form of fish population control or management, and no changes to connectivity in

fish-bearing streams would occur. All woody debris recruitment and stream shading (the effect mechanism which tends to have the greatest effect on stream temperature) to fish-bearing, Class 1 streams in the project area is generally expected to occur well within 120 feet of these streams. Although low impacts to woody debris recruitment may occur to non-fish-bearing, Class 1 streams as a result of harvest of up to 50 percent of merchantable timber between the edge of the SMZ and edge of the RMZ, this effect is not expected to have any impact to the woody debris or channel forms of habitats in downstream fish-bearing reaches. Impacts to stream temperature in non-fish-bearing, Class 1 streams may affect downstream fish-bearing reaches; however, the retention of all riparian vegetation within 50 feet of a stream is expected to ensure levels of stream shading that are very similar to the existing condition (USFWS and DNRC 2010). No foreseeable measureable or detectable direct or indirect impacts to these fisheries resources would be expected to occur in any of the analysis areas; furthermore, no additional cumulative effects to these fisheries resources would be expected in any of the analysis areas as a result of implementing the Action Alternative.

EXISTING ENVIRONMENT

LOWER SWIFT, MEADOW AND MIDDLE SWIFT CREEK ANALYSIS AREAS

The proposed activity that may affect fisheries resources in these three analysis areas is use of forest road haul routes for timber and equipment transportation. The fisheries resource variables potentially affected by the proposed actions are channel forms and sediment. The assessment of these fisheries resources will be qualitative and tier primarily to the Watershed and Hydrology analyses.

A determination was made in the 2010 303(d) list that sediment levels in the Lower and Middle Swift creek drainages were within the range of natural variability and, in effect, potential cumulative sedimentation from forest roads throughout the drainages was not measureable or detectable. An analysis of in-stream sediment in the Meadow Creek drainage for the Olney Urban Interface Timber Sale (2009) and in the Lower and Middle Swift creek drainages for the SE Stryker Ridge Timber Sale (2010) found an expected low risk of low long-term impacts to sediment. Field reviews of the haul route in these analysis areas as part of the proposed Mystery Fish Timber Sale (see Watershed and Hydrology analyses) found low risks of existing sedimentation at road-stream crossings or other possible point-sources. Numerous other forest roads with road-stream crossing structures occur throughout all three analysis areas, and these road-stream crossings retain a minimal risk of sedimentation to fish-bearing streams, regardless of the application and effectiveness rates of forest road Best Management Practices. Consequently, a low risk of very low existing impacts to sediment and channel forms is likely in the Lower and Middle Swift creek analysis areas; a low risk of low existing impacts is likely in the Meadow Creek analysis area.

Other related existing direct and indirect effects within the analysis areas may include competitive displacement and hybridization of native fisheries by non-native species, elevated nutrient levels (phosphorus), past riparian and upland harvest effects, and recreational fishing.

Several open, public roads in the analysis areas are utilized year-round for forest management and recreational purposes. Unapproved off-road vehicle use may also occur within the analysis areas. No other related existing effects to fisheries resources are known to occur in the analysis areas. Other related existing impacts are expected to have a moderate risk of low impacts to fisheries resources in the analysis areas.

Considering potential very low to low impacts to channel forms and a risk of low impacts from other related actions, an existing low adverse cumulative impact to fisheries resources likely occurs in the analysis areas.

ROCK CREEK ANALYSIS AREA

The proposed activity that may affect fisheries resources in the Rock Creek analysis areas is SMZ harvest adjacent to one Class 3 stream. The fisheries resource variables potentially affected by the proposed actions are channel forms and sediment. The assessment of these fisheries resources will be qualitative. Other fisheries resources, such as flow regime (see Watershed and Hydrology analyses), woody debris, stream shading and temperature and connectivity, are not expected to be measurably affected by the proposed actions.

The Duck to Dog Timber Sale (2007) project area analysis involved the assessment of fisheries resources in the Rock Creek drainage. That analysis projected future low impacts to sediment and channel forms may occur as a result of implementing the proposed actions. Field reviews of drainage features in this analysis area as part of the proposed Mystery Fish Timber Sale (see Watershed and Hydrology analyses) found a similar concurrent condition.

Other related existing direct and indirect effects within the analysis area likely includes competitive displacement of native fisheries by nonnative species and past riparian and upland harvest effects. Several open, public roads in the analysis area are utilized year-round for forest management and recreational purposes. Unapproved off-road vehicle use may also occur within the analysis area. No other related existing effects to fisheries resources are known to occur in the analysis areas. These other related existing impacts are expected to have a moderate risk of moderate impacts to fisheries resources in the analysis area, which are primarily a result of displacement impacts to native fisheries from non-native species.

Considering potential low impacts to channel forms and a risk of moderate impacts from other related actions, an existing moderate adverse cumulative impact to fisheries resources likely occurs in the analysis areas.

UPPER DOG CREEK ANALYSIS AREA

The proposed activities that may affect fisheries resources in the Upper Dog Creek analysis area are the use of forest road haul routes for timber and equipment transportation and upland harvest. The fisheries resource variables potentially affected by the proposed actions are channel forms, sediment and flow regime. The assessment of these fisheries resources will be

qualitative. Other fisheries resources, such as woody debris, stream shading and temperature and connectivity, are not expected to be measurably affected by the proposed actions.

The Duck to Dog Timber Sale (2007) project area analysis also involved the assessment of fisheries resources in the Upper Dog Creek drainage. That analysis projected future low impacts to sediment and channel forms may occur as a result of implementing the proposed actions. Field reviews of drainage features in this analysis area as part of the proposed Mystery Fish Timber Sale (see Watershed and Hydrology analyses) found a similar concurrent condition at most locations.

Supplemental field reviews of zones unaffected by the Duck to Dog Timber Sale (2007) and within the Mystery Fish Timber Sale project area found two locations exhibiting sedimentation impacts to water and fisheries resources. The first location in NE1/4 Section 18 T33N R23W involves several non-fish-bearing, Class 1 streams that have had flows diverted to the ditch and relief culverts of an insloped forest road. This condition has contributed to excessive erosion of the existing forest road prism and disruption of normal sediment transport and storage processes in affected stream reaches. The second location in NW1/4 Section 20, T33N R23W, involves a potential fish-bearing, Class 1 stream that has been adversely impacted through long-term sedimentation from an adjacent, poorly-located historic forest road. The historic forest road segment that has been the source of this sedimentation has been reclaimed, and a new forest road segment has been constructed well away from the stream channel. This passive restoration process to restore normal sediment transport and storage processes to the stream is a positive action for fisheries resources in the analysis area, although this restoration process is still ongoing and expected to continue for many years.

The Watershed and Hydrology analyses have determined that a low risk of existing impacts to flow regime is likely occurring in the analysis area. Considering existing sediment conditions and flow regime, a moderate risk of moderate impacts to channel forms is expected to occur in the analysis area. Existing impacts to channel forms are due to potential sedimentation from existing road-stream crossings and past forest road location.

Other related existing direct and indirect effects within the analysis area include competitive displacement of native fisheries by nonnative species throughout most of the watershed and past riparian and upland harvest effects. Several open, public roads in the analysis area are utilized year-round for forest management and recreational purposes. Unapproved off-road vehicle use and recreational fishing may also occur within the analysis area. No other related existing effects to fisheries resources are known to occur in the analysis area. These other related existing impacts are expected to have a high risk of high impacts to fisheries resources in the analysis area, which are primarily a result of displacement impacts to native fisheries from nonnative species.

Considering potential moderate impacts to channel forms and high impacts from other related actions, an existing high adverse cumulative impact to fisheries resources likely occurs in the

analysis area. This existing cumulative impact is, again, primarily a result of displacement impacts to native fisheries from nonnative species.

ENVIRONMENTAL EFFECTS

Descriptions of baseline impacts can be found above, under the section titled *Existing Conditions*.

Direct and Indirect Effects of the No-Action Alternative – All Analysis Areas

As a result of implementing the No-Action Alternative, no additional direct or indirect effects to fisheries resources would occur within all analysis areas beyond those described in the Existing Conditions section.

Future related actions considered part of cumulative impacts include other forest management practices, various recreational activities, and displacement of native fisheries by non-native fisheries. Forest management activities similar to those developed under the proposed actions are likely to occur on adjacent land ownerships in the future. Open, public roads in all analysis areas will continue to be utilized year-round for forest management and recreational purposes. Unapproved off road vehicle use will also likely occur within the analysis areas in the future. Most future related actions that do occur are expected to be risks to sediment and channel forms.

Consequently, foreseeable cumulative impacts to fisheries resources are expected to be similar to those described in Existing Conditions.

Direct and Indirect Effects of the Action Alternative – Lower Swift, Meadow and Middle Swift Creek Analysis Areas

The proposed actions and affected fisheries resources in these three analysis areas are broadly described above in *Existing Conditions* - *LOWER SWIFT, MEADOW AND MIDDLE SWIFT CREEK ANALYSIS AREAS*. Project-specific BMPs and road maintenance would be applied to all segments of the haul route through the analysis areas (see Watershed and Hydrology analyses). Total lengths of the haul route through the analysis areas are 5.0 miles in Lower Swift, 3.7 miles in Meadow Creek, and 2.6 miles in Middle Swift, although impacts to fisheries resources would be expected to occur only at road-stream crossings of haul routes.

Increased truck traffic can accelerate the mobilization and erosion of roadbed material at road-stream crossings. However, through the implementation of project-specific BMPs and road maintenance, the applicable road-stream crossing sites would be expected to deliver most mobilized sediment away from the stream and road prism, and filter eroded material through roadside vegetation. These actions are expected to substantially offset the risk of increased sedimentation due to the anticipated levels of project-specific vehicle traffic. Due to the haul route utilizing crossing sites of only intermittent streams in both the Lower and Middle Swift

Creek analysis areas, a moderate risk of very low impacts to the sediment and channel form components of fisheries resources is expected in these analysis areas. One perennial crossing site would be utilized in the Meadow Creek analysis area, and a moderate risk of low impacts to sediment and channel forms would be expected in this analysis area.

Cumulative Effects of the Action Alternative –
Lower Swift, Meadow and Middle Swift Creek Analysis Areas

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions for this analysis area would be expected to continue. Additionally, very low to low impacts to sediment and channel forms may occur as a result of implementing the proposed actions. Considering all of these impacts collectively, a low cumulative impact to fisheries resources is expected in all analysis areas.

Direct and Indirect Effects of the Action Alternative –
Rock Creek Analysis Area

The proposed actions and affected fisheries resources in this analysis area are broadly described in *Existing Conditions* – *ROCK CREEK ANALYSIS AREA*. The SMZ Law and Rules would be applied to the single Class 3 stream reach in the analysis area (see Watershed and Hydrology analyses). Class 3 streams include intermittent reaches that rarely contribute surface flow to another stream. The total length of affected Class 3 stream channel is approximately 400 feet, and the affected reach occurs at least 4,000 feet upstream of any potential fish-bearing habitats.

A 50-foot equipment-exclusion zone would be implemented adjacent to the Class 3 stream reach, although selective riparian harvest would occur within the same zone adjacent to the stream. The equipment-exclusion zone would be implemented as part of the SMZ Law and Rules, and this management zone is expected to greatly reduce potential sediment delivery to the stream channel from ground disturbances related to upland harvesting. As a result of implementing the proposed actions, a low risk of very low impacts to the fisheries resources of sediment and channel forms would be expected in this analysis area.

Cumulative Effects of the Action Alternative –
Rock Creek Analysis Area

As part of the consideration of cumulative effects, all direct, indirect and other related impacts described in the Existing Conditions for this analysis area would be expected to continue. Additionally, very low impacts to sediment and channel forms may occur as a result of implementing the proposed actions. Considering all of these potential impacts collectively, a moderate cumulative impact to fisheries resources is expected in this analysis area. This moderate cumulative effect is principally a result of the related impact of native fisheries displacement by nonnative species described under Existing Conditions.

Direct and Indirect Effects of the Action Alternative – Upper Dog Creek Analysis Area

The proposed actions and affected fisheries resources in this analysis area are broadly described in *Existing Conditions – UPPER DOG CREEK ANALYSIS AREA*. Project-specific BMPs and road maintenance would be applied to all segments of the haul route through the analysis area (see Hydrology and Soils Analyses). The total length of the haul route through the analysis area is 18.6 miles, although impacts to fisheries resources would be expected to occur only at road-stream crossings of the haul route. The existing road segment exhibiting sedimentation impacts to water and fisheries resources in NE1/4 Section 18, T33N, R23W (involving several non-fish-bearing, Class 1 streams with diverted flows) would be mitigated through the construction of 2 new, separate road-stream crossings. Total upland harvest would include approximately 456 acres, which may affect the flow regime component of fisheries resources.

Increased truck traffic can accelerate the mobilization and erosion of roadbed material at road-stream crossings. However, through the implementation of project-specific BMPs and road maintenance, the applicable road-stream crossing sites would be expected to deliver most mobilized sediment away from the stream and road prism and filter eroded material through roadside vegetation. These actions are expected to substantially offset the risk of increased sedimentation due to the anticipated levels of project-specific vehicle traffic. The proposed haul routes in the analysis area include the utilization of at least 17 crossings of perennial stream reaches. As a result of this proposed action, a moderate risk of low impacts to the sediment and channel form components of fisheries resources is expected in the analysis area.

The construction of the 2 road-stream crossings in NE1/4 Section 18, T33N, R23W, will cause short-term sediment delivery to 2 separate non-fish-bearing, Class 1 streams (high risk of moderate short-term impacts); however, long-term risks of impacts to sediment at both sites are expected to be low.

The Watershed and Hydrology analyses describes an estimated increase in water yield of 3.0 percent as a result of implementing the Action Alternative, and the consequent cumulative increase in water yield for the analysis area is expected to be approximately 9.1 percent. A low risk of low impacts to this variable is expected. A low risk of low impacts to peak seasonal flow volume, flow time, and flow duration are also expected (see Hydrology and Soils Analyses).

Cumulative Effects of the Action Alternative – Upper Dog Creek Analysis Area

As part of the consideration of cumulative effects, all direct and indirect impacts described in Existing Conditions would be expected to continue, except for those sediment impacts associated with the flow diversions in NE1/4 Section 18, T33N, R23W. Other related impacts described in the Existing Conditions for this analysis area would be expected to continue. Additionally, high short-term impacts and low long-term impacts to sediment and channel forms may occur as a result of implementing the proposed actions. Low impacts to flow regimes are expected as a result of implementing the proposed actions. Considering all

potential impacts described under Existing Conditions and Action Alternative, a high cumulative impact to fisheries resources is expected in this analysis area. This high cumulative effect is principally a result of the related impact of native fisheries displacement by nonnative species described under Existing Conditions.

SUMMARY

Five analysis areas are considered in the fisheries assessment for the Mystery Fish Timber Sale. Existing adverse cumulative effects to fisheries resources in the Lower Swift, Meadow, and Middle Swift creek analysis areas are likely low. Existing adverse cumulative effects are likely moderate in the Rock Creek analysis area and high in the Upper Dog Creek analysis area. The primary mechanism for the elevated existing impacts in the Rock and Upper Dog creek analysis areas is the displacement of native fisheries by non-native fisheries.
The proposed actions do not include any timber harvest within 300' of a fish-bearing stream. Also as part of the proposed actions, two road-stream crossings would be constructed in the Upper Dog Creek analysis area to mitigate existing impacts to the sediment and channel form components of fisheries resources. Short-term impacts to sediment are expected as a result of the construction of the two road-stream crossings, but long-term impacts at the affected areas are expected to be low. A risk of additional low, direct and indirect long-term impacts to fisheries resources is expected in all analysis areas as a result of implementing the Action Alternative, but the overall cumulative effects to fisheries resources in all five analysis areas are expected to generally be the same as those described under Existing Conditions.

Wildlife Analysis

Introduction

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

- The proposed activities could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.
- The proposed activities could affect wildlife species associated with old-growth forests by reducing the acreage of available habitat and increasing fragmentation.
- The proposed activities could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.
- The proposed activities could alter grizzly bear cover, reduce secure areas, and increase human access, which could adversely affect bears by displacing them from important habitats and/or increase risk of human-caused bear mortality.
- The proposed activities could result in the modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.
- The proposed activities could decrease habitat suitability for fishers by decreasing canopy cover and snag/coarse woody abundance, and by increasing risk of trapping mortality through greater road access.
- The proposed activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.
- The proposed activities could negatively affect pileated woodpecker habitat suitability by removing canopy cover and snags used for foraging and nesting, and by creating disturbance.
- Timber harvesting and associated activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons.

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

Analysis Areas

The discussions of existing conditions and environmental effects will focus on two different spatial scales. The first scale will be the "project area," which was used to assess direct and indirect effects to wildlife species and their habitats. The "project area," totaling 1,915 acres,

consists of an area surrounding the proposed timber harvest units and it is the area where all proposed new road construction would occur. Elevation within the project area ranges between 4,000 and 6,720 feet. The proposed project area contains a variety of slope aspects and wildlife habitats.

The second scale is the "cumulative effects analysis area," which refers to the surrounding landscape for assessing cumulative effects to wildlife species and their habitat. Cumulative effects were primarily analyzed on the project area and the adjacent surrounding sections. This area totals 5,740 acres. The spatial scale of the cumulative effects analysis area (CEAA) is larger for certain species discussed and is described in the applicable section of this document. In general, cumulative effects analysis areas were delineated to approximate the size of a focal species' home range or to approximate a surrounding landscape in which the proposed activities could most likely have measureable cumulative effects in regards to wildlife habitat. See *FIGURE W-1- WILDLIFE ANALYSIS AREAS* for a map showing the project and cumulative effects analysis areas.

In December 2011, DNRC adopted a Habitat Conservation Plan (HCP) in cooperation with the USFWS to minimize potential impacts of the Forest Management Program to grizzly bears, Canada lynx and three species of fish. As a part of the HCP, DNRC agreed to limit road construction and use for 50 years in this geographic area to that which is described in a transportation plan developed for blocked forest lands managed by the DNRC Stillwater Unit. This comprehensive access plan is called the Stillwater Block Transportation Plan and includes blocked lands on the Stillwater and Coal Creek state forests. To analyze effects associated with roads and access for this project, the Stillwater Block Transportation Plan was used as the foundation and baseline for analysis. Changes in road amounts and densities are described in relation to the project area, applicable CEAAs, and this transportation plan. The effects to wildlife associated with the full transportation plan were analyzed in the DNRC HCP EIS (*USFWS and DNRC 2010*). This effects assessment tiers to the detailed analyses contained in those documents.

Analysis Methods

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

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

Relevant Agreements, Laws, Plans, Rules and Regulations

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

Coarse Filter Wildlife Analysis

Mature Forested Habitats and Landscape Connectivity

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

Introduction

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

Forested landscapes in the western United States were historically shaped by natural disturbance events; primarily wildfire, blowdown, and pest outbreaks. Resulting broad landscape patterns were a mosaic of forest patches varying in age, composition and development. Timber harvest, like stand-replacement fire and blowdown, is a disturbance event that can create open, non-forested patches that over time develop into young, conifer forests. Patch size, age, shape, abundance, and distance to similar patches (connectivity) can be factors influencing wildlife use. The way through which patch characteristics influence wildlife use and distribution are dependent upon the particular species and its habitat requirements. Temporary non-forested openings, patches, and forest edges created by timber harvest may be avoided by certain wildlife species adapted to mature closed-canopy forest. In contrast, other wildlife species flourish in early seral habitats created by disturbance. Connectivity under historical fire regimes within forest types found in the vicinity of the project area was likely

relatively high as fire differentially burned various habitats across the landscape (*Fischer and Bradley 1987*).

Analysis Area

Direct and indirect effects were analyzed on the project area (1,915 acres). Cumulative effects were analyzed on the surrounding sections directly adjacent to the proposed project area sections (CEAA = 5,740 acres, see FIGURE W-1 – WILDLIFE ANALYSIS AREAS). This scale of analysis would be large enough to support a diversity of species that use mature forested habitat and/or require connected forested habitats and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, DNRC's stand level inventory (SLI) data, aerial-photograph interpretation, USDA Forest Service data (VMap 9.1.1), and Geographical Information System (GIS) analysis. Mature forested habitat was defined as forest stands typically >100 years old with ≥40% canopy cover comprised primarily of trees >9 inches dbh. Forested stands containing trees of at least this size and density were considered adequate for providing minimal conditions necessary to facilitate movements of many wildlife species that benefit from well-connected mature forest conditions across the landscape. Road density was calculated in linear miles per square mile by taking the number of road miles and dividing it by the specified analysis area in square miles. Factors considered in the analysis include: 1) availability of mature forested habitats (≥40% canopy cover, >9 inches dbh), 2) average patch size, 3) the degree of timber harvesting, 4) open and restricted road density, and 5) the availability of potential travel corridors.

Existing Environment

The project area currently contains approximately 1,139 acres (59.5%) of mature subalpine fir, Douglas-fir/western larch, Douglas-fir and mixed-conifer stands that have a reasonably well-developed canopy (≥40% crown closure). Another 604 acres (32%) of more open canopy forest with old, decadent forest or young developing stands exists within the project area. Approximately 168 acres (8.8%) of recently (<20 years) harvested stands within the project area consist of widely scattered mature trees and young, short regenerating trees. Mature forested stands are well-connected within the proposed project area, functioning as one forest patch (see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS). Additionally, small, dense patches of regenerating conifers and larger patches of dense brush are present and interspersed throughout the area. Roads are currently present within the project area, with a density of 1.6 miles of road per square mile. Roads that can be legally accessed by the general public make up a smaller portion of the total roads. Under the Stillwater Block Transportation Plan, approximately 4.6 miles (1.5 miles/sq. mile) of open DNRC roads exist in the project area, however many of them are managed with seasonal closures for public motorized use (see TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION). All of the road miles within the project area are inaccessible by wheeled motor vehicles (but not snow machines) during average winter conditions. Due to abundant mature forest cover and

generally low open-road densities, habitat connectivity for species using older (100+ years), undisturbed forest is good within the project area (see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS).

Similar to the proposed project area, stands of mature forest are relatively abundant and well-connected in the CEAA. Presently, roughly 50 percent (2,858 acres) of the cumulative effects analysis area is comprised of mature forest stands with >40% crown closure. Average patch size of mature forest is 476 acres (6 patches). Landscape connectivity of mature forest stands within the CEAA is good. Streams run through many of the existing patches of mature forest and offer an additional level of linear connectivity within the CEAA. A portion of the CEAA (18%, 1,052 acres) has been harvested within the last 20 years and consists of young, regenerating forest with large scattered trees. Land ownership within the cumulative effects analysis area is 100% DNRC. Open roads are present within the CEAA (14.3 miles, density open roads = 1.6 miles/sq. mile) and are primarily a result of past timber management activities. Ongoing harvesting associated with the SE Stryker Timber Sale in the CEAA would continue altering forested habitats and landscape connectivity. Across the cumulative effects analysis area, mature stand abundance and landscape connectivity are widely available for species requiring connected stands of mature forests.

Environmental Effects

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

Under this alternative no timber harvesting activities would occur. Thus, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) no changes to existing stands would occur; 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Under the Action Alternative, approximately 373 acres (19.5%) of mature forest would undergo harvesting (see *TABLE III-13 Mature Forested Habitat*). Of these harvested acres, roughly 159 acres are stands currently classified as old-growth forest using *Green et al. (1992)* standards. An additional 83 acres (4%) of more open canopy stands would also be harvested. All proposed harvest units would receive regeneration treatments; removing over-mature and diseased or suppressed/intermediate trees and leaving 4 to 10 mature trees per acre. Crown closure on these 373 acres would be reduced from >40% to 5-15%. Species that rely on mature forested habitats would experience a reduction in habitat for 50 to 80 years. Roughly 766 acres of mature, closed-canopy forest in the project area would remain unharvested and could provide suitable habitat for species utilizing smaller patches of mature forest (mean patch size 59 acres). Many of the remaining smaller patches would be connected to larger patches of mature cover adjacent to the project area, increasing effective patch size. Another 520 acres within the project area is primarily mature forest containing large trees (>15" dbh) and a more open (<40%)

canopy (see FIGURE W-2 - MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS). After harvesting, the project area would continue to provide a variety of forested habitat conditions for wildlife, but the proportions of these habitats would change. In general, under this alternative, habitat conditions would improve for species adapted to more open forest conditions, while reducing habitat quality for species that prefer dense, mature forest habitats.

TABLE III-13 – MATURE FORESTED HABITAT. Existing acres, proposed harvest acres, and percentages of mature forested habitat within the effects analysis areas.

Analysis Area	Total Analysis Acres	Mature Forested Habitat Present (% area)	Proposed Harvest Under Action Alternative (% area)	Mature Forested Habitat Post-Harvest (% area)
Project Area	1,915	1,139 (59.5%)	373 (19.5%)	766 (40.0%)
Cumulative Effects Analysis Area	5,740	2,858 (49.8%)	373 (6.5%)	2,484 (43.3%)

Following proposed harvesting, the majority of the project area (51%) would consist of harvested stands with a very open canopy (5-15% canopy, 456 acres) and unharvested stands with mature trees and a moderately developed canopy (20-40% canopy, 521 acres). These stands would provide habitat characteristics that favor use by species utilizing open forest conditions comprised of large, scattered trees, although certain wildlife species could find the resulting stands too open for appreciable use. Approximately 766 acres of unharvested, mature forest would be located in the project area, providing corridors for wildlife use and movement throughout the project area.

Approximately 2.4 miles of permanent road and 2.0 miles of temporary road would be constructed with the proposed Action Alternative (see *TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION*). During harvest activities, up to 9.6 miles of road within the project area could receive traffic. New permanent roads would be restricted to DNRC administrative use after harvesting. All temporary roads would be reclaimed and portions recontoured following use. At the conclusion of the proposed project, the amount of open roads within the project area would return to pre-harvest levels, however the amount of restricted roads and density of restricted roads would increase.

Thus, minor adverse direct and indirect effects to mature forested habitat connectivity and suitability in the project area would be expected since: 1) harvesting would appreciably reduce tree density and existing cover on roughly 373 acres (19.5%) of mature stands; 2) connectivity of mature forest would be altered, but substantial connectivity would remain in between harvest units and along riparian areas; and 3) overall road density would increase, but open road density would return to its pre-project level after 1-4 years.

TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION. Miles of existing road and new road that could be used under the proposed Action Alternative.

	Restricted Roads *(restricted from public motorized use year-round)*					**Open Roads**		**Total Roads**
Analysis Area (acres)	Existing *(opened for harvest activities)*		New Road Construction	Temporary Roads *(reclaimed after harvest)*		Existing		
	Open >30 days during nondenning period	Open <30 days or during denning period	Open >30 days during nondenning period	Open >30 days during nondenning period	Open <30 days or during denning period	Open year-round	Open seasonally	
Project Area (1,915)	0.2	0.4	2.4	1.4	0.5	2.0	2.6	9.6
Mature Forest, Old Growth, Snags and Coarse Woody Debris, and Pileated Woodpecker CEAA (5,740)	0.2	0.4	2.4	1.4	0.5	8.3	6.0	19.2
Lynx CEAA (39,240)	0.2	0.4	2.4	1.4	0.5	56.6	18.5	80.0
Grizzly Bear, Fisher, Wolf and Big Game CEAA (40,860)	0.2	0.4	2.4	1.4	0.5	38.5	18.5	61.9

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

Under this alternative no timber harvesting activities would occur. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could alter mature forest wildlife habitat in the present and future. No additional cumulative effects to mature forested habitat connectivity and suitability are expected to result from the No-Action Alternative that could affect wildlife in the cumulative effects analysis area since: 1) no changes to existing stands would occur; 2) no further changes to the suitability of mature forested cover or connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

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

Proposed harvesting would remove 373 acres (6.5%) of mature forest stands within the CEAA. Reductions in mature, closed canopy forested habitats associated with this alternative (13% of available mature habitat in cumulative area) would be additive to losses associated with past harvesting activities and any ongoing activities within the CEAA (e.g. SE Stryker Timber Sale). Across the cumulative-effects analysis area, a considerable percentage (49.8%) of mature, closed-canopy forested habitats would exist (average patch size = 62 acres) and landscape connectivity would be minimally altered given the existing condition of the surrounding forested landscape. Habitat for interior forest species and species associated with dense, mature stands would be reduced in the CEAA, however the remaining habitat would persist in the absence of large-scale disturbance or timber harvest. Wildlife species using and preferring young forest stands in the cumulative area would benefit from increases in the project area 10-20 years post-harvest. Landscape connectivity would be maintained primarily through unharvested riparian areas and upland corridors. Overall, connectivity of young forests and forest stands with large, widely scattered trees would increase while the acreage of dense, mature stands would decrease. Under the Action Alternative, approximately 2.4 miles of new permanent road would be constructed, but would be managed as a restricted road closed to public motorized use (see *TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION*). Proposed harvesting and associated activities could temporarily (up to 4 years) increase open road density within the cumulative effects analysis area from 1.6 miles/square mile to 2.1 miles/square mile. After project completion, open road density would decrease to pre-harvest levels. Thus, minor adverse cumulative effects to mature forested habitat suitability and connectivity for wildlife would be expected in the cumulative effects analysis area since: 1) harvesting would remove 373 acres (6.5%) of existing mature, closed canopy forest in the cumulative effects analysis area; 2) current availability of mature, closed canopy habitat is relatively high and minor cumulative changes to wildlife use would be expected; 3) forest retention along streams and the crest of Stryker Ridge would maintain connectivity; and 4) long-term open road density would not appreciably change or alter current levels of connectivity.

Old-Growth Wildlife Habitat

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

Introduction

Old-growth forests are an important component of biological diversity. They are old forest stands that typically have large old trees, abundant snags and downed logs, and multiple canopy layers, which are not found in young forests. These attributes provide structures used by a diversity of wildlife species. The diversity of species and the complexity of interactions between them can be different than in earlier successional stages (*Warren 1990*). On nearby lands on the Flathead National Forest, approximately 31 wildlife species associated with old-growth forests have been documented (*Warren 1998*).

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

Analysis Area

Direct and indirect effects were analyzed on the project area (1,915 acres). Cumulative effects were analyzed on the surrounding sections directly adjacent to the proposed project area sections (5,740 acres, see FIGURE III-5 – WILDLIFE ANALYSIS AREAS*)*. This scale of analysis would be large enough to support a diversity of species that use old-growth forest habitat and/or require connected old-growth forest habitat and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Analysis Methods

Old-growth forest patches were identified as described in the VEGETATION ANALYSIS section of this chapter. Patch sizes and shapes were assessed using *ArcGIS 9.3*. Changes in the total acres of old growth, as well as the number of patches greater than 80 acres, were assessed. Effects to wildlife were evaluated in terms of the total amount of old-growth habitat and the abundance of large patches greater than 80 acres that would not be harvested at this time.

Existing Environment

The project area contains approximately 775 acres (40%) of stands meeting the definition of old growth (*Green et al. 1992;* see VEGETATION ANALYSIS). Old-growth stands in the project area average 194 acres, and 3 of 4 existing total patches are larger than 80 acres (TABLE III-15 – NUMBER OF OLD-GROWTH PATCHES AND PATCH SIZES). Old-growth habitat within the project area is abundant and generally well-connected (see FIGURE III-6 – MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS). Mature forested stands not meeting old-growth classification are interspersed between old-growth stands and likely provide some additional connectivity for species that move between existing patches. Across the project area, periodic reductions of some attributes, such as large trees, snags, and

downed logs, occurred during recent past timber sales and salvage logging (168 acres, 8.8%). Thus, habitat quality has been reduced in some areas for some wildlife species associated with structurally diverse forest conditions.

There is approximately 1,434 acres (25%) of old-growth forest present within the CEAA. The average existing patch size of old-growth stands within the CEAA is 102 acres and 6 out of 14 existing patches are larger than 80 acres (see TABLE III-15– NUMBER OF OLD GROWTH PATCHES AND PATCH SIZES). Many of the old-growth patches in the CEAA share some, if not all, of their boundaries with mature, dense forests and old-growth patches located outside of the CEAA. In these cases, the effective patch size for old-growth associated species is likely larger than for patches surrounded by younger-aged forest stands. Stands in the mature and old-age categories in the project area currently represent greater than 50% of the forested acres (see *VEGETATION ANALYSIS* for further details). Decreases in the acreage of old growth, reductions in average patch size, simplification of patch shapes, and loss of connectivity between stands of old growth have occurred due to past timber management within the CEAA (1,052 acres, 18.3%), including ongoing harvesting associated with the SE Stryker Timber Sale. Presently within the CEAA, an abundance of mixed-conifer covertypes and shortages of western white pine and western larch/Douglas-fir covertypes also exist. Thus, wildlife species that are typically associated with old growth in covertypes comprised of seral tree species that are underrepresented have likely suffered from lower habitat quality, while those associated with old growth in the overrepresented covertypes have likely benefited from a greater abundance of high-quality habitat.

TABLE III-15 - *NUMBER OF OLD-GROWTH PATCHES AND PATCH SIZES*.
Number of patches and patch sizes of old-growth forests in the project area and the cumulative effects analysis area.

	ALTERNATIVE	
	NO-ACTION	ACTION
Project Area		
Number of old-growth patches	4	11
Average patch size (acres)	194	61
Number of large patches greater than 80 acres	3	3
Maximum patch size	349	229
Minimum patch size	2	0.7
Average size for large patches	258	182
Cumulative Effects Analysis Area		
Number of old-growth patches	14	21
Average size (acres)	102	61
Number of large patches greater than 80 acres	6	6
Maximum patch size	390	232
Minimum patch size	0.4	0.4
Average size for large patches	218	178

Environmental Effects

Direct and Indirect Effects of No-Action on Old-Growth Wildlife Habitat

No changes to the amounts, quality, or spatial arrangement of old growth would occur under this Alternative. Thus, old-growth-associated wildlife species would not be affected.

Direct and Indirect Effects of the Action Alternative to Old-Growth Wildlife Habitat

Under the Action Alternative, of the 775 acres of old-growth forest in the project area, 159 acres would be harvested (4.3% of the project area; 20.0% of the existing old growth in the project area not meeting old-growth definition), resulting in 616 acres (32.2%) of old-growth forest remaining in the 1,915-acre project area. Logging would alter the existing attributes on all of the acres of old growth treated and potentially affect some old-growth-associated species using those stands, particularly those preferring dense forest stands. Old-growth forest stands identified for proposed harvest were generally stands with lower abundance of large trees (>21" dbh) and higher levels of disease/insect mortality compared to other stands within the project area. Thus, old-growth stands selected for retention contain higher habitat quality that are expected to persist in old-growth status longer on the landscape than those proposed for harvesting. Remaining old-growth patches would range from 0.7 to 182 acres in size; 3 patches greater than 80 acres would remain (TABLE III-15 – NUMBER OF OLD-GROWTH PATCHES AND PATCH SIZES). However, the average patch size of old-growth stands on the project area would be reduced from 194 acres to 61 acres (68.6% reduction). Thus, because:

- the total amount of old growth would be reduced on the project area by 20.0%;

- the number of small patches (less than 80 acres) would increase, but the number of large patches would remain the same;
- the average large patch size would decrease by 68.6%;
- unharvested mature, non-old-growth forest would provide some connectivity between remaining old-growth patches;
- stands with the highest old-growth habitat attributes would be retained; and
- stands in the mature and old forest age categories in the project area would continue to represent 50% of the forested acres (see *VEGETATION ANALYSIS* for further details);

a moderate level of adverse direct and indirect effects to wildlife associated with old-growth forests would be expected under the Action Alternative as a result of reduced availability of habitat and increases in old growth fragmentation habitat parameters, such as reduced overall average patch size and reduced average size of large patches (*TABLE III-15 – NUMBER OF OLD-GROWTH PATCHES AND PATCH SIZES*).

Cumulative Effects of the No-Action Alternative to Old-Growth Wildlife Habitat

Under the No-Action Alternative, the project would not affect any old-growth forest. Ongoing and proposed forest management projects not associated the proposed Mystery Fish Timber Sale within the cumulative effects analysis area could alter mature forest wildlife habitat in the present and future. Therefore, existing stands of old growth would remain in their current state and no additional cumulative effects to old-growth associated wildlife species would be anticipated.

Cumulative Effects of the Action Alternative to Old-Growth Wildlife Habitat

Under the Action Alternative, of the 1,434 total acres of old-growth forest across the CEAA, 159 acres would be harvested (11% of the total old-growth amount), resulting in 1,275 acres of old-growth forest remaining (22.2% of the 5,740-acre CEAA). Logging would alter the existing attributes on all of the acres of old growth treated and potentially affect some old-growth-associated species using those stands, particularly those preferring dense forest stands. Effects to old-growth and associated wildlife species that would be likely under this alternative would be in addition to those that have occurred in CEAA over the last several decades on DNRC lands (e.g. ongoing SE Stryker Timber Sale). Remaining old-growth patches would range from 0.4 to 234 acres in size; 6 patches greater than 80 acres would remain across the forest (*TABLE III-15 – NUMBER OF OLD-GROWTH PATCHES AND PATCH SIZES*). However, the average patch size of large old-growth stands within the CEAA would be reduced from 218 acres to 178 acres (18.3% reduction), although 6 of the 21 patches within the CEAA would connected to larger old-growth patches outside of the CEAA and have a larger effective patch size. Thus, because:

- the total amount of old growth would be reduced within the CEAA by 11%;
- the number of large patches would remain essentially the same;
- the average large patch size would decrease by 18.3%;
- unharvested mature, non-old-growth forest would provide some connectivity between remaining old-growth patches;
- stands with the highest old-growth habitat attributes would be retained; and

- stands in the mature and old-forest age categories within the CEAA would continue to represent approximately over 50% of the forested acres (see *VEGETATION ANALYSIS* for further details);

a moderate level of adverse cumulative effects to wildlife associated with old-growth forests would be expected under the Action Alternative as a result of reduced availability of habitat and increases in old-growth fragmentation habitat parameters (*TABLE III-15 – NUMBER OF OLD GROWTH PATCHES AND PATCH SIZES*).

Snags and Coarse Woody Debris

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

Introduction

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

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

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

Analysis Area

Direct and indirect effects were analyzed within the project area (1,915 acres). Cumulative effects were analyzed within the surrounding sections directly adjacent to the proposed project area sections (5,740 acres). Land ownership within the cumulative effects analysis area (CEAA) is 100% DNRC. (see *FIGURE III-5 – WILDLIFE ANALYSIS AREAS).*

Analysis Methods

The abundance of snags and coarse woody debris were quantitatively estimated in the proposed project area using 12 systematically placed plots containing a single 100 foot long sampling transect. Factors considered in the analysis included the level of proposed harvesting and number of snags and weight in tons of coarse woody debris.

Existing Environment

Analysis of sampling plots and field observations indicated snags within the project area were relatively abundant (= 25 per acre, range 0-46). The average diameter of all snags >8" dbh was 15" dbh (range 8-39") and snag species composition was diverse, with the most abundant snag species being subalpine fir, followed by Engelmann spruce. Few large snags >21" dbh (15% of all snags recorded) were observed within project area sampling plots, but large snags were observed throughout the area. Snags were generally distributed unevenly, with some areas containing higher densities than others. The presence of large, high quality snags within the project area can be partially attributed to prevalent levels of insect and disease combined with the lack of past harvesting and firewood gathering. Approximately 4.6 miles of open roads in the project area facilitate firewood gathering, however the majority of the project area is inaccessible for firewood cutting due to lack of roads and steep, heavily vegetated terrain. Evidence of snag use for feeding and/or cavity building was observed in snags that were present. Coarse woody debris levels were also variable across the project area, averaging ~18.9 tons per acre (range 1.2 to 46.9 tons per acre). Similar to snags, downed logs were generally small diameter (=7.4" at transect line, range 3-21"), although some larger logs were observed. Thus, habitat quality for wildlife utilizing snags and/or coarse woody debris is likely moderate to high within the project area.

Overall, snags exist at current levels to meet DNRC's minimum-retention thresholds (*ARM 36.11.411)*, although size classes are smaller than preferred. Coarse woody debris in the project area is present in appropriate amounts for the current existing habitat types (*Graham et al. 1994*). Similar to other unaltered forested landscapes, snags and coarse woody debris are not distributed evenly across the project area. Snags and coarse woody debris are frequently collected for firewood near open roads in the cumulative effects analysis area. Within the CEAA, past harvesting on 1,052 acres (18.3%), including the recent SE Stryker Timber Sale have altered snags, snag recruits, and coarse woody debris levels. On these acres of harvested land within the cumulative effects analysis area, snag and downed wood abundance is likely considerably lower than levels in unharvested areas.

Environmental Effects

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

No direct changes in the abundance or distribution of deadwood resources would be expected. Existing snags would continue to provide wildlife habitat, and new snags would be recruited as trees die. No direct and indirect effects would be expected to affect wildlife species requiring snags and coarse woody debris since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations; 2) no changes to human access for firewood gathering would occur; and 3) no change in habitat quality that could affect wildlife species ability to survive and/or reproduce would be expected.

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

Existing snags, live recruitment trees and large coarse woody debris would be reduced due to timber harvesting on 456 acres in the proposed project area. Because snags are relatively abundant within the project area, most harvested areas would likely undergo an appreciable reduction in snags. Similarly, coarse woody debris amounts would likely decrease within harvest units under the proposed Action. Harvest prescriptions call for retention of 2 snags, and 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees may be left if sufficient large snags are not present), and 10 to 15 tons of coarse woody debris per acre retention in the proposed harvest areas. While some snags and/or recruit trees could be lost due to safety and operational concerns, replacements would be identified to comply with *ARM 36.11.411 and LY-HB2* (USFWS and DNRC 2010, Vol. II, p. 2-48). In roughly 175 acres of harvest units that would undergo broadcast burning site preparation post-harvest, down woody debris could be present in lower amounts than that recommended by Graham et al. (1994). Although current snags present in the project area are generally small diameter, live trees/snag recruits >21" dbh exist at levels within harvest units to fully meet *ARM 36.11.411.* Future snag quality in the harvested areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species like western larch that tend to provide high-quality structures important for nesting and foraging. The potential future risk for snag and coarse woody debris loss due to firewood gathering would not be altered with the proposed Action, as long-term open road density would be unchanged. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect habitat quality of wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris on 456 acres (23.8%), but levels of these habitat attributes in unharvested areas (67.2%) would remain high; 2) snags and future recruitment trees would be retained in all proposed treatment areas; 3) open road access for firewood gathering would be unchanged in the long-term, and 4) minor changes in habitat quality that could impact survival and/or reproduction of species associated with dead wood would be expected.

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

Snags and coarse woody debris would not be altered in the project area under this alternative. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could alter snags and coarse woody debris in the present and future. No additional cumulative effects to habitat quality for wildlife utilizing snags and downed woody debris are expected to result from the No-Action Alternative. Thus, no cumulative effects to wildlife associated with snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur that could affect existing snag and coarse woody debris abundance; 2) no changes to human access for firewood gathering would occur; and 3) no change in habitat quality that could affect wildlife species ability to survive and/or reproduce would occur.

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

Some snags could be removed from the project area, whereas coarse woody debris material would remain the same or decrease slightly. Lands within the cumulative effects analysis area have experienced different management rules through time, and snags and coarse woody debris have received different levels of consideration; however, past harvesting (1,052 acres, 18.3% of the CEAA) has reduced these attributes. The reduction of snags associated with this alternative would be additive to the losses associated with past harvesting and any ongoing harvesting within the CEAA (i.e., SE Stryker Timber Sale). However, the project requirements to retain 2 large snags and 2 large snag recruits per acre (greater than 21 inches dbh or next largest size class), and 10 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. However, coarse woody debris amounts could be reduced below levels recommended by Graham et al. (1994) on 175 acres proposed for broadcast burning. Approximately 4,314 acres (75.2%) within the CEAA have not been harvested and likely contain moderate to high levels of snags and coarse woody debris. Under the Action Alternative, long-term open road density would not change; thus, potential loss of snags and coarse woody debris resulting from firewood gathering would remain the same. 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 (particularly within broadcast burn units). Thus, since:

- 456 acres of the cumulative effects analysis area would be harvested reducing snags and snag-recruit trees while decreasing or maintaining coarse woody debris levels,
- much of the CEAA (75.2%) would continue to provide good snag and down wood habitat quality,
- no change in public access and associated firewood gathering would be anticipated, and
- there would be slightly increased representation of shade-intolerant species that could become high-quality snags in the long term;

minor adverse effects to habitat quality for wildlife requiring snags and coarse woody debris would be anticipated that would affect these species survival and/or reproduction in the cumulative effects analysis area for 30-100 years.

Fine-Filter Wildlife Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include those listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and animals managed as big game by Montana FWP. *TABLE III-16 – FINE FILTER* summarizes how each species considered was included in the following analysis or removed from further consideration, because suitable habitat either does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE III-16 – FINE FILTER. Species considered in the fine-filter analysis for this proposed project.

	SPECIES/HABITAT	DETERMINATION – BASIS
Threatened and Endangered Species	**Grizzly bear** (*Ursus arctos*) Habitat: Recovery areas, security from human activity	***Included*** – The proposed project area occurs in the Stryker Subunit of the Northern Continental Divide Ecosystem (NCDE) Recovery Area (USFWS 1993).
	Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Included*** – Potential Canada lynx habitat types occur within the project area.
Sensitive Species	**Bald eagle** (*Haliaeetus leucocephalus*) Habitat: Late-successional forest less than 1 mile from open water	***No further analysis conducted*** – There are no known nest territories in the vicinity of the project area and no large water bodies within 1 mile of the project area that might provide suitable locations for nesting. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	***No further analysis conducted*** – No recent (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene salamander (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	***No further analysis conducted*** – No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	***No further analysis conducted*** – No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loon (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	***No further analysis conducted*** – No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.

	Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	***Included*** – Potential fisher habitat occurs within the project area.
	Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	***No further analysis conducted*** – Suitable dry ponderosa pine and Douglas-fir stands do not exist in the project area.
	Gray wolf (*Canis lupus*) Habitat: Ample big game populations, security from human activities	***Included*** – Wolf packs have used the vicinity of the proposed project area in the past and future wolf use of the area is likely.
	Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	***No further analysis conducted*** – No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern bog lemming (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	***No further analysis conducted*** – No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine falcon (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	***No further analysis conducted*** – No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated woodpecker(*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	***Included*** – Potential suitable mature and old growth stands exist within the proposed project area.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	***No further analysis conducted*** – No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.
Big Game Species	**Elk**	***Included*** – Year-round use by deer, elk, and moose is possible. Big game security habitat and winter range exist in the project area.
	Moose	
	Mule deer	
	White-tailed deer	

Threatened And Endangered Species

GRIZZLY BEAR

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

Introduction

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

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 1,915 acre project area. Cumulative effects were analyzed in the Stryker Bear Management Unit Sub-unit of the NCDE (see *FIGURE III-5 – WILDLIFE ANALYSIS AREAS)*. Grizzly bear subunits were created to approximate the home range size of a female grizzly bear in northwest Montana (*Mace and Roberts 2011*).

Analysis Methods

Field evaluations, aerial photograph interpretation, scientific literature and GIS queries were the basis for this analysis. Within the cumulative effects analysis area, open road densities were calculated using a simple linear calculation method. Factors considered within this cumulative effects analysis area include availability of timbered stands for hiding cover, level of human disturbance, and miles of open roads.

Existing Environment

The proposed project area occurs in the Stryker Subunit of the NCDE Recovery Area (USFWS 1993). Ownership of the Stryker Subunit is 81% DNRC, 18% USDA Forest Service, and 1% private. Grizzly bears have been observed in the vicinity of the project area in the past and

continued use by bears is anticipated. The proposed project area contains habitat that grizzly bears would likely use during the non-denning period. Grizzly bear hiding cover, defined as vegetation that will hide 90% of a grizzly bear at a distance of 200 feet, is abundant within the proposed project area. The abundance of vegetative cover likely provides security for bears to freely move within the project area. Most stands harvested within the last 20 years (168 acres, 8.8%) within the project area contain scattered patches of dense regenerating conifers that currently break up sight distances and provide a limited amount of hiding cover for grizzly bears.

Managing human access is a major factor in management for grizzly bear habitats. Presently, open road density in the proposed project area is approximately 0.4 miles per square mile (simple linear calculations) and total road density is 1.6 miles per square mile. Under the Stillwater Block Transportation Plan, roads open to year-round public motorized use within the project area will increase from 1.1 miles to 1.8 miles. Under the Transportation Plan, an additional 1.1 miles will be open to public motorized use from June 30 to April 1 and an additional 1.2 miles from November 30 to April 1 and June 30 to September 15 (*USFWS and DNRC 2010, Vol. II, Appendix C, p. C-9*). Thus, open road density inside the project area from June 30 to Sept 15 will be 1.5 miles per square mile. Due to abundant hiding cover, extensive forage, and low density of open roads throughout much of the non-denning season, appreciable use of the project area by grizzly bears is likely.

The CEAA (Stryker Subunit) is a relatively intact, mostly undeveloped forested area with a variety of preferred grizzly bear habitats (avalanche chutes, berry fields, riparian areas). Ownership of the Stryker Subunit is 81% DNRC, 18% USDA Forest Service, and 1% private. Mature forest that provides hiding cover persists on over half of the CEAA (>20,500 acres). Forest habitats across the cumulative effects analysis area are a combination of age classes, ranging from recently harvested stands to mature stands. Roughly 10% of the subunit (3,993 acres) has been harvested within the last 40 years and consists of younger stands with regenerating trees. Ongoing timber sale projects within the CEAA (i.e. Duck to Dog, Highway 93 Corridor) are sources of disturbance and are currently altering grizzly bear habitat. The proposed Fish Bull Face Timber Sale project could also reduce hiding cover, increase open road densities, and elevate temporary disturbance levels within the CEAA. Reductions in vegetative cover, such as those associated with timber harvest, can lower effective bear use of habitat and render bears more vulnerable to human-caused mortality (*Servheen et al. 1999*). Human disturbance levels and level of forest harvesting are both closely tied to road access. Following project completion, road density for roads open for public motorized use during the summer portion of the non-denning period within the CEAA will be approximately 1.0 miles per square mile. Roads present in the cumulative effects analysis area are primarily a result of past timber management activities, but also include roads used to access USDA Forest Service and privately-owned lands.

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 in open-road densities or hiding cover described under existing conditions would be anticipated. No changes to the level of disturbance to grizzly bears would be anticipated. Thus, since no changes in available habitats or level of human disturbance would be anticipated, no direct or indirect effects to grizzly bear diplacement or mortality risk would be anticipated.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

Grizzly bear hiding cover would be reduced for 10-20 years on approximately 456 acres (23.8%) under the Action Alternative. Harvesting associated with the Action Alternative would likely increase sight distances within proposed harvest units. Existing dense patches of regenerating conifers, combined with visual screening in the form of topographic breaks, would maintain sight distances to less than 600 feet within all harvest units. Current levels of patchy cover in the form of brush, shrubs, and sub-merchantable trees would be retained where present in 281 acres of harvest units. In roughly 175 acres of harvest units that would undergo broadcast burning site preparation post-harvest, visual screening would likely be present only through topographic breaks. Existing riparian cover along 7.9 miles of Class 1 and 2 streams would be largely protected and offer movement corridors as well as hiding cover for bears in this preferred habitat. Each of 4 harvest units in the western half of the project area (totaling 67 acres) would be harvested in 30 days or less to decrease disturbance to grizzly bears, should any be present in the area. Visual screening along open roads would be maintained (where present) and reduce the likelihood of bear detection or accidental/intentional bear mortality. Overall levels of hiding cover would improve over time as shrub and tree regeneration proceeds.

Should grizzly bears be present in the area at the time of harvest operations, they could be affected by increased road traffic, noise, and human activity, and by altered amounts of hiding cover and forage resources. Proposed activities in grizzly bear habitats would reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area, should they be present. These disturbances would only occur during harvesting operations (1 to 4 years). Contract requirements would assist in mitigating bear-human conflict risk by specifying that contractors are not permitted to carry firearms on the work site and that unnatural attractants must kept/disposed of in a bear-resistant manner. Restrictions on motorized use in spring and commercial harvest restrictions would apply to 418 acres of proposed harvest, which would minimize bear disturbance during the spring period (April 1 to June 30). Commercial harvest on the remaining acres would be regulated by soil moisture contract stipulations, which would likely limit harvest activities during most (to all) of the same seasonal period.

Motorized activites associated with this Action Alternative, such as the use of restricted roads and the construction of new roads, could affect grizzly bears by temporarily (1 to 4 years) displacing them from previously secure areas. See *TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION* for road summaries. No new permenantly open road would be built under the Action Alternative. The temporary opening of 0.4 miles of currently restricted roads and

use of 0.5 miles of new temporary road would occur for no more than 30 days during a bear non-denning season to minimize duration of activity in grizzly bear habitats. Roughly 1.5 miles of new temporary road and 0.4 miles of currently restricted road would be opened during the non-denning season for up to 4 years. An additional 2.4 miles of new roads would be constructed and would be used during the non-denning period. Opening of currently restricted roads and new permanent/temporary road construction (5.0 miles) would contribute temporarily to open road density (3.2 miles/sq. mile) in the short term (1 to 4 years); increasing potential for disturbance to grizzly bears. Existing and new roads that would be temporarly opened (for 1 to 4 years) under this alternative (5.0 miles) would be closed in a manner to prohibit public motorized access during and after the proposed harvesting. Existing open road amounts would increase temporarily from 4.6 miles (density 1.5 mi/sq. mile) to 9.6 miles (density 3.2 mi/sq. mile) during project operations. Public access would only be allowed on the 4.6 miles of currently open road.

Thus, minor to moderate adverse direct or indirect effects to grizzly bears in the project area would be expected since: 1) minor to moderate levels of temporary (1 to 4 years) disturbance and displacement would be anticipated; 2) hiding cover on 456 acres (23.8%) would be lost in the short term, but would be expected to recover fairly rapidly; 3) reductions in hiding cover would be mitigated through vegetation retention patches withing units and along riparian cooridors; 4) commercial harvest and motorized activities would be restricted during the spring period; and 5) short-term increases in open road densities from 1.5 miles per square mile to 3.2 miles per square mile would be anticipated, but no changes to long-term open road densities would occur and visual screening would be maintained along open roads.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

No cumulative effects to grizzly bears would be expected. No cumulative changes to the level of disturbance to grizzly bears or secure areas would be anticipated. No cumulative changes in open-road densities or hiding cover from the existing conditions would be anticipated. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could alter grizzly bear habitat and/or disturb bears in the present and future. Thus, since no additional changes in available habitats or level of human disturbance would be anticipated as a result of the No-Action Alternative, and no cumulative effects to grizzly bear diplacement or effects involving mortality risk would be anticipated.

Cumulative Effects of the Action Alternative on Grizzly Bears

The increased use of road systems during the proposed project would temporarily increase human disturbance and displacement risk for grizzly bears within a portion of the cumulative effects analysis area, should they occur there. Collectively, short-term (1 to 4 years) increases in human disturbance would be anticipated in the area, but contract requirements would lessen risk of human-bear conflicts during active harvest operations (i.e. proper storage/disposal of unnatural attractants). Reductions in forest cover on 456 acres (1.1%) and disturbance levels would be additive to past timber harvesting that have affected approximately 3,993 acres (9.8%), as well as currently proposed harvest projects (i.e. Fish Bull Face Timber Sale). Harvesting and road building within the last 40 years in the cumulative effects analysis area has altered grizzly

bear cover and habitat connectivity, however 32.2% (13,153 acres) of the area remains in well-connected mature forest possessing ≥40% canopy cover in the overstory. Continued use of the cumulative effects analysis area by grizzly bears would be anticipated. Mature stands and younger regenerating stands likely providing hiding cover make up 24,352 acres (59.6%) of the CEAA. Early successional stages of vegetation occurring in harvest units provide foraging opportunities that do not exist in some mature stands across the cumulative effects analysis area. A short-term increase in open road density would occur, increasing from 1.0 miles per square mile to 1.4 miles per square mile. However, no changes in long-term open road densities would be expected. Temporarily-opened roads would be additive to roads opened under ongoing forest management projects (i.e. Duck to Dog and Highway 93 Corridor Timber Sales) and proposed timber harvest (i.e. Fish Bull Face Timber Sale) within the CEAA. Within the CEAA, high-risk factors for bears (i.e. pets, livestock, garbage, etc.) would continue to be present at relatively low levels. Thus, since:

- short-duration (1 to 4 year) increases in human disturbance levels would be expected within the cumulative effects analysis area,
- hiding cover would be removed in the short-term (~10 years) on a small portion (1.1%) of the cumulative effects analysis area, but would be expected to recover fairly rapidly,
- a large portion (50%) of the cumulative effects analysis area contains hiding cover, and
- negligible changes in long-term open road densities would occur;

minor adverse cumulative effects to grizzly bear diplacement or effects involving mortality risk would be expected in the short term (1 to 4 years) and long term (10 to 20 years).

CANADA LYNX

Issue: The proposed activities could result in the modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.

Introduction

Canada lynx are listed as "threatened" under the Endangered Species Act. Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (*Ruediger et al. 2000*). Lynx abundance and habitat use are strongly associated with snowshoe hare populations; thus conditions which decrease habitat quality for snowshoe hares can reduce the availability of prey for lynx. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares including dense, young and mature coniferous stands (*Squires et al. 2010*). Forest type, stem densities, natural disturbance history, and time since harvesting play important roles in shaping the suitablilty of young foraging habitat for lynx. Mature subalpine fir stands with abundant coarse woody debris also provide structure important for denning and cover for kittens, and dense cover used for for travel and security. These conditions are found in a variety of habitat types (*Pfister et al. 1977*), particularly within the subalpine fir series. Historically, northwest Montana contained a variety of stand types with differing fire regimes. This variety of stand types combined with patchy elevation

and snow-depth gradients preferred by lynx, likely formed a non-continuous mosiac of lynx and non-lynx habitats (*Fischer and Bradley 1987, Ruggiero et. al. 1999, Squires et al. 2010*). Forest management considerations for lynx include providing a mosaic of young and mature lynx habitats and maintaining a network of travel corridors.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 1,915 acre project area. The cumulative effects analysis area consisted of the 39,240 acre Stillwater West Lynx Management Area (see *FIGURE III-5 - WILDLIFE ANALYSIS AREAS*), which approximates the home range size of a Canada lynx. Lynx Management Areas (LMAs) are designated portions of DNRC land "where resident lynx populations are known to occur or where there is a high probability of periodic lynx occupancy over time." (*USFWS and DNRC 2010, Vol. II, p. 2-46*)

Analysis Methods

Analysis methods include field evaluations, aerial photograph interpretation, and Geographical Information System (GIS) analysis of SLI data and suitable lynx habitats. Suitable lynx habitat was subdivided into the following lynx habitat types: 1) winter foraging; 2) summer foraging; 3) other suitable; and 4) temporary non-habitat. Classification occurred according to DNRC HCP lynx habitat mapping protocols (*USFWS and DNRC 2010*) based upon a variety of vegetation characteristics important to lynx and snowshoe hares (i.e. forest habitat type, canopy cover, stand age class, stems/acre, and coarse woody debris). Other suitable lynx habitat is defined as habitat that has the potential to provide connectivity and lower quality foraging habitat. The temporary non-habitat category consists of non-forest and open forested stands that are not expected to be used by lynx until adequate horizontal cover develops. Factors considered in the analysis include: 1) the availability of lynx habitat types; 2) landscape connectivity; and 3) the level of harvesting.

Existing Environment

Approximately 1,872 acres (98.6%) of potential lynx habitat occurs in the 1,915 acre project area. Of this habitat, 1,872 acres (99.2%) are currently suitable habitat (*TABLE III-17 – LYNX HABITAT*). The majority of suitable lynx habitat is classified as "winter foraging" and is well connected as a single block of habitat within the project area. Amounts of coarse woody debris were quantitativly assessed within the project area and found to be abundant (see SNAGS AND COARSE WOODY DEBRIS). Additionally, riparian areas and ridges are present within the proposed project area which provide a number of preferred potential travel corridors for lynx, should they be present in the area. Past harvesting of 168 acres (8.8%) within the proposed project area has altered lynx habitat, however the majority of these acres (153 acres) have regenerated enough to become suitable summer foraging or other suitable habitat for lynx. Throughout the project area, habitat and connectivity conditions are good for potential lynx use.

Canada lynx have been documented within the cumulative effects analysis area in the past (*DNRC unpublished data, MNHP 2011*). Land owners in the cumulative effects analysis area are DNRC (99%) and various private owners (1%). Habitat types preferred by lynx are abundant within the CEAA (*TABLE III-17 – LYNX HABITAT*). The distribution of the various lynx habitat elements on DNRC-managed lands is the result, primarily, of past timber harvesting and the

lack of recent wildfire. The lack of recent fire disturbance in the cumulative effects analysis area (influenced by modern-day fire suppression) has likely led to a smaller proportion of young foraging habitat and a greater proportion of mature foraging habitat or forested travel/other habitats on DNRC lands than what was typically present pre-European settlement. Suitable habitat is well connected within the CEAA. Timber harvesting on 7,209 acres (18.4%) within the CEAA in the last 40 years has altered lynx habitat, however those harvest units older than 20 years are now providing suitable summer foraging or other suitable habitat.

TABLE III-17 – LYNX HABITAT. *Estimates of existing lynx habitat acres and habitat post-harvest acres on DNRC lands in the project area and cumulative effects analysis area. Percent refers to the percent of the lynx habitat category of the total amount of potential habitat present (sum of all suitable and temp non-suitable classes) on DNRC-managed lands.*

LYNX HABITAT CATEGORY	**Acres of lynx habitat (percent of DNRC lynx habitat)**			
	Project Area		**Cumulative Effects Analysis Area**	
	Existing	Post-Harvest	Existing	Post-Harvest
OTHER SUITABLE	39.5 (2.1%)	39.1 (2.1%)	4,127.7 (11.6%)	4,127.3 (11.6%)
SUMMER FORAGE	82.7 (4.4%)	82.0 (4.3%)	6,486.1 (18.3%)	6,485.3 (18.2%)
TEMP NONSUITABLE	15.5 (0.8%)	471.0 (24.9%)	4,590.7 (12.9%)	5,046.2 (14.2%)
WINTER FORAGE	1,749.9 (92.7%)	1,295.6 (68.6%)	20,334.0 (57.2%)	19,879.7 (55.9%)
Grand Total - Suitable Lynx Habitat	1,872.2 (99.2%)	1,416.7 (75.1%)	30,947.8 (87.1%)	30,492.3 (85.8%)

Environmental Effects

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

Under this alternative, no changes in lynx habitat elements would be expected in the project area and landscape connectivity would not be altered. Thus, no direct or indirect effects influencing lynx habitat suitability would be expected to occur in the project area.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 456 acres (23.8%) of suitable lynx habitat would be subject to harvesting with this alternative. Activities associated with active logging operations could temporarily displace any lynx using the area for 1 to 4 years. Proposed harvest prescriptions on all 456 acres would decrease mature tree abundance to 6 to 10 trees per acre and reduce overstory crown closure to

<15%. Suitable lynx habitat inside harvest units would be converted to temporary non-suitable habitat (*TABLE III-17 – LYNX HABITAT*) for the next 15 to 30 years. In the short term, lynx would likely avoid all 456 acres of harvested area. Where operationally feasible, some existing patches of shade-intolerant regenerating and sub-mechantable conifers would be retained, however the total area of regenerating patches would not be expected to comprise more than 10% of the treated habitat areas. Broadcast burning treatments would be applied to 175 acres of harvest units (9.1% of the project area); these areas would likely have a longer time delay before becoming suitable lynx habtat. Growth of retained mature trees and patches of sapling to pole-sized conifers, combined with post-harvest conifer regeneration following harvest, would increase habitat suitability over time. Following proposed logging in the project area, 1,416 acres (73.9%) of lynx habitat would remain unharvested. Suitable lynx habitat would be largely retained along perrenial streams in the project area, and thus provide habitat connectivity from the lower elevation portions of the project area up to the crest of Stryker Ridge. Changes in lynx habitat suitability in the project area would not be expected to appreciably alter lynx movement patterns, should lynx be present. In the proposed harvest units, 10 to 15 tons/acre of coarse woody debris would be retained to provide horizontal cover and security structure for lynx and lynx prey, although lynx would not be expected to use harvest units appreciably for 15 to 30 years. Collectively, since: 1) the amount of existing suitable lynx habitat in the project area would be reduced by 24.1%, but the majority (75.1%) would remain suitable; 2) suitable lynx habitats would likely develop in the next 15 to 30 years in the project area; 3) coarse woody debris and patches of regenerating conifers would be retained to promote forest structural complexity in harvest units as they grow back into suitable lynx habitat; and 4) moderate levels of landscape connectivity would persist despite an overall slight reduction in landscape connectivity, minor adverse direct and indirect effects to habitat suitability for Canada lynx would be expected.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable change in lynx habitats would occur under this No-Action Alternative and no further changes in landscape connectivity would be anticipated. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could alter lynx habitat in the present and future. No additional cumulative effects to suitable lynx habitat are expected to result from the No-Action Alternative that could affect lynx habitat suitability in the CEAA. Thus, no cumulative effects to lynx habitat suitability would be expected to occur.

Cumulative Effects of the Action Alternative on Canada Lynx

Under the Action Alternative, approximately 456 acres (1.2%) of the 39,240-acre cumulative effects analysis area would be altered and converted to temporary nonsuitable habitat. Within the cumulative effects analysis area, considerable amounts of suitable lynx habitats would continue to persist (*TABLE III-17 – LYNX HABITAT*). Reductions in suitable lynx habitat and increases in temporary nonsuitable habitat in the proposed harvest units would not be expected to appreciably alter lynx use of the cumulative effects analysis area given that surrounding habitat suitability is high. The cumulative effects analysis area contains 30,948 acres (87.1%) of currently suitable lynx habitat. Landscape connectivity in the cumulative effects analysis area would not be appreciably reduced with the proposed activities, as existing connectivity of

suitable lynx habitat would be maintained along riparian areas and features typically used for lynx travel (i.e. forested saddles). Suitable lynx habitat within the CEAA is being altered by the ongoing Duck to Dog and Highway 93 Corridor timber sales, and could be altered within next 5 years by the proposed Fish Bull Face Timber Sale. At the same time, stands harvested 15 to 20 years ago could become summer foraging habitat as conifers regenerate within units. Increased levels of motorized activities associated with the Action Alternative could temporarily displace lynx should they be present near the proposed project area and associated roads. Thus, since:

- overall baseline habitat suitability and connectivity for lynx would remain high,
- existing suitable lynx habitat on DNRC lands would be reduced by 1.2% in the cumulative effects analysis area and remain unsuitable for at least 15 years, but young foraging habitat would continue developing in the CEAA,
- habitat connectivity within the CEAA would be minimally affected by proposed activities, and
- lynx could be temporarily displaced by logging activities in the cumulative effects analysis area;

minor adverse cumulative effects to lynx habitat suitability would be expected as a result of proposed activities.

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 , could become listed under the *Federal Endangered Species Act* if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful 'fine filter' for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the *Montana Natural Heritage Database* documented no sensitive species (as shown in *TABLE III-16 – FINE FILTER*) in the vicinity of the project area.

FISHER

Issue: The proposed activities could decrease habitat suitability for fishers by decreasing canopy cover and snag/coarse woody abundance, and by increasing risk of trapping mortality through greater road access.

Introduction

Fishers are generalist predators that prey upon a variety of small mammals and birds, as well as snowshoe hares and porcupines. They also eat carrion and seasonally available fruits and

berries (*Foresman 2001*). Fishers use a variety of successional stages, but are disproportionately found in low to mid elevation mature stands with dense canopies (*Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994*) and avoid openings or young forested stands (*Buskirk and Powell 1994*). However, some use of openings does occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (*Jones 1991*). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest management considerations for fisher involve maintaining legacy snags and coarse woody debris and providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects for fisher habitat were analyzed on the 40,860-acre Stryker grizzly bear subunit (see *FIGURE III-5 – WILDLIFE ANALYSIS AREAS)*.

Analysis Methods

To assess potential fisher habitat and travel cover on DNRC managed lands in the cumulative effects analysis area, sawtimber stands within preferred fisher cover types (ARM 36.11.403(60)) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. DNRC manages preferred fisher cover types within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density (ARM 36.11.440(1)(b)(i)). Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to Class 1 and Class 2 streams (ARM 36.11.403(15) and (16)). Direct and indirect effects were analyzed using field evaluations and GIS analysis of potential habitat. Cumulative effects were analyzed using field evaluations and GIS analysis of potential habitat and aerial photograph interpretation of potential habitat on all other lands within the CEAA. Potential suitable fisher habitat on non-DNRC lands was considered to be mature forest with ≥40% crown closure below 6,000 feet in elevation. Factors considered include amount of suitable fisher habitats, landscape connectivity, and human access. Snags and coarse woody debris were assessed using sampling plot data, site visits and by reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting and trapping mortality.

Existing Environment

The proposed project area ranges from 4,000 to 6,720 feet in elevation. The proposed project area contains roughly 1,029 acres (53.7%) of suitable fisher habitat below 6,000 feet in elevation. Approximately 73.5 acres (3.9%) of suitable fisher habitat are within 100 feet of Class 1 streams

and 28 acres (1.4%) are within 50 feet of Class 2 streams. Snags and coarse woody debris were quantified at sampling plots within proposed harvest units and found to be relatively abundant (see WILDLIFE- SNAGS AND COARSE WOODY DEBRIS). Mature forested stands occur along all of the perennial streams in the project area and provide connectivity with habitat lower in the watershed. Within uplands on the project area, preferred fisher cover types are abundant and generally provide structural features necessary for use as fisher travel habitat. Approximately 287 acres in the northern portion of the project area is above 6,000 feet in elevation and does not likely provide high quality habitat for fisher travel or connectivity due to unsuitable forest cover types, lack of riparian areas, and decreasing levels of crown closure. Connectivity of mature forest and suitable fisher habitat within the rest of the project area is good (see WILDLIFE- MATURE FORESTED HABITATS AND CONNECTIVITY). At the time of proposed project start-up, there will be approximately 4.6 miles of open road (1.5 miles per square mile) within the project area. Because of steep terrain and dense forest conditions, gathering of snags and coarse woody debris by firewood cutters is likely limited to within 200 feet of open roads. Roads near streams offer trappers convenient access to forested riparian areas, which increases trapping risk to fishers should they be using the area. Open roads intersect streams containing fisher habitat primarily in downstream reaches, although snow machines could be required during typical winter conditions. The majority of stream miles within the proposed project area are >400 feet from open roads and are on steep terrain; discouraging trapper access and decreasing the risk of trapping mortality. Overall, fisher habitat suitability and connectivity within the project area is high and risk factors are low.

There is a single historical record of fisher occurring in the cumulative effects analysis area within the last 50 years (*MNHP 2011*). Several additional occurrences of fisher were recorded within 3 miles of the CEAA. Within the CEAA on 32,905 acres of DNRC lands, there are 9,361 acres (22.9%) of moderately or well-stocked suitable fisher cover types (see TABLE III-18 – FISHER HABITAT). Of this habitat, approximately 1,026 acres (2.5%) would be considered riparian fisher habitat. Approximately 68 miles of Class 1 and 70 miles of Class 2 streams occur on lands within the cumulative effects analysis area. Mature forested areas adjacent to these streams within non-DNRC lands could contribute to the total riparian fisher habitats in the CEAA (1,260 acres total). Approximately 234 acres of mature, forested habitat with >40% crown closure are within 100 feet of perennial streams and 50 feet of intermittent streams on non-DNRC lands in the CEAA, while the remaining miles are located in recently harvested, mature open-canopy forest, or non-forested (i.e. burned, rock/scree) areas. The majority of Class 1 and 2 streams within the CEAA (below 6,000 feet elevation) have accompanying riparian vegetation that would facilitate fisher travel, and thus facilitate habitat connectivity. Roughly 894 acres (2.2%) of mature (>40% canopy) forest on non-DNRC lands within the CEAA provide additional upland fisher habitats, however it is possible that some of these acres are in cover types not preferred by fishers. Including riparian and upland habitat, potential suitable habitat within the CEAA totals approximately 10,405 acres (25.5%). Within the cumulative effects analysis area, past harvesting has reduced mature crown closure and snag and coarse woody debris densities in about 3,993 (9.8%) of the area. Within the CEAA there is a network of existing roads that may facilitate trapper access, although most are not plowed, which limits

motorized vehicle use during typical winter conditions. Collectively, habitat suitability for fishers within the CEAA is good.

Environmental Effects

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

No change to the stands providing fisher denning and foraging habitats would be expected as no timber harvesting activities would occur under this alternative. Also, no changes in landscape connectivity would occur. Thus, since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered; 3) no appreciable changes to canopy cover, snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or potential for trapping mortality would be anticipated, no direct or indirect effects associated with fisher habitat suitability would be expected in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 283 acres of the 486 acres (58.2%) of suitable fisher habitat in the project area would be included in proposed harvest units. All of these acres are presently meeting structural requirements for fisher use. Suitable upland fisher habitat within the project area harvest units (281 acres) would receive treatments that would likely yield stands too open for appreciable fisher use for 50 to 80 years. Approximately 98 acres (96.7%) of riparian fisher habitat would remain unharvested in the project area. Adjacent to Class 1 streams, riparian area harvesting would not occur within 50 feet of the stream; outside of this buffer up to 50% of trees by size and species could be harvested. In all areas, harvest prescriptions call for retention of 2 snags and 2 snag recruits per acre (>21 in. dbh) where they exist, otherwise the next largest size class. Also, 10-15 tons of coarse woody debris per acre would be planned for retention within the proposed units. While the proposed harvest may reduce density of snags and their recruits in the near future, the sustainability of snags in the area will be maintained by retention of appreciable numbers of leave trees and snag recruitment trees. Prescriptions call for retention of large, dominant trees in the project area; further improving the development and sustainability of large snags. These large snags and trees could be a source for fisher denning and resting sites in the future when harvested stands regenerate and develop mature stand characteristics (50 to 80 years). Approximately 59 acres of riparian and upland preferred fisher covertypes would continue maturing and could provide suitable habitat in the next 15 to 40 years. Connectivity of suitable upland fisher habitat would be altered to a minor degree, which could render the project area slightly less suitable for extended fisher use. Fisher mortality risk due to trapping and increased reductions of snags/coarse woody debris due to firewood gathering would not be expected to change as no new open roads would be built. Thus, since: 1) harvesting would remove a minor amount of suitable riparian (2.1%) and upland (14.6%) fisher habitat in the project area; 2) minor reductions in habitat connectivity would occur and riparian fisher habitat would be maintained; and 3) motorized human access levels would remain the same, minor adverse direct and indirect effects would be anticipated that would affect fisher habitat suitability in the project area.

Cumulative Effects of the No-Action Alternative on Fishers

No effects to riparian or upland fisher habitats on DNRC managed lands would be expected as no timber harvesting activities would occur under this No-Action Alternative. Also, no changes to landscape connectivity within the cumulative effects analysis area would be expected. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could alter fisher habitat in the present and future. No additional cumulative effects to suitable fisher habitat are expected to result from the No-Action Alternative that could affect fisher habitat suitability in the CEAA. Thus, since: 1) no changes to existing habitats on DNRC ownership would occur; 2) landscape connectivity afforded by the stands on DNRC ownership would not change; 3) no changes to canopy cover, snags, snag recruits, or coarse woody debris levels would be expected; and 4) no changes to human access or potential for trapping mortality would be anticipated, no further cumulative effects to fisher habitat suitability would be anticipated in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Fishers

Approximately 283 acres (3.0%) of 9,362 acres of suitable fisher habitat in the DNRC-owned cumulative effects analysis area would be harvested. Of these proposed acres, 2.1 acres (0.9%) of 1,026 acres of suitable fisher riparian habitat would be harvested. These reductions would be additive to the losses associated with past and current timber harvesting in the CEAA, including the Duck to Dog and proposed Fish Bull Face timber sales. Future harvest operations or natural disturbance on non-DNRC ownerships could affect fisher habitat on the larger landscape. Roughly 10,123 acres of the 40,860 acre cumulative effects analysis area (24.7%) would remain in suitable habitat. Negligible reductions in landscape connectivity within the CEAA would occur; suitable forest stands along the majority of riparian areas would persist. Human access and potential trapping mortality would be expected to return to pre-harvest levels following treatment. Thus, since:

- harvesting would alter tree density and structure in stands in a minor amount (2.7%) of suitable fisher cover types within the cumulative effects analysis area,
- minor changes to fisher habitat associated with the riparian areas in the cumulative effects analysis area would be anticipated,
- negligible reductions in landscape connectivity for fishers would be anticipated, and
- no changes to motorized public access would occur;

minor adverse cumulative effects would be anticipated that would affect fisher habitat suitability within the cumulative effects analysis area.

TABLE III-18 – FISHER HABITAT. *Estimates of existing fisher habitat acres and estimated habitat acres post-harvest within the project area and cumulative effects analysis area. Percent refers to the proportion of the fisher habitat category of the total amount of area within the analysis area.*

Fisher Habitat Category	Existing		Post-Harvest	
	Project	CEAA	Project	CEAA
	1,915 acres	40,860 acres	1,915 acres	40,860 acres
Upland Fisher Habitat (DNRC)	928 (48.4%)	8,334 (20.4%)	648 (33.8%)	8,054 (19.7%)
Upland Fisher Habitat (non-DNRC)	0* (0%)	810 (2%)	0* (0%)	810 (2%)
Riparian Fisher Habitat (DNRC)	101 (5.3%)	1,028 (2.5%)	99 (5.2%)	1,026 (2.5%)
Riparian Fisher Habitat (non-DNRC)	0* (0%)	234 (0.6%)	0* (0%)	234 (0.6%)
Total Suitable Fisher Habitat (DNRC)	1,029 (53.7%)	9,362 (22.9%)	747 (39%)	9,080 (22.2%)
Total Suitable Fisher Habitat (DNRC lands & non-DNRC lands)	1,029* (53.7%)	10,406 (25.5%)	747* (39%)	10,123 (24.8%)

*Non-DNRC lands are absent from the proposed project area.

GRAY WOLF

Issue: Timber harvesting and associated activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.

Introduction

In April 2011, gray wolves were removed from the federal list of threatened and endangered species in Montana, Idaho and parts of Washington, Oregon, and Utah. DNRC currently considers them as a sensitive species for the purpose of analyzing impacts associated with forest management activities.

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

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

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on a 40,860 acre CEAA around the project area (see *FIGURE III-5 – WILDLIFE ANALYSIS AREAS)*. This scale approximates an area large enough to support a wolf pack (based upon DFWP wolf pack home range data, 2010).

Analysis Methods

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

Existing Environment

The annual home range of the Lazy Creek wolf pack included portions of the CEAA area in the past (*Sime et al. 2011*). Wolves are believed to be most sensitive to human disturbance at denning and rendezvous sites. No known denning or rendezvous sites are present in the project area. Landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, are largely absent from the project area. Given the area's history of wolf use, however, current or future wolf presence is likely.

In northwest Montana, wolf population levels and habitat use generally track those of their ungulate prey; primarily white-tailed deer, moose, and elk. The proposed project area contains summer habitat for the aforementioned prey species, as well as 1,915 acres and 1,545 acres of winter range for moose and elk, respectively (see WILDLIFE – BIG GAME HABITAT). Signs of summer use by elk were observed during field visits. The proposed project area contains a number of open, seasonally open, and restricted roads that could serve as a source of disturbance and mortality for both wolves and big game (see *TABLE III-14 – ROAD MANAGEMENT AND CONSTRUCTION*). Currently, 2.0 miles of road present within the proposed project area are legally open for year-round public motorized use. An additional 2.6 miles of road is opened seasonally to public motorized use.

Within the larger CEAA, white-tailed deer winter range is relatively limited (10.2%), while elk (44.3%) and moose (79.9%) winter range areas are more abundant. Landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur within the CEAA. Past harvesting on all ownerships in the cumulative effects analysis area has altered big game and wolf habitat (3,993 acres, 9.8%). Harvesting has reduced the amount of mature forest within the CEAA, in turn reducing the amount of thermal cover and snow intercept available to big game. Current and proposed harvesting (i.e. Fish Bull Face Timber Sale) could continue to alter big game and wolf habitat. However, the CEAA contains 13,153 acres (32.2%) of mature forest that likely provide these important winter range characteristics. The CEAA contains an extensive network of restricted and open roads, which has increased human access and the potential for wolf-human interactions. Increasing access to these areas can elevate risk of wolf/human encounters and increase the vulnerability of their ungulate prey, especially during the hunting season. Open roadways and a limited number of human dwellings in the cumulative effects analysis area pose additional risk for wolves. Pets and livestock associated with homes likely pose the greatest risk to wolves should they use the area, due to the heightened potential for associated conflicts. Wolf and big game habitat within CEAA remains largely intact and undeveloped; continued use of the area by wolves would be expected.

Environmental Effects

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

Additional disturbance to wolves would not be anticipated based on this alternative. No changes in big game habitat, including no changes to forested cover on white-tailed deer or elk winter range would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. No changes in the ability for wolves to use the project area would be expected. Thus, since: 1) no additional changes in human disturbance levels would occur, and 2) no changes to big game winter range would occur, no direct or indirect effects would be expected to affect gray wolf displacement risk or big game prey availability for gray wolves.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

Wolves using the area could be temporarily disturbed by harvesting activities; however they are most sensitive at den and rendezvous sites, which are not known to occur within the project area. In the short term (approximately 1 to 4 years), activities associated with the proposed harvest could displace wolves and/or big game, should they be present in the area. Additionally, the resulting open stand conditions could increase the probability of a wolf or big game species being observed and harvested during future hunting seasons. Currently closed roads would be opened for harvest activities for no more than four consecutive years. Following harvest, the existing restricted and newly constructed roads used to conduct project activities would be closed to motorized use. After timber harvesting, motorized human disturbance levels would revert to pre-harvest levels, but non-motorized human use could

slightly increase on 2.4 miles of newly-constructed restricted roads. Similarly, potential for any wolf use of the project area for denning and rendezvous sites would likely revert to pre-harvest levels. Harvest would result in the reduction of thermal cover on big game winter range within the project area (see WILDLIFE – BIG GAME HABITAT). These minor reductions in cover on big game winter range could result in slight shifts in prey availability for wolves. Additional impacts to big game winter range are discussed in more detail in a subsequent section of this analysis. Thus, since: 1) no known wolf den and/or rendezvous sites are within the project area; 2) there would be minimal reductions in habitat quality of big game winter range that could alter wolf prey availability; and 3) there would be short-term increases in motorized disturbance and potential for slight long-term increases in non-motorized access; minor adverse direct and indirect effects to wolf prey availability and minor adverse direct and indirect effects affecting gray wolf displacement risk would be expected.

Cumulative Effects of the No-Action Alternative on Gray Wolves

No disturbance of gray wolves, their prey, or their habitat would occur under this alternative as no timber harvesting activities would occur. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could displace wolves and/or alter wolf prey availability in the present and future. No additional cumulative effects to wolf displacement risk or prey availability are expected to result from the No-Action Alternative that could affect wolves in the CEAA. Thus, no adverse cumulative effects to gray wolf denning/rendezvous sites or big game prey in the cumulative effects analysis area would be expected that could result in adverse effects on gray wolves.

Cumulative Effects of the Action Alternative on Gray Wolves

In the CEAA, temporary displacement of big game and wolves is possible, should they occur in the area within close proximity to proposed timber harvest and hauling activities. Disturbance associated with the Action Alternative would be additive to ongoing and proposed forest management activities within the CEAA (i.e. Highway 93 Corridor Timber Sale, Duck to Dog Timber Sale, proposed Fish Bull Face Timber Sale). Reductions in cover may cause slight decreases in use by deer, moose, and elk; however, no appreciable changes in deer and elk distribution or abundance would be expected at the scale of the CEAA (see WILDLIFE – BIG GAME HABITAT). Minor reductions in cover on big game winter range would be expected. Reductions in cover would be additive to losses from past timber-harvesting activities in the cumulative effects analysis area. The reductions that would occur under this alternative to big game winter range would not be expected to affect the overall use of the cumulative effects analysis area by wolves. Under this alternative 2.4 miles of new permanent road would be constructed, which could increase non-motorized use of the CEAA and associated hunting mortality risk to wolves and big game. All temporary roads and new restricted roads used to conduct project-related work would be closed to motorized public use following harvest activities. Other minor risks within the CEAA, such as pets and livestock on private land, would continue to pose risks to wolves in this area because of the potential for conflicts and resulting management actions. No substantive change in long-term potential for wolf use of the cumulative effects analysis area would be expected.

Thus, since:

- localized disturbance would occur due to logging activities in the area, but would revert to existing levels,
- winter range habitat quality would not be appreciably reduced within the CEAA, this is unlikely to lower big game winter carrying capacity in the area, and
- there would be no long-term increase in motorized access;

minor adverse cumulative effects to gray wolf displacement risk and minimal changes to big game prey availability would be expected under the Action Alternative.

PILEATED WOODPECKER

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

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." Necessary feeding and nesting habitat attributes include large snags, large decayed trees, and downed wood, which closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*).

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. For cumulative effects, the surrounding sections and the project area were used as the scale of the analysis, for a total CEAA comprised of 5,740 acres (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. This scale includes sufficient area to support multiple pairs of pileated woodpeckers if enough suitable habitat is present (*Bull and Jackson 1995*).

Analysis Methods

Analysis methods include field evaluation, aerial photograph interpretation, and GIS analysis of available habitats. SLI data were used to identify preferred pileated woodpecker habitat (*ARM 36.11.403(58)).* Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and mapped potential habitat. Factors considered included the amount of potential habitat, degree of harvesting, and the amount of continuous forested habitat.

Existing Environment

In the project area, there are approximately 839 acres (43.8%) of potential pileated woodpecker habitat. Current potential pileated habitat consists of mature Douglas-fir, western larch, and subalpine fir stands in a single contiguous patch. Approximately half of these acres are above 5,000 feet in elevation, and could be of lower habitat suitability (*Aney and McClelland 1985*). Snags and coarse woody debris are relatively abundant within the proposed project area (see SNAGS AND COARSE WOODY DEBRIS) and pileated woodpecker foraging evidence was observed during field visits. Mature forest with >40% crown closure covers over half (59.5%) of the project area and could function as additional foraging areas. Past harvesting has altered mature stands, snags, and coarse woody debris on roughly 168 acres (8.8%) of the project area. Open roads (4.6 miles) have facilitated firewood gathering, resulting in a reduction of woodpecker nesting and foraging substrates within a small portion of the project area. Because of difficult terrain and vegetation along open roads within the project area, however, firewood gathering has been largely restricted to area immediately adjacent (<200 feet) to these roads. Given these observations, it is likely the majority of the potential pileated habitat below 5,000 feet has high habitat quality and above 5,000 feet has moderate habitat quality for pileated woodpeckers.

The CEAA contains approximately 1,859 acres (32.4%) of potential pileated woodpecker habitat. Presently, 18.3 percent (1,053 acres) of the CEAA is not suitable for use by pileated woodpeckers due to road building and past harvesting. Most of the remaining acres within the CEAA 2,828 acres (49.3%) consist of mature forested stands (of less preferred covertypes) that could provide habitat for pileated woodpeckers, should any be using the area. Around half of the cumulative effects analysis area (and suitable pileated habitat) is above 5,000 feet in elevation; thus habitat conditions at these upper elevations could be of lower quality for nesting pileated woodpeckers (*Aney and McClelland 1985*).

Environmental Effects

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

No timber harvesting activities would occur under this alternative. Thus, no adverse direct and indirect effects associated with disturbance levels or habitat suitability for pileated woodpeckers in the project area would be expected since: 1) no changes in the amount of continuously forested habitat would be anticipated; 2) no changes to existing pileated woodpecker habitat would be anticipated; and 3) no additional disturbance would take place.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Harvesting would reduce forested habitat for pileated woodpeckers and create younger-aged stands with widely scattered mature trees. Roughly 237 acres (28.3%) of available potential pileated woodpecker habitat would be altered with regeneration-type treatments and would be too open to be considered habitat following proposed treatments. Approximately 602 acres of suitable pileated habitat would remain unharvested within the project area. In the stands

proposed for treatment, suitable pileated habitat would be removed for 50 to 80 years. Elements of the forest structure important for nesting pileated woodpeckers would be retained in the proposed harvest areas (see SNAGS AND COARSE WOODY DEBRIS), however the abundance of snags and snag recruits would be reduced. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*), pileated woodpecker habitat quality in the project area would be expected to be reduced on 237 acres. Overall patch size of contiguous pileated habitat would decrease, although 3 large (>100 acres) unharvested patches would remain. After proposed harvesting, unharvested patches would remain connected by areas of mature forest. Silvicultural prescriptions in harvest units would retain healthy western larch, Douglas-fir, and subalpine fir in low densities (6-10 per acre) while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Low-quality habitat associated shade-tolerant tree species would likely be converted to a more desirable forest type, although it would take many years (~50 to 80) to mature into pileated habitat. Pileated woodpeckers tend to be tolerant of human-caused disturbance (*Bull and Jackson 1995*), but could be temporarily displaced by the noise and activity associated with the proposed harvesting. Thus, minor adverse direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) 28.3% of available suitable habitat would be harvested; 2) the majority of current pileated woodpecker habitat would remain unharvested (602 acres, 71.7%); 3) some snags and snag recruits would be removed, however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in harvest areas would be included; 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas where pileated habitat is currently not present; and 5) temporary levels of potential disturbance would increase, but long-term disturbance would be unchanged.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No timber harvesting activities would occur under this alternative. Ongoing and proposed forest management projects not associated with the proposed Mystery Fish Timber Sale could serve as a disturbance to pileated woodpeckers and/or alter habitat suitability in the present and future. No additional cumulative effects to pileated woodpecker disturbance risk or habitat suitability are expected to result from the No-Action Alternative that could affect pileated woodpeckers in the CEAA since: 1) no changes in the amount of continuously-forested habitat would be anticipated; 2) no changes to existing pileated woodpecker habitat would be anticipated; and 3) no additional disturbance would take place.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Under this alternative, pileated woodpecker habitat would be reduced on 237 acres (4.1%) in the CEAA. Forest canopy on 237 acres of treatments would be too open for appreciable use by pileated woodpeckers and would be more similar to other recently harvested stands that comprise 1,052 acres (18.3%) within the CEAA. Snags, coarse woody debris, and potential nesting trees would be retained in the project area according to forest management ARM

36.11.41; however, future recruitment potential for these attributes would be temporarily reduced in all of the proposed units. Recent and ongoing harvesting in the cumulative effects analysis area have reduced the quality and abundance of pileated woodpecker habitat; reductions associated with this Action Alternative would be additive to those reductions. However, considerable amounts of suitable pileated woodpecker habitat (1,622 acres, 28.3%) would remain inside the CEAA. Firewood gathering along open roads would continue to limit snags and woody debris within certain areas of the CEAA. In the long term, maturation of stands across the cumulative effects analysis area would increase suitable pileated woodpecker habitats through time.

Thus, minor cumulative effects to habitat suitability for pileated woodpeckers would be anticipated since:

- a minor amount (12.8%) of suitable pileated woodpecker habitat currently present within the CEAA would be altered,
- 28.3% of suitable pileated woodpecker habitat would remain,
- some snags and snag recruits per acre would be removed in the proposed harvest areas for operational and human safety purposes; however, mitigation measures would retain some snags and recruitment trees in harvested areas, and
- disturbance and firewood gathering would not appreciably change in the long-term.

BIG GAME HABITAT

Issue: Timber harvesting and associated activities could reduce habitat quality for big game, especially during the fall hunting and winter seasons.

Introduction

Timber harvesting can increase big game (e.g. elk) vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during times of hunting pressure (*Hillis et al. 1991*). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and resulting decrease in hunter opportunity. Large (≥ 250 acres) heavily forested patches at least ½ mile from an open road that would limit elk (and subsequently deer) visibility and hunter accessibility (*Hillis et al. 1991*) are considered security cover. *Hillis et al. (1991)* also recommended that >30% of a fall elk herd home range area should contain cover patches meeting these criteria to provide adequate security for elk. It is expected that when elk security is substantially compromised, effects to deer can also be expected (albeit to a lesser degree than for elk).

Timber harvesting can affect big game and habitat quality through disturbance during harvest activities, removal of forest crown closure, and by creating openings in the forest used for foraging. Forested habitat on winter ranges enables big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be areas confined to lower elevations that support concentrations of big game, which are widely distributed during the remainder of the year. Suitable winter ranges have adequate midstory and overstory cover that reduces wind velocity and intercepts snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on a 40,860 acre CEAA (see FIGURE III-5 – WILDLIFE ANALYSIS AREAS). This scale of analysis approximates an area capable of supporting an elk herd home range in fall.

Analysis Methods

To assess big game habitat on the project area, SLI data were used to identify stands with habitat types and forest structure (≥40 crown closure) that could provide thermal and/or hiding cover for big game species. Direct, indirect, and cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats.

To determine levels of elk security habitat, existing open roads were buffered 0.5 mile and those areas identified as areas not meeting elk security habitat criteria (*Hillis et al. 1991*). Within the cumulative effects analysis area, recent timber harvest activities and permanent non-forest openings (i.e. lakes, rock scree) were taken into account as they likely reduce the amount of secure habitat for elk. Additionally, elk security habitat patches need to be large forested blocks (>250 acres) with adequate cover (≥40% crown closure) to afford elk security during the general big game hunting season, so areas failing to meet this criteria were also removed, leaving patches that were distant enough from open roads, were large enough to meet the minimum acreage criteria, and had adequate forest cover density to provide elk security habitat (*Hillis et al. 1991*).

Factors considered in the analysis include the amount of security and winter range habitat available, the extent of past and proposed harvesting, and level of human access for recreational hunting.

Existing Environment

Although the proposed project area contains a number of open roads, 536 acres (28.0%) of elk security habitat occurring in a single patch is present in the project area. This patch of habitat contributes to a 7,964-acre block of contiguous security habitat within the CEAA. This block and two others (2,651 and 8,821 acres) are also connected to larger security habitat areas outside of the CEAA. Total elk security habitat within the CEAA is roughly 19,436 acres (47.6%). Additionally, hiding cover, which is inherently a component of elk security habitat, is abundant in the project area and CEAA. Moderate levels of hunter access exist in the project area, with several miles of open roads and some non-motorized access on closed roads. The CEAA also receives moderate levels of hunter access, especially in areas where roads, both open and restricted, are more numerous.

Portions of the proposed project area were identified by Montana Fish, Wildlife, and Parks as moose and elk winter range. Because no winter range was identified for deer in the project area, those species are not discussed further in this analysis. The entire project area (1,915 acres) was considered moose winter range, while 1,544 acres (80.7%) were considered elk winter range. No moose or moose sign was detected in the project area, but evidence of summer/fall elk use was observed during field visits. The project area contains approximately 1,577 acres (82.3%) of habitat that is currently providing year-round cover and visual screening for big game. These acres also provide moderate to high amounts of thermal cover and snow intercept for wintering big game. Additional acres within the project area consist of mature forest with a relatively open canopy (<40% canopy closure) that do not likely provide appreciable amounts of thermal cover or snow intercept. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Due to past forest management, 168 acres (8.8%) of the project area have forested stands that are too open to be considered high-quality thermal cover/snow intercept. However, existing patches of scattered dense conifer regeneration supply limited (<10% of area) additional cover capable of ameliorating the influences of cold and snow.

Approximately 32,638 (79.9%) and 18,095 acres (44.3%) of the CEAA were identified as moose and elk winter range, respectively. Presently, approximately 22,529 acres (55.1%) within the CEAA are providing usable thermal cover and snow intercept for big game. These forest patches are currently well-distributed throughout big game winter range occurring within the CEAA. In the last 20 years, harvesting has reduced thermal cover and snow intercept on winter range within the CEAA. These recent harvests have reduced the quality and quantity of winter range within the area, but may have increased forage quality by opening up the forest overstory canopy. Encroachment into recently opened areas by noxious weeds has likely offset much of the potential gain in foraging habitat. Ongoing and future harvesting (i.e. Duck to Dog Timber Sale, proposed Fish Bull Face Timber Sale) could continue to reduce these attributes and temporarily displace big game within the CEAA.

Environmental Effects

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

No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing cover would continue to contribute to winter range quality, and security habitat would not be altered. Thus, since: 1) no changes to existing thermal cover would be anticipated and continued maturation of forest cover would improve thermal cover and snow intercept; and 2) the level of human access would remain unchanged, no direct or indirect effects to big game habitat in the project area would be anticipated.

Direct and Indirect Effects of the Action Alternative on Big Game Habitat

Under the Action Alternative, approximately 456 acres (23.8%) of big game habitat would be harvested. Of these acres, roughly 85 acres of elk security habitat and 447 acres of forest stands currently providing thermal cover would be harvested. Harvest prescriptions in all harvest units would result in areas that are currently too open to effectively function as security cover, thermal cover or snow intercept. Forest vegetation capable of providing these big game habitat attributes would require 40 to 60 years for suitable sized trees (>40 ft. tall) to develop in harvested stands. Proposed tree removal would increase sight distances in harvest units and could increase risk of hunting mortality. Proposed broadcast burning on 175 acres of harvest units could improve ungulate forage and long-term habitat quality. Some short-term (1 to 4 years) displacement of big game would be expected as a result of the proposed motorized logging disturbance. No long-term changes in the amount of open roads or motorized access would occur; however, up to 0.6 miles of existing restricted road could be opened in combination with 4.4 miles of new permanent and temporary road construction within the project area. New construction of 2.4 miles of permanent, restricted road could result in an increase in non-motorized public use within a portion (~50%) of the existing security habitat. During all phases of the project, any restricted roads and new road construction opened with project activities would be restricted from use by the general public and closed after completion of project activities. Collectively, since: 1) minor percentages of security habitat (15.9%) and effective thermal cover/snow intercept (23.4%) in the project area would be altered; 2) considerable amounts of unaltered security habitat (451 acres) and winter range (1,089 acres) would remain; 3) sight distances would increase on 456 acres, which could increase elk vulnerability and associated hunting mortality risk; 4) relatively short-term logging activities would create disturbance in this area; and 5) there would be no long-term changes in open road density, minor adverse direct and indirect effects to big game security habitat and winter range habitat quality would be expected for the next 40 to 60 years.

Cumulative Effects of the No-Action Alternative on Big Game Habitat

No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing levels of cover would persist. Ongoing and proposed forest management

projects not associated with the proposed Mystery Fish Timber Sale could alter big game habitat quality in the present and future. No additional cumulative effects to big game habitat quality are expected to result from the No-Action Alternative that could affect big game species in the CEAA since: 1) no big game habitat would be altered and continued maturation of forest cover would improve thermal cover and snow intercept; and 2) the level of human access would remain unchanged, therefore no cumulative effects to big game habitat quality in the project area would be anticipated.

Cumulative Effects of the Action Alternative on Big Game Habitat

Forest stands providing suitable thermal cover and snow intercept would be removed from approximately 447 acres (1.1%) of winter range within the CEAA (40,860 acres). Elk security cover across 85 acres (0.4%) would also be reduced within the CEAA. This reduction in security habitat, thermal cover and snow intercept would be additive to past reductions within the CEAA due to forest management. No appreciable changes in big game habitat quality within the larger winter range would be expected. Harvesting and motorized disturbance within the CEAA associated with the proposed project would displace wintering big game and reduce available winter range habitats. Displacement associated with this alternative would be additive to any displacement associated with ongoing timber harvesting (Duck to Dog Timber Sale, proposed Fish Bull Face Timber Sale). Continued maturation of previously harvested stands within the cumulative effects analysis area would improve hiding cover and partially offset these current losses within 20 to 40 years. Under the Action Alternative, existing restricted roads and new road construction used for harvesting activities could temporarily increase access and disturbance on 7.2 miles of road and result in a temporary increase in open road density from 0.9 miles per square mile to 1.0 miles per square mile. After harvesting, open road density would remain at current levels in the CEAA and continue to facilitate hunter access.

Thus, since:

- harvesting would slightly reduce overall levels of cover on 447 acres (1.1%) of winter range and 85 acres (0.4%) of elk security habitat,
- existing thermal cover and snow intercept on winter range in the cumulative effects analysis area would be altered,
- overall habitat quality within the larger winter range (32,638 acres for elk, 79.9% of the CEAA) would be unaltered,
- logging activities would create disturbance on 4.5% of the CEAA, and
- long-term open road densities would not change;

minor adverse cumulative effects to big game winter range and elk security habitat would be expected.

FIGURE III-5 – WILDLIFE ANALYSIS AREAS. *Areas used to assess effects of the Action and No-Action Alternatives on wildlife and wildlife habitat.*

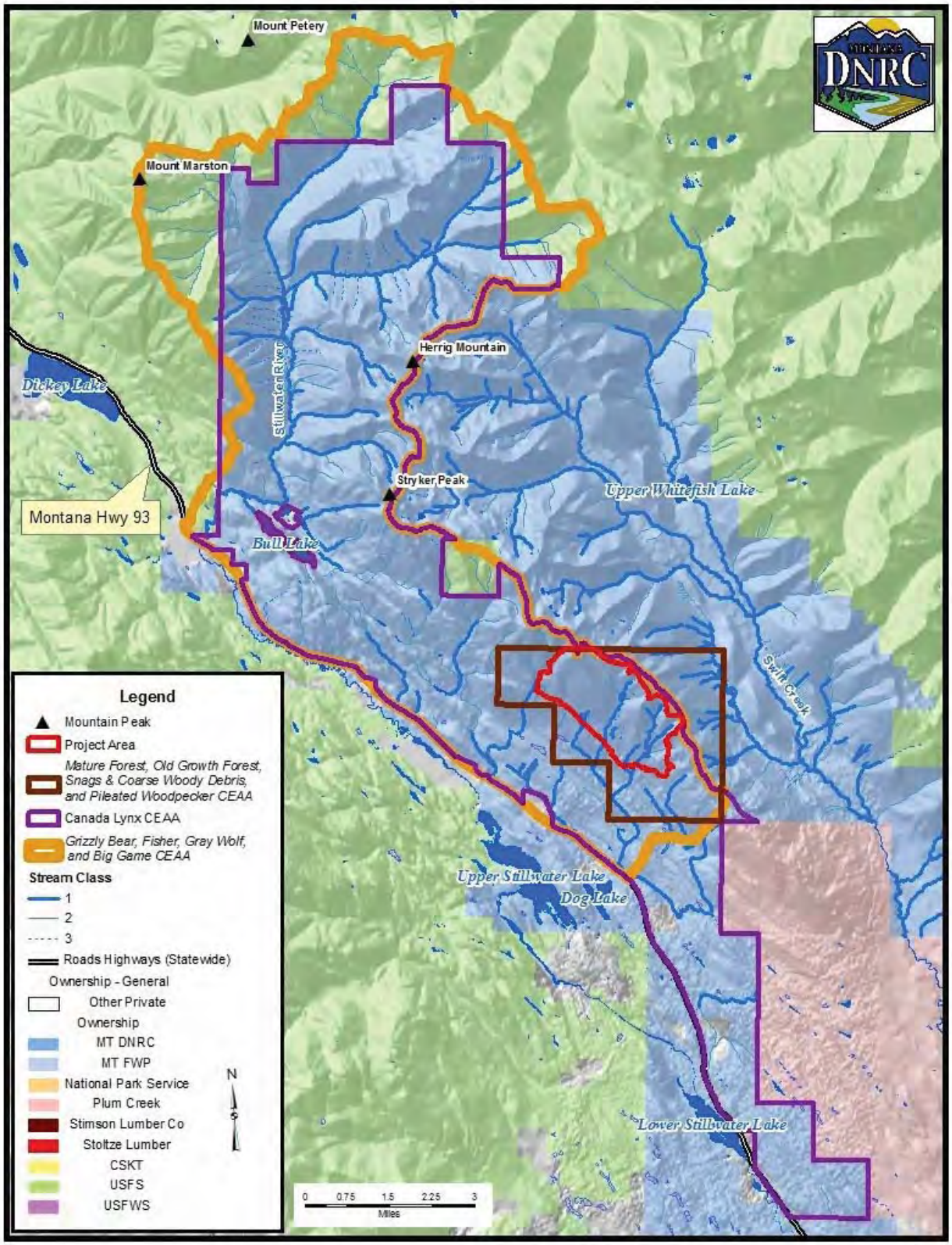
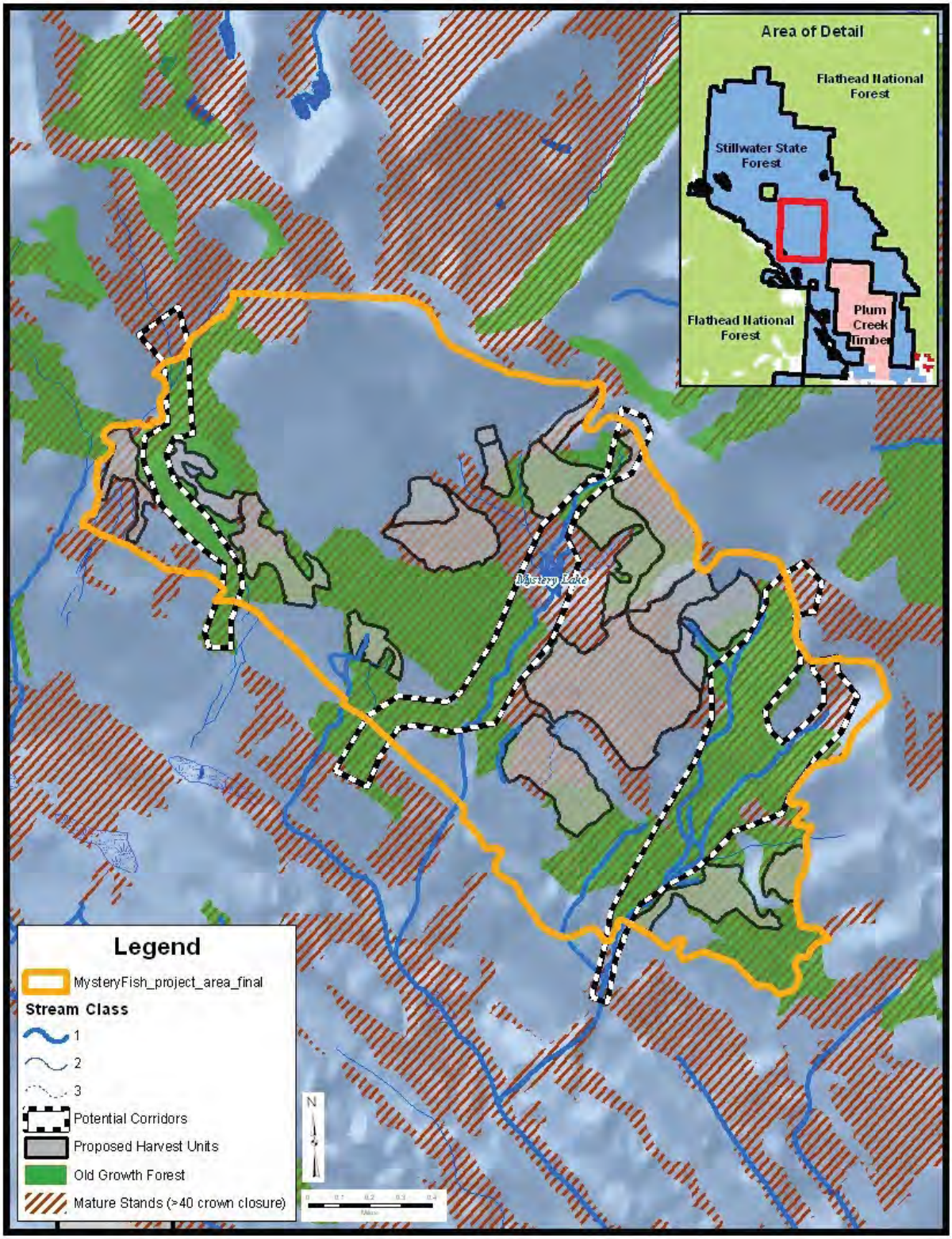


FIGURE III-6 – MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY CORRIDORS. *Relationship of the project area and proposed units to mature forested stands and identified potential connectivity corridors for the DNRC Mystery Fish Timber Sale.*



Aesthetics Analysis

Introduction

This analysis describes the existing landscape as it relates to attributes associated with aesthetic quality and viewsheds, and discloses the potential environmental effects the proposed action may have on those visual attributes.

Analysis Methods

Potential impacts on the visual resource caused by timber harvesting and road building were determined based on the following assessments:

- Foreground and middleground viewpoints consider disturbance to vegetation and soils, effect of the silvicultural treatments on stand structure, the viewing distance due to size of openings, the length of treatment along open roadways (primarily where people can walk, drive, or snowmobile), and the length of time that the impact would affect the visual resource.

- Background views consider the elements analyzed from these views including size of openings, shape of openings, and associated texture changes or seasonal color contrasts. Potential impacts on the visual resource caused by timber harvesting and road building were determined based on the proposed silvicultural treatments, the amount of anticipated visible roadway, field evaluation, visibility of activities, and length of time that the impact would affect the visual resource.

Analysis Area

Primarily, the analysis of direct and indirect effects to aesthetics and viewshed looks qualitatively at the effects to foreground views, middleground views, and background views from identified observation points. *Foreground* viewpoints are areas where access by foot or vehicle are likely; *middleground* is from approximately 0.25 to 2.0 miles distance; and *background* viewpoints are from a distance greater than 2.0 miles, such as highway corridors where viewing of the area by the public would be likely. Actions are proposed on a large ridge that runs southeast to northwest.

Foreground and middleground viewing of the area takes place most often by visitors traveling the Ewing Main Road, Stryker Middle Road, and the Upper Stryker Ridge Road. Background views were primarily analyzed from the Highway 93 corridor (approximately 10 northwest of Whitefish to Radnor). The ridge encompassing the proposed timber sale roughly parallels Highway 93 and is visible to motorists traveling the highway.

Existing Conditions

The area is predominately covered with dense stands of mature coniferous timber. These stands are mostly two-or three-storied and provide visual diversity on the landscape. Openings created by past timber harvests in the 1960's, 1970's and 1990's are visible. Timber stand regeneration and/or shrub growth in these openings has progressed to where the visual contrast with adjacent mature timber stands has been slightly reduced; although most of those past harvest units can be recognized as harvested areas. Seasonal changes in vegetation color vary from openings that tend to have more deciduous vegetation, to older mature forests that are primarily coniferous. Snow cover during winter month tends to increase the contrast between openings, both natural and existing harvest units, and surrounding mature forests.

Environmental Effects

Direct, Indirect and Cumulative Effects of the No-Action Alternative to Aesthetics

Timber harvesting and road construction would not take place at this time. Effects to the visual resource include activities such as firewood gathering and recreational use, which are presently taking place. In time, tree growth would create more timber stands with closed canopies. Natural processes on the landscape, such as wildfire, blowdown events, insect infestations or disease infections, would continue to alter the visual resource over time. Cumulatively, there would not be additional harvest units visible from Highway 93.

Direct, Indirect and Cumulative Effects of the Action Alternative to Aesthetics

The proposed silvicultural treatment for this alternative is 133 acres of clearcuts with reserves and 323 acres of seedtree with reserves. Small inclusions (up to 10% of each stand) of existing brush and small trees would remain interspersed within these harvested areas. (See *CHAPTER II – ALTERNATIVES* for treatment details and locations of harvest units.) Some openings would not be visible due to their position on the face of the ridge; while others would add to the number of existing openings now visible.

As related to the foreground and middleground view points, the viewing distance into the harvest units would be increased due to the reduction in tree densities. These new harvest areas would primarily be open stands with scattered overstory trees. Once the regeneration harvest areas are logged, the stands would be more open, but would still contain most of the same trees species. Retaining the inclusion areas of brush and small trees along open roads would reduce viewing distance. The vegetative screens along roadways would reduce the number of vantage points potentially available. The road cuts and fills would initially be bare soil but after a few years should be covered with grass, forbs, and shrubs. Over time, approximately 7 to 10 years, views into the units would be limited with the regeneration of trees

and shrubbery. Western larch would be regenerated, adding to the diversity of small trees as well as to the colors associated with western larch in the spring and fall.

The view of Stryker Ridge can be seen for approximately 20 miles along Highway 93 starting approximately 10 miles north of Whitefish, Montana. The background view is sometimes intermittent due to topography and established trees along the highway.

The background views of the treated areas would have an open appearance with scattered overstory trees retained. This would change the texture from the surrounding untreated forest canopy and would define boundary lines along adjacent timber stands. The irregular edges on the proposed harvest units would help reduce the visual impact. When available, additional "reserve" trees would be retained around harvest unit perimeters to provide a transition into the adjacent untreated forests. Harvest units would be most noticeable when snow is on the ground.

Once the regeneration harvest areas are logged, the stands would be more open, but would still contain most of the same trees species. Western larch would be regenerated, adding to the diversity of small trees as well as to the colors associated with western larch in the spring and fall. Harvest units from the 1970's and 1990's are still visible although the 1970's harvest units are not as visible due to the density of the understory trees. It is anticipated that these proposed units would continue to be noticeable as harvested areas for another 40 years.

Construction of 2.4 miles of new road and up to 2.0 miles of temporary roads would be built, and segments of these roads would be noticeable from Highway 93. There are to be mitigations applied to the design and final location of this road; they include:

- The proposed new road and the temporary roads would be located to minimize cut and fill sections of the road and use terrain features such as locating the road on benches to reduce the road's visibility.
- There would be a larger component of sapling and overstory trees retained below the cut /fill sections to help mask the road.
- The temporary roads would be reclaimed following harvest-related use; the cut and fill portions would be reclaimed.

Cumulative effects to the background view seen from Highway 93 are that these proposed units and roads would be additive to the more open views associated with the SE Stryker Ridge and Stryker Ridge II timber sale units.

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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 was crafted to guide the analysis of this section:

- The proposed action may affect income generated for Common School Trust funds, funding for Forest Improvement (FI) projects, timber-related employment, and the regional economy.

The following measurement criteria were selected to describe the existing environment of the economic resource in the area and to 'measure' the extent of the potential direct, indirect, and cumulative economic effects under each alternative:

- For revenue, the measurement criterion is dollars distributed to the Common Schools trust, Forest Improvement (FI) program, and regional economy.
- For employment, the measurement criterion is the number of timber-related jobs provided.

Analysis Area

The geographic scope of the economic analysis is located within Flathead and Lincoln counties and is economically relevant to the proposed action.

Analysis Methods

The economic analysis for the timber sale proposal includes estimates of project revenue, and income distributed to state trusts. Minimum bids for timber sales are determined through a transaction evidence appraisal, which is based on bid rates of past timber sales and current wood product price indexes. Characteristics that influence bid rates include market prices, sale location, logging and road development costs, as well as quality, species, size, and density of timber. Stumpage prices for this EA were determined using the current transaction equation modified by professional judgment to reflect current and local market conditions.

The Western Wood Products Association Inland Lumber Price Index for 2010 was used for estimating the delivered price of the logs.

FI fees are estimated using the current FI fee schedule set at $25.13 per MBF.

DNRC does not have a formal accounting system to track costs for individual projects from start to finish. A cash-flow analysis of the DNRC forest product sales program is conducted annually. Revenue and costs are calculated by land office and at the statewide level. The revenue-to-cost ratios are a measure of economical efficiency.

Ratio values less that 1.0 means the costs are higher than the revenues (losing money). A ratio greater than 1.0 means the revenues are higher that the costs (making money).

Estimated forest-management revenues and expenditures for the Mystery Fish Timber Sale Project were based on a 2006 through 2010 average operational revenue/cost ratio of $2.51. This ratio means that an average of $2.51 was earned in revenue for every $1.00 spent over the last 5 years in the forest-management program.

The employment multiplier used in this analysis is an average of 10.0 jobs supported by every MMbf of timber harvested in the analysis area *(Bureau of Business and Economic Research, 2008).* The exactness of this employment multiplier is limited as the real change in employment varies from sale to sale. Jobs calculated using this multiplier represent mostly existing direct industry jobs that are maintained one full year due to this timber sale.

Existing Environment

The proposed action would take place on state lands managed by DNRC's Stillwater Unit. Timber sales in this area generally supply raw materials for lumber and pulp industries in Lincoln and Flathead counties. Flathead County includes the northern portion of Flathead Lake and the west side of Glacier Park. Lincoln County encompasses the northwestern corner of Montana.

Though the overall economy in each county is different, they share forestry and logging industries. Employment and wages for forestry and logging *(NAICS)* in the 2-county area are described in detail below *(TABLE III-19 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.

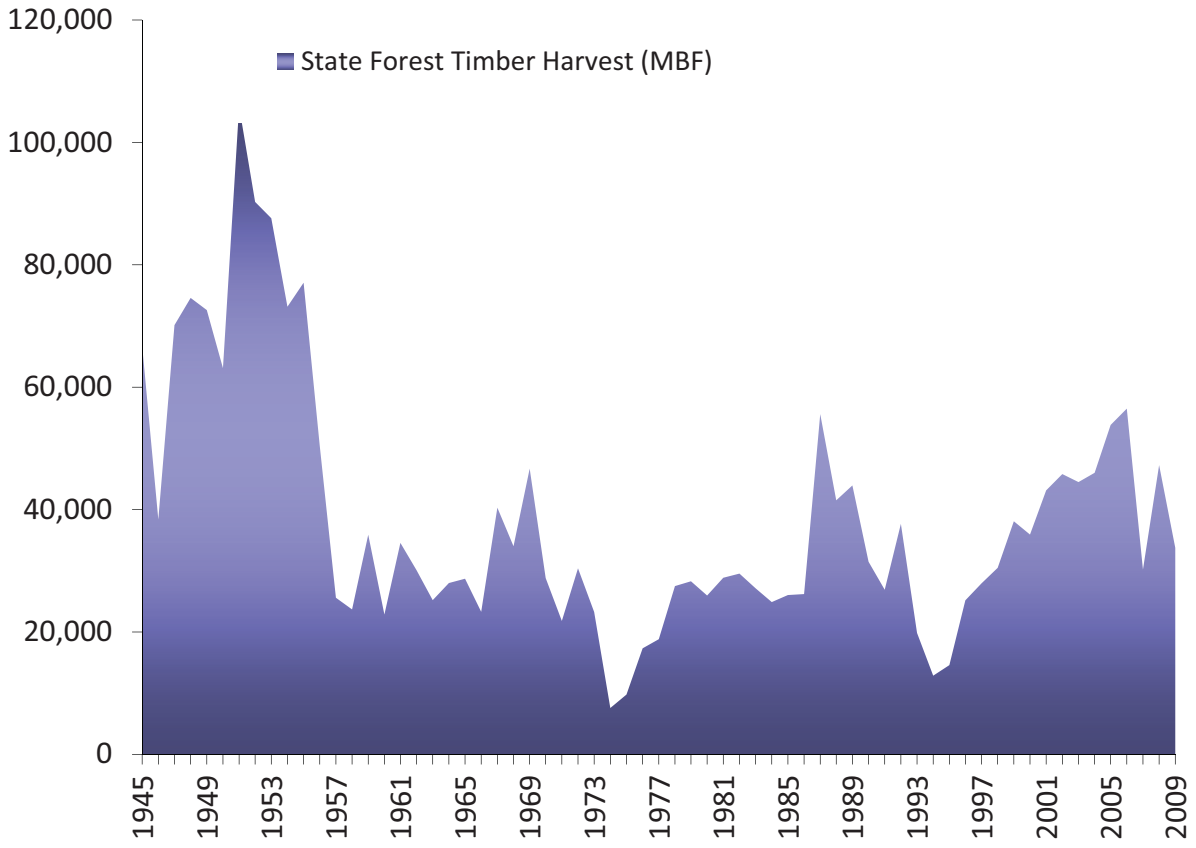
TABLE III-19 -- EMPLOYMENT AND WAGE *- County Employment and Average Wages 2008*

COUNTY	INDUSTRIAL SECTOR	JOBS	NUMBER OF ESTABLISHMENTS	TOTAL WAGES
Flathead	Forestry and logging	125	47	$5,260,358
Lincoln	Forestry and logging	97	36	$4,899,571

Historically, harvesting activity in Montana's timber-related industries has fluctuated. *FIGURE III-7 TIMBER HARVEST* shows the aggregate timber-harvesting activity in Montana. The more

recent volume decline is, in part, a reflection of the diminishing contribution of USFS to statewide harvest levels. Currently, DNRC has an annual statewide sustained yield of 57.6 MMbf.

FIGURE III-7 -- TIMBER HARVEST. *Total Timber Harvesting in Montana Forests 1945 through 2009*

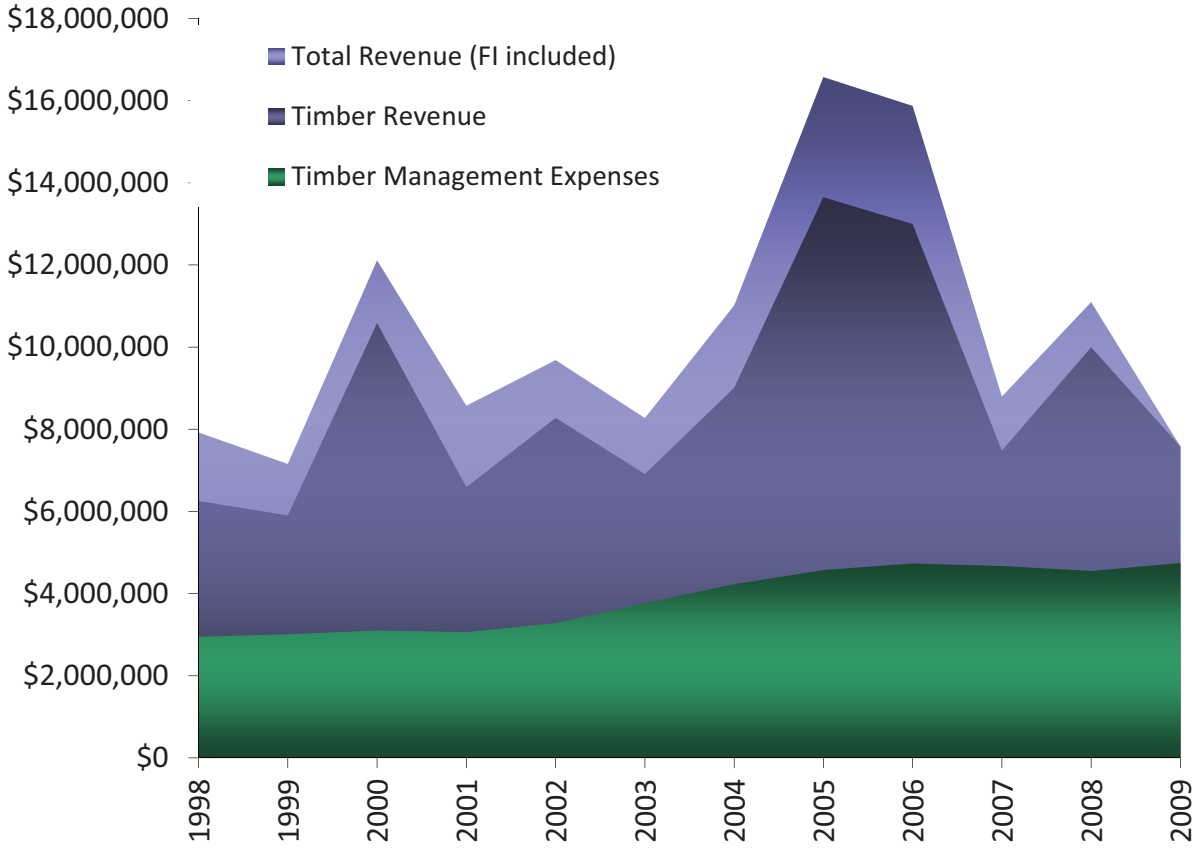


State-owned forests contribute revenues to trusts based on endogenous (harvested volume) and exogenous (market prices) factors. Timber sale revenues distributed to the trusts vary more widely than the respective volume sold. This additional variability in revenue comes from timber prices that fluctuate according to supply and demand events in national and international markets. *TABLE III-20 - TIMBER SALE REVENUE* shows gross revenue from harvests, net revenues distributed to the trusts, and FI fees collected over the last 5 years.

TABLE III-20 - TIMBER SALE REVENUE

YEAR	GROSS TIMBER REVENUE ($)	TIMBER REVENUE DISTRIBUTED TO TRUSTS ($)	FI FEES COLLECTED ($)
2010	9,150,692	3,101,442	1,196,307
2009	7,584,525	3,386,103	865,271
2008	10,000,724	5,858,579	1,098,577
2007	8,799,298	2,286,943	1,316,404
2006	15,875,615	8,262,120	2,875,277
2005	16,596,191	9,075,011	2,944,559

FIGURE III-8- TIMBER HARVEST. *Timber Revenues and Expenses on State Lands*



In addition to timber sale revenues, FI fees are collected on non-Morrill Grant lands and used to finance projects that improve the health, productivity, and value of forested trust lands. Forest Improvement 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 two-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-21 - 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 the potential loss of logs that would not be generated from this alternative. Trust funding would not benefit from this alternative.

Direct Effects of the Action Alternative to Economics

As displayed in *TABLE III-21 - COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE*, an estimated $568,500 in revenue would be deposited into the Common Schools trust and an estimated $125,650 would be deposited into the FI account. Approximately $98,850 of road development and maintenance work would be accomplished. An estimated $69,700, or $185.37 per acre, would be spent from the FI budget to reduce fire hazards and prepare harvested areas for natural and planted regeneration.

TABLE III-21 – *COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE*

	ALTERNATIVES	
	NO-ACTION	**ACTION**
Estimated total harvest volume (MMbf)	0	5
Road development costs ($/Mbf)	0	19.77
Estimated stumpage value ($/Mbf)	0	113.7
FI fee ($/Mbf)	0	25.13
Estimated stumpage value, FI, and development cost ($/Mbf)	0	158.6
Total timber-dollar value based on estimated stumpage value, FI, and road-development value, multiplied by the estimated harvest volume ($).	0	793,000
Estimated stumpage value and FI ($/Mbf)		138.83
Total revenue ($) to the State (stumpage value and FI)	0	694,150
Total revenue ($) to Common Schools trust(stumpage value)	0	568,500

Indirect Effects of the Action Alternative on Economics

Approximately 465 acres of timber would be treated, and 337 acres would be moved toward a more desirable future condition. Both counties have a substantial presence in the wood-processing industry. To the extent that sales provide employment, and using the employment multiplier of 10.0 jobs per MMbf as stated under this sections *Analysis Methods*, this sale would provide work for approximately 50 positions. As a result, the short-term impact would be positive.

Cumulative Effects of the No-Action Alternative on Economics

DNRC has a statewide sustainable-yield annual harvest goal of 57.6 MMbf. If this project were not sold, this volume could come from sales elsewhere; however, the timber may be from other areas and 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 sustainable yield of 57.6 MMbf. This yield establishes a relatively stable supply of state trust land timber for the regional market. The state's regional market share is growing 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.

Appendix A

Stipulations and Specifications

Stipulations and specifications for the Action Alternative include project design provisions that follow Forest Management Rules, relevant laws and regulations. They also include mitigations that were designed to avoid or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

Stipulations and specifications that apply to operations required by, and occurring during the contract period, would be contained within the Timber Sale Contract. As such, they are binding and enforceable. Project administrators would enforce stipulations and specifications relating to activities such as hazard reduction, site preparation, and planting, that may occur during or after the contract period.

The following stipulations and specifications would be incorporated into the selected action alternative to mitigate potential effects of resources.

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 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 Upper Stryker Ridge Road and Middle Stryker Ridge Road.
- Where possible, the new road construction would be located where cut and fill would be minimized thus making the new construction less visible.

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.
- In order to reduce smoke production, some large woody debris would be left in the woods to minimize the number of burn piles.
- 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, HCP commitments, 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.
- Middle Stryker Ridge Road, Upper Stryker Ridge Road, and Unit 4b spur would be brushed, and would have improvements made to the surface and ditches to meet BMPs.

Noxious Weed Management

- All tracked and wheeled equipment would be cleaned of noxious weeds prior to beginning project operations. The Forest Officer would inspect equipment periodically during project implementation.

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

Recreation

Log hauling may not take place on weekends (between Dec 1-March 15th), although the operators may use their personal or repair vehicles to access the job site.

- Log hauling would not take place between the periods of December 24 and January 2.
- The road would be plowed where the snow berm is winged-off, making a suitable trail for snowmobiles (between December 1and March 15).
- Information would be disseminated to the public through signage, press releases, and pre-operation meetings with DNRC winter recreation lease holders.
- The Stillwater Block Transportation Plan would apply for all road use.

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. Steeper slopes and even gentler slopes would have slash treatment and site preparation done with an excavator. 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 to reduce 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 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 periodically inspected 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.

- 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

- 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.
- Segments of temporary road would be reclaimed to near-natural levels following the sale.
- 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

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*).
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while on duty as per GB-PR2 (*USFWS AND DNRC 2010, Vol. II p. 2-5*).
- Contractors will adhere to food storage and sanitation requirements as per GB-PR3 (*USFWS AND DNRC 2010, Vol. II p. 2-6*).
- Manage road closures and restrictions in accordance with the Stillwater Block HCP transportation plan as per GB-ST1 (*USFWS AND DNRC 2010, Vol. II p.2-21)*
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).

- Restrict commercial harvest and motorized activities on seasonally restricted roads (refer to Stillwater Block HCP transportation plan) to reduce disturbance to grizzly bears from April 1-June 15 during the Spring Period (*GB-NR3, USFWS AND DNRC 2010, Vol. II pp. 2-11, 2-12*).
- In a portion of harvest units not undergoing broadcast burn site preparation, retain patches of advanced regeneration of shade-tolerant trees as per LY-HB4 (*USFWS AND DNRC 2010, Vol. II pp. 2-50, 2-51*).
- Manage for snags, snag recruits, and coarse woody debris, particularly favoring ponderosa pine, western larch and Douglas-fir. Emphasize the retention of downed logs ≥15 inches dbh where they occur as per LY-HB2 (*USFWS AND DNRC 2010, Vol. II p. 2-48).*
- Close roads and trails to the extent possible following the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.
- Use a combination of topography, group retention, and roadside vegetation to reduce sight distances within harvest units and along open roads where feasible as per GR-NR4 and GR-RZ2 (*USFWS AND DNRC 2010, Vol. II p. 2-13 to 14, 2-17).*

Appendix B

References

Ake, K. 1994. Protocol paper: Moving Window Motorized Access Density Analysis and Security Core Area Analysis for Grizzly Bear. Unpublished mimeograph, 2/22/1995. Flathead National Forest, Kalispell, MT. 10pp.

Allen, Eric, Morrison, D., Wallis, G. Common Tree Diseases of British Columbia. Online: http://forestry-dev.org/diseases/CTD/index_e.html

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

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

Brown, J. K. 1974. *Handbook for Inventorying Downed Woody Material*. In: USDA and Forest Service (editors). Ogden, Utah: Intermountain Forest and Range Experiment Station.

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

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

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

Carlson, Clinton E., and N. William Wulf. 1989. Silvicultural strategies to reduce stand and forest susceptibility to the western spruce budworm. Agricultural Handbook No. 676. USDA Forest Service Cooperative State Research Service.

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

DNRC, 2009. *DNRC Compiled Soils Monitoring Report on Timber Harvest Projects*. Missoula, MT.

DNRC 2010. DNRC Canada lynx habitat mapping protocols for implementation of the HCP. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan Final EIS. September 2010. Vol. II, Appendix B, pp. B-5 to B-19.

DNRC. 2011. Montana Department of Natural Resources and Conservation Forested State Trust Lands Habitat Conservation Plan, Record of Decision. Montana Department of Natural Resources and Conservation, Missoula, MT. December 2011.

Fellin, D.G.; Dewey, J.F. Western Spruce Budworm. For. Insect & Disease Leafl. 53. Washington DC: U.S. Department of Agriculture, Forest Service; 1982.

Fins, L., J. Byler, D.Ferguson, A. Harvey, M.F. Mahalovich, G. McDonald, D. Miller, J. Schwandt, and A. Zack. 2001. Return of the Giants. University of Idaho College of Natural Resources, Station Bulletin 72.

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

Flathead County Weed Board. October 2007. Flathead County Weed Management Plan.

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

Fuller, T. K.,W. E. Berg, G. L. Radde, M. S. Lenarz, and G. B. Joselyn. 1992. A History and Current Estimate of Wolf Distribution and Numbers in Minnesota. Wildlife Society Bulletin 20:42-55.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and Assessment of Wolf-Ungulate Interactions and Population Trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at: *http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm*

Graham, R. T., A. E. Harvey, M. F. Jurgensen, T. B. Jain, J. R. Tonn and D. S. Page-Dumroese. 1994. *Managing Coarse Woody Debris in Forests of the Rocky Mountains*. USDA Forest Service Research Paper. INT-RP-447. 13 pp.

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

Hagle, Susan, Gibson, K., Tunnock, S. 2003. Field Guide to Disease and Insect Pests of Northern and Central Rocky Mountain Conifers. USDA Forest Service. Northern Region. Missoula, Montana.

Harger, R. 1978. Old-growth forests: managing for wildlife. USDA Forest Service, Northern Region, Missoula, MT. 58pp.

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

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

Helms, A. John, ed. 1998. The Dictionary of Forestry. Bethesda: The Society of American Foresters.

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

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

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

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

Kunkel, K., T.K. Ruth, D.H. Pletscher, and M.G. Hornocker. 1999. Winter Prey Selection by Wolves and Cougars in and near Glacier National Park, Montana. Journal of Wildlife Management 63:901-910.

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

Losensky, B.J. 1997. Historical Vegetation of Montana. Montana Department of Natural Resources and Conservation. Missoula, MT

Mace, R. and L. Roberts. 2011. Northern Continental Divide Ecosystem Grizzly Bear Monitoring Team Annual Report, 2009-2010. Montana Fish, Wildlife & Parks, 490 N. Meridian Road, Kalispell, Montana 59901. Unpublished data.

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

Mace, R.D., J.S. Waller, T.L. Manley, L.J. Lyon, and H. Zuuring. 1997. Relationships among Grizzly Bears, Roads, and Habitat in the Swan Mountains, Montana. Pages 64-80 *in* Mace, R.D., and J.S. Waller. 1997. Final Report: Grizzly Bear Ecology in the Swan Mountains, Montana. Montana Fish, Wildlife and Parks, Helena, Montana. 191pp.

Maloy, O.C. 2001. White Pine Blister Rust. Online: Plant Health Progress doi:10.1094/PHP-2001-0924-01-HM.

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

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

Montana Bald Eagle Working Group. 1994. Montana Bald Eagle management plan. USDI Bureau of Land Management. Billings, Montana. 61pp.

MNHP. 2011. Tracker data. Montana Natural Heritage Program online database query for the Selow Valley Timber Sale project area. http://mtnhp.org/Tracker/NHTMap.aspx

NRCS, 1998. MT619-*Soil Survey of Flathead National Forest Area, Montana*. United States Department of Agriculture Natural Resources Conservation Service.

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

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

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

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

Powell, R. A., and W. J. Zielinski. 1994. Fisher. Pages 38-73 in L.F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech eds. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. USDA Forest Service General Technical Report RM-254. Fort Collins, CO.

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

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

Servheen, C., S. Herrero, and B. Peyton (compilers). 1999. Bears. Status survey and conservation action plan. IUCN/SSC Bear and Polar Bear Specialist Groups, IUCN, Gland, Switzerland and Cambridge, U.K. 309 pp.

Sime, Carolyn A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, A. Nelson, and J. Steuber. 2011. Montana gray wolf conservation and management 2010 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 168 pp.

Squires, J.R., N.J. DeCesare, J.A. Kolbe, and L. F. Ruggiero. 2010. Seasonal resource selection of Canada lynx in managed forests of the Northern Rocky Mountains. Journal of Wildlife Management 74:1648-1660.

USDA Forest Service. 1998. *Soil Survey of the Flathead National Forest Area, Montana.* USDA Forest Service and Natural Resources Conservation Service.

USFWS and DNRC. 2010. Montana Department of Natural Resources and Conservation Forested Trust Lands Habitat Conservation Plan, Final Environmental Impact Statement, Volumes I and II. U.S. Department of Interior, Fish and Wildlife Service, Region 6, Denver, Colorado, and Montana Department of Natural Resources and Conservation, Missoula, MT. September 2010.

USFWS. 1993. Grizzly Bear Recovery Plan. Missoula Montana. 181pp.

USFWS, Montana Fish, Wildlife & Parks, Nez Perce Tribe, National Park Service, Blackfeet Nation, Confederated Salish and Kootenai Tribes, Wind River Tribes, Washington Department of Wildlife, Oregon Department of Wildlife, Utah Department of Natural Resources, and USDA Wildlife Services. 2011. Rocky Mountain Wolf Recovery 2010 Interagency Annual Report. C.A. Sime and E. E. Bangs, eds. USFWS, Ecological Services, 585 Shepard Way, Helena, Montana. 59601.

Warren, N.M. (ed.) 1990. Old-growth habitats and associated wildlife species in the northern Rocky Mountains. USDA Forest Service, Northern Region, Missoula, MT.

Warren, N.M. 1998. Old-growth associated wildlife: status and management strategies. Land management technical note. No. 16. Flathead National Forest. 19pp.

Wittinger, W.T. 2002. Grizzly bear distribution outside of recovery zones. Unpublished memorandum on file at USDA Forest Service, Region 1. Missoula, Montana. 2pp.

Glossary

Administrative road use: Road use that is restricted to DNRC personnel and contractors or 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.

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

Best Management Practices: A practice or combination of land use management practices that are used to achieve sediment control and protect soil productivity and prevent or reduce non-point pollution to a level compatible with water quality goals. The practices must be technically and economically feasible and socially acceptable.

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

Board foot: A unit for measuring wood volumes. One board foot is a piece of wood 1 foot long, 1 foot wide, and 1 inch thick (144 cubic inches). This measurement is commonly used to express the amount of wood in a tree, saw log, or individual piece of lumber.

Canopy: The upper level of a forest consisting of branches and leaves of the taller trees.

Canopy closure: The percentage of 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 begun decomposing on the forest floor; generally larger than 3 inches in diameter.

Coarse-filter: An approach to maintaining biodiversity as described in the State Forest Land Management Plan (DNRC 1996) that involves maintaining a diversity of structures and species composition within stands and a diversity of ecosystems across the landscape.

Co-dominant tree: A tree that extends its crown into the canopy, receiving direct sunlight from above and limited sunlight on its sides. One or more sides are crowded by the crowns of other trees.

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

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

Connectivity (fish): The capability of different life stages of HCP fish species to move among the accessible habitats within normally occupied stream segments.

Connectivity (lynx): Stand conditions where sapling, pole or sawtimber stands possess at least 40% crown canopy closure, in a patch greater than 300 feet wide.

Cover: See *Hiding cover* and/or *Thermal cover*.

Covertype: A classification of timber stands based on the percentage of tree species composition.

Crown cover or crown closure: The percentage of the ground surface covered by vertical projection of tree crowns.

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

Cutting units: Areas of timber proposed for harvesting.

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.

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: Those trees within a forest stand that extend their crowns above surrounding trees and capture sunlight from above and around the crown.

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.

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

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

Remaining ECA - 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.

Fire regimes: Describes the frequency, type, and severity of wildfires. Examples include: frequent nonlethal underburns; mixed-severity fires; and stand-replacement or lethal burns.

Forage: All browse and nonwoody plants available and acceptable to grazing animals or that may be harvested for feeding purposes.

Forest improvement: 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.

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 or animal naturally or normally lives and grows.

Habitat type: Forest vegetation types that follow the habitat type climax vegetation classification system developed by Pfister et al. (1977).

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.

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.

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 characteristic of certain tree species that allows them to survive in relatively low light conditions, although they may not thrive.

Landscape: An area of land with interacting ecosystems.

Live Crown Ratio: The percentage of the length of tree having live limbs divided by the tree's height.

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 level of the forest canopy 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 tissue of the tree.

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 Mystery Fish Timber Sale is located at the Stillwater State Forest office near Olney, Montana.

Redds: The spawning ground or nest of various fish species.

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

Restricted road: A road that is managed to limit the manner in which motorized vehicles may be used. Restricted roads have a physical barrier that restricts the general use of motorized vehicles. Restriction s may be man-made or naturally occurring.

Residual stand: Trees that remain standing following any harvesting operation.

Road: Any created or evolved access route that is greater than 500 feet long and is reasonably and prudently drivable with a conventional two-wheel-drive passenger car or two-wheel-drive pickup.

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 mechanized gouging and ripping of surface vegetation and litter 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.

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

Seedlings: Live trees less that 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 that is carried to streams.

Seral: Refers to a biotic community that is in a developmental, transitional stage in 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 get 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 that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State Forest, shade-tolerant species generally include subalpine fir, grand fir, Engelmann spruce, and western red cedar.

Sight distance: The distance at which 90% of an animal is hidden from view. On forested trust lands, this is approximately 100 feet, but may be more or less depending on specific vegetative and topographic conditions.

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.

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 distinguishable from the adjoining forest.

Stand density: Number of trees per acre.

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.

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 in the absence of disturbance.

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, the road would no longer function as an open road, restricted road or trail. DNRC would assure that they no longer could be accessed for commercial, administrative or public motorized use.

- 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 would 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: 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.

Total Road Densities: Percent of grizzly bear subunit with more than 2 miles per square mile of total road.

Understory: The trees and other woody species growing under a, more or less, continuous cover of branches and foliage formed collectively by the overstory of adjacent trees and other woody growth.

Uneven-aged stand: Various ages and sizes of trees growing together on a uniform site.

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.

Visual screening: Vegetation and/or topography providing visual obstruction capable

of hiding a grizzly bear from view. The distance or patch size and configuration required to provide effective visual screening depends on the topography and/or type and density of cover available.

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: Due to forest canopy removal, an increase in the average annual runoff over natural conditions.

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.

Appendix D

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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*

GBS……*Grizzly Bear Subunit*

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*

NCDE .....*Northern Continental Divide Ecosystem*

NWLO .....*Northwestern Land Office*

PCTC .....*Plum Creek Timber Company*

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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