HAYWIRE WALLACE TIMBER SALES

Environmental Assessment

Montana Department of Natural Resources and Conservation

Southwestern Land Office

Clearwater Unit

March 2006

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HAYWIRE WALLACE

TIMBER SALES

ENVIRONMENTAL ASSESSMENT FINDING

for

HAYWIRE WALLACE TIMBER SALES

An Environmental Analysis (EA) has been completed for the proposed Department of Natural Resources and Conservation (DNRC) Headquarters Timber Sale. After a thorough review of the EA, project file, public correspondence, Department policies, standards and guidelines, and the Administrative Rules for Forest Management (ARM 36.11.401-450), I have made the following decisions:

1. ALTERNATIVE SELECTED

Two alternatives were presented and were fully analyzed in the EA: the No-Action Alternative (Alternative A), which includes existing activities, but does not include pre-commercial thinning, tree planting, and a timber sale *(EA page 2.2)*; and the proposed action (Action Alternative, Alternative B), which proposes harvesting up to 7.0 and 9.0 million board feet of timber from 1,123 acres and upwards of 501 acres would be pre-commercially thinned *(EA Table 2-1)*.

For the following reasons, I have selected the proposed action without additional modifications:

a. In my opinion, the proposed action best meets the purpose and need for action and the specific project objectives listed in the EA on page 1.1, *Project Objectives*. The proposed action generates more return to the school trust than the no action alternative (*page EA 4-26*). The environmental effects of the proposed action are acceptable as compared with the no action alternative. No major losses in habitat, or unacceptable effects to water quality (*EA pages 4-5 through 4-11*), fisheries (*EA pages 4-11 through 4-13*), or soil (*EA pages 4-13 through 4-14*) would occur under the proposed action. No losses in habitat, or unacceptable effects to Threatened, Endangered (*EA pages 4-14 through 4-17*), or Sensitive (*EA pages 4-17 through 4-19*) species would occur under the proposed action. The action alternative would reduce the threat of catastrophic wildfire (*EA pages 4-4 through 4-5*), decrease the susceptibility of remaining trees to insect and disease infestations (*EA page 4-2*), increase stand health (*EA page 4-1*), and provide for the opportunity to pre-commercially thin areas within the analysis area (*EA pages 4-1 through 4-5*).

b. The analysis of identified issues did not reveal information compelling the DNRC not to implement the proposed action.

c. The proposed action includes activities to address environmental concerns expressed by DNRC staff and the public.

d. All proposed mitigations are adequate and feasible.

2. SIGNIFICANCE OF IMPACTS

For the following reasons, I find that the proposed action would not have significant impacts:

a. Economic Analysis

The Action Alternative would return a greater amount back to the School Trust. This increase is described in EA page 4-26 *Economics*. Within that portion, it has been stated that although there would be forest improvement costs (pre-commercial thinning, road building, etc.) which would cost the DNRC approximately $449,900.00 - $673,350.00 ("todays" dollar). That would yield up to $780,085.00 - $1,171,627.00 of "profit". This is much

higher than the existing amount of money received under the No-Action Alternative. The current amount of income would continue to be received during and after the timber sale.

b. Timber Stand Health

The action alternative is designed to bring stands back toward an historic condition and basal area distribution *(EA page 4-1)*. Harvest and pre-commercial thinning would be used to open stands, make limited resources (water, nutrients, and sunlight) more plentiful for the remaining stands and regeneration, increase the vigor of the remaining stems, and generally increase the health (and resistance to insect infestation and disease attack) (*EA page 4-1*).

c. Fire Hazard

This project is designed to emulate the effects of a low-severity, high frequency fire *(EA page 4-4 and 4-5)*. This will reduce fuel levels that have occurred on this site (*EA page 4-4*). The thinning and removal of forest fuels and canopies would decrease the general fire intensity and thereby improve the ability to control these fires. Immediately after the harvest, the fresh slash caused by that harvest would temporarily increase the fireline intensity, but that effect would decrease within a few years *(EA pages 4-4 and 4-5)*. It can be assumed that the harvest and pre-commercial thinning, and the decrease in long-term fire behavior, would be a benefit to the surrounding landscape and to DNRC lands within the project area *(EA page 4-5)*.

d. Aesthetics

A large percentage of this project can be seen from Highway 200 *(EA page 3-27)*. Immediately after harvest, "red slash" would be evident after harvest *(EA page 4-25)*. As said in the EA, this sale is "at least 2 miles away" (*EA page 4-25*) and would often not divert the viewer's eye. The overall proposed activities should blend with the current natural mosaic and past activities on the surrounding landscape *(EA page 4-25)*.

e. Noxious Weeds

The project area has several small areas and pockets of noxious weeds *(EA page 3-23)*. Increases of ground disturbance often cause increases the areas that weeds can inhabit. This project would use Integrated Weed Management (IWM) techniques which includes: requiring cleaned equipment, treating existing weed patches with herbicide and insects, and grass seeding new roads, protection of water quality will be done by following label descriptions and not applying it near streams and areas where runoff could reach streams *(EA page 4-22 and 4-23)*.

f. Soils

The primary risk to soils and their productivity are compaction and erosion *(EA page 4-13)*. The project has been designed to leave tops, limbs, and unusable pieces of trees "skidder piled" or scattered within the units to be recycled and return nutrients into the soils *(EA page 4-13)*. To restrict compaction, harvesting would only be done when the forest officer approves soil moisture, skid trail design has been approved (less than 15% of unit area), and approved conditions for ground skidding *(EA page 4-13)*. There are concerns with areas within the Warren Creek parcel of ownership where this will be a primary portion of the sale administration.

g. Hydrology and Fisheries

There are several water bodies within the project area (*EA pages 4-5 through 4-11*). The Blackfoot River and it's tributaries (Elk Creek, Cap Wallace, North fork of Elk Creek, Fish Creek, and Little Fish Creek) are under the B-1 Classified Stream in the Montana Surface Water Quality Standards. This standard is for water bodies that are considered suitable for domestic use after conventional treatment, as well as recreation, swimming, and bathing. All streams within this proposed area are predicted to see water yield increases of minimal to moderate conditions *(EA pages 4-6 through 4-11)*. These streams are suitable for the growth and propagation of salmonid fish and other aquatic animals (*EA pages 4-11 through 4-13*). Minimal direct, indirect and cumulative impacts

to fisheries are expected *(EA pages 4-11 through 4-13)*. During this project, there will be crossings of Warren Creek and the North Fork of Elk Creek *(EA page 4-12)*. As is standard, there are 124 permits that will be required for these crossings.

h. Wildlife: Threatened and Endangered Species

Bald Eagle: Although there is a bald eagle nest within ½ mile of this project, the portions that would effect the eagles are actually haul roads. These areas are blocked by tall vegetation (trees), and would not be a risk of any effects to those eagles *(EA page 4-14)*.

Grizzly Bears: This project area is outside the Northern Continental Divide Ecosystem (NCDE) recovery area. The proposed sale is predicted to have minimal effects upon Grizzly bears *(EA page 4-15)*. This timber sale and other DNRC projects would use sale activities to reduce human-bear interactions, and reduce the total of open road densities *(EA page 4-15)*.

Gray Wolf: Given road closures discussed in the Grizzly Bear discussion *(EA page 4-15)*, and it is predicted that this action may cause an increase in deer within the area. If that occurs, it would be an increase in the prey base, and that could benefit the wolf population as well *(EA page 4-15)*.

Canada Lynx: Although this project would harvest within 19% of the potential Canada Lynx habitat *(EA page 4-16)*, efforts would be put in place to reduce any effect (leaving regeneration, etc.) to the lynx by the harvest *(EA page 4-16)*. As stated within the EA "When proposed DNRC actions are put in the context of the analysis area, the scale at which lynx use habitat, and examined in conjunction with past actions on private industrial timber lands, DNRC's mitigative efforts to retain affected lynx habitat in suitable conditions post-harvest would likely pose low risk of cumulative effects to lynx" *(EA page 4-16 and 4-17)*.

i. Wildlife: Sensitive and Other Species

Fischer: There would likely be low risk of direct and indirect effects, and cumulative effects to fisher because of the marginality of existing and future habitat *(EA page 4-17)*.

Flammulated Owl: An active nest was located in section 16 Township 13 North, Range 14 West, in 2005 *(EA page 3-20)*. The silvicultural practices planned for this sale would take place within dry Douglas-fir and ponderosa pine types and would attempt to reduce the occurrence of Douglas-fir regeneration. This would likely improve habitat for flammulated owls *(EA page 4-18)*. There would be low risk of direct, indirect, and cumulative effects to flammulated owls as a result of the proposed action *(EA page 4-18)*.

Pileated Woodpecker: The proposed harvest would likely have low to moderate cumulative effects for one to a few pairs of pileated woodpeckers due to the reduction of suitable nesting and roosting habitat within the analysis area *(EA page 4-18 and 4-19)*.

j. Big Game:

Although this proposed project would reduce snow intercept cover and hiding cover and potentially change movements of big game animals, the predicted effect on white-tailed deer, mule deer, and elk is low to moderate *(EA page 4-20)*. The proposed roads to be built would be gated or closed. This would reduce stresses caused by motorized travel, but could still cause a low to moderate effect *(EA pages 4-20 through 4-22)*. Effects to moose by this project are low due primarily to their "habitat requirements and wide-ranging nature" *(EA page 4-22)*.

3. SHOULD DNRC PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS)?

Based on the following, I find that an EIS does not need to be prepared:

a. The EA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.

b. Evaluation of the potential impacts of the proposed timber sale indicates that no significant impacts would occur.

c. Sufficient opportunities for DNRC staff and public review and comment during project development and analysis were provided. DNRC staff and public concerns were incorporated into project design and analysis of impacts.

Stephen J. Wallace
Unit Manager
Clearwater Unit
Southwestern Land Office
March 13, 2006

ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED

HAYWIRE WALLACE

TIMBER SALES

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CHAPTER I

PURPOSE AND NEED

CHAPTER I - PROPOSED ACTION AND OBJECTIVES

INTRODUCTION

Chapter I provides the framework for the Environmental Analysis. Included are discussions of the proposed action, project objectives, and a summary of the organizational and legal basis used to make decisions related to the proposed action. A list of the decisions to be made, and a description of the public involvement process and its outcome is also included.

Description of the Proposed Action

The Department of Natural Resources and Conservation (DNRC), Clearwater Unit, proposes to harvest timber and do forest improvement operations on state lands to generate revenue for the Montana School Trusts. The project area is located approximately 3 to 5 miles southeast of Greenough, Montana in the Elk Creek drainage, and involves portions of Section 2, 4, 10, 14, and 16 in Township 13 North, Range 14 West (these sections will be referred to as Sections 2, 4, 10, 14, and 16 in the rest of this Environmental Analysis) for a total gross sale area of approximately 2,700 acres (see Figure I-1 Vicinity Map). The proposed action would harvest approximately 7.0 to 9.0 million board feet (MMBF) of timber from 1,123 acres of forested land. This would be accomplished by means of ground skidding and cable harvesting. Harvest systems would be; an improvement harvest, commercial thin, or shelterwood type harvest silvicultural prescription. Approximately 12 miles of road would be constructed, and nearly all of it would be effectively closed behind existing or newly installed gates. Harvest operations would be expected to take place between July 2006 and approximately October 2010.

Project Need

The lands involved in this proposed project are held by the State of Montana in trust 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 and the Department of Natural Resources and Conservation are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). Additionally, some of the stands on these parcels of land are sometimes in poor to fair health and are in need of treatment to bring them back toward their income generating potential. In 2003, the DNRC adopted the State Forest Land Management Rules (SFLMR). The SFLMR set requirements that the DNRC must follow when managing forested state trust lands. The DNRC would manage the lands involved in this project according to the SFLMR.

Project Objectives

In order to follow the SFLMR and meet the DNRC's sustained yield requirements, the DNRC has developed the following specific project objectives:

1. Maximize revenue over the long-term for the School Trust accounts from the timber resources and provide a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield as mandated by State Statute 77-5-222, MCA.
2. Manage the identified parcels intensively for healthy and biologically diverse forests to provide long-term income for the Trust.
3. Improve timber stand growth and vigor and reduce the threat of future losses.
4. Minimize impacts to endangered, threatened, or sensitive wildlife species.

Decisions to be made:

-Determine if alternatives can meet project objectives.
-Determine which alternative should be selected.
-Determine if the selected alternative would cause significant environmental effects, requiring the preparation of an Environmental Impact Statement (EIS).

Relevant Laws, Regulations, EISs, EAs, and Other Relevant Documents

- The Clean Water Act and Environmental Protection Agency Water Quality Planning and Management Regulations require the determination of allowable pollutant levels in 303(d) listed streams through the development of Total Maximum Daily Load (TMDL) limits.

- The Montana Streamside Management Zone (SMZ) Law administered by the Department of Natural Resources and Conservation (DNRC) would be adhered to when operations occur near streams.

- Open Burning regulations under the Montana DEQ would be followed for all burning and hazard reduction work.

- Endangered Species Act would be followed for any threatened, endangered, and sensitive species within the project area

Other EISs, EAs, and Relevant Documents in the Area

Sour Fish Timber Sale (DNRC 2000)
Clearwater River Timber Sale (DNRC 2000)
Elk 36 Timber Sale (DNRC 2002)
Lost Bear Timber Sale (DNRC 2003)
Headquarters Timber Sale (DNRC 2005)
Dry Gulch Timber Sale (DNRC proposed)
Gambler-Packer Timber Sale (DNRC proposed)
Elk Creek Vegetation Management Timber Sale (Bureau of Land Management (BLM) 2001)
Lubrecht Experimental Forest (LEF) harvest within adjoining sections
Lubrecht harvest within Washoe Creek
L-3030347 Grazing License in section 4 and 10 (DNRC)

State Forest Land Management Rules Plan and Role in the Project

On June 17, 1996, the Land Board approved the State Forest Land Management Plan (SFLMP). The SFLMP provides the philosophy adopted by DNRC through programmatic review (DNRC, 1996). The DNRC will manage the lands in this project according to this philosophy, which states: "*Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biological diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream... In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.*" On March 13, 2003, the DNRC adopted Administrative Rules for Forest Management (Administrative Rules of Montana [ARM] 36.11.401 through 450, DNRC 2003). Together, the SFLMP and Rules define the programmatic framework for this project.

Project Scoping

The initial stage of many EAs is the public scoping process, which is used to inform the public that a state agency is proposing an action and gather comments on the possible impacts of the project. The scope of this EA was determined by the professional judgment of resource specialists in DNRC, other state agencies, public comments, and other interested parties.

The initial proposal, which was scoped in October of 2002, proposed the harvest of 6.5 MMBF and included the construction of approximately 7.0 miles of road. The scoping was printed in the *Missoulian* (Missoula, MT.) newspaper, and was sent to a list of individuals and agencies (within the Clearwater Unit Sale Files). In addition to public scoping, resource professionals in state and federal agencies were scoped to notify them and receive input. Comments were received from various individuals, organizations, and agencies and grouped into the concerns that follow.

These concerns as well as issues that were identified internally within the DNRC were used to help guide the development of the action alternative.

The mailing list of parties receiving initial scoping notices for this project is located in the project file at the Clearwater Unit Office. Public scoping comments as well as internal DNRC issues and concerns were summarized and can be found below. The original comments are also located in the project file at the Clearwater Unit Office.

Respondents to Project Scoping

The Ecology Center, Inc.- Missoula, MT.
Mark Baker- Missoula, MT.

Issues and Concerns

The comments received as well as internal issues were grouped and a summary is presented below. Issues and concerns are listed in no particular order. See Chapters III and IV for more detailed descriptions and on relative importance of these issues and concerns.

Comments were received expressing concerns that:

< If the proposed action does not take place,
- would timber stand health continue to decline
- would there be an increased risk of insect and disease outbreaks
- would there be an increased competition stress from overstocking
- would residual stands be susceptible to blowdown?

< If the proposed action does not take place, the potential risk of high intensity stand replacing fires would continue to increase.

< What is the efficacy of Water Quality Best Management Practices?

< Will this project cause damage to cultural resources within the proposed project area?

< The proposed project could affect Elk Creek and its tributaries (water quality and fisheries).

< Increased levels of compaction and erosion could occur as a result of the proposed harvest.

< The proposed project, if implemented, may negatively impact Threatened, Endangered, and Sensitive species that may occur within the project area.

< The proposed project, if implemented, may negatively impact white-tailed and mule deer, elk, and moose.

< Proposed activities could spread noxious weeds.

< Will recreational opportunities be changed?

< Will this project change the aesthetic concerns for the area?

< Will the proposed project be economical?

<u>Issues That Drove Development of Action Alternative</u>

Stand Health, Risk of Insect and Disease Outbreaks, Overstocking, and Blowdown. There is concern that timber stand health would continue to decline. There is a concern that stands would show increased risk of insect and disease outbreaks. There is also a

concern about overstocking and regeneration concerns. There is a concern regarding blowdown occurring in harvested units.

Potential Wildfire Concerns
There is a concern that without treatment, the potential for high intensity stand replacement wildfire would continue and increase.

Water Quality and Fisheries Concerns
There is a concern that this project could cause detrimental effects to water quality and fisheries of Elk Creek and all tributaries within the project area.

Soil Concerns
There is the concern that this project could increase levels of compaction and erosion could occur as a result of the proposed harvest and road building.

Endangered, Threatened, and Sensitive Species
There is concern that the proposed project, if implemented, may negatively impact Threatened, Endangered, and Sensitive species that may occur within the project area.

Big Game
There is the concern that this proposed project, if implemented, may negatively impact white-tailed and mule deer, elk, and moose.

Noxious Weed Concerns
There is the concern that harvesting practices would cause an increase in noxious weed populations, and potentially introduce weed species into the area.

Recreational Opportunities
There is concern that this project will change recreational activities within the general project area.

Aesthetic Concerns
There is the concern that this project will change the aesthetic values of the general project area.

Is the Project Economical?
There is concern that this project will not be economical.

Issues Eliminated From Further Study

Efficacy of Water Quality Best Management Practices.
The Best Management Practices (BMP's) used for water quality is part of the Montana Streamside Management law (MCA 77-5-301(1)). In the past 10 years, the DNRC has rated above 90% in all SMZ audits. These audits are performed by groups of members from State, Federal, industrial, and private organizations. All road building and harvest on DNRC lands includes BMP's and analysis from our hydrologist. The efficacy of the BMP's has been shown since their institution.

Potential damage to cultural resources within the proposed project area.
DNRC field staff has not identified any cultural resources within the project area. Should a potential cultural resource be discovered, all operations would cease and a further investigation would take place.

Bull Trout and Westslope Cutthroat Trout Fisheries Concerns
Concern was raised on the effects of the proposed project on Bull Trout and Westslope Cutthroat Trout meta-populations.

Bull trout have not been found during surveys of Elk Creek and its tributaries. Westslope Cutthroat Trout have been found in segments of Elk Creek and its tributaries, and fisheries habitat is considered in this analysis. Bull Trout and Westslope Cutthroat Trout meta-populations consider fisheries that exist outside of the project area and include the larger Blackfoot River drainage. It is beyond the scope of this analysis to assess impacts to Bull Trout and Westslope Cutthroat Trout meta-populations that are outside of the project area where effects may occur and this issue is therefore dismissed from further study.

Threatened, Endangered, and Sensitive Species
Peregrine Falcon
There is concern that timber harvest activities would disturb nesting peregrine falcons. The nearest known peregrine falcon nest is located approximately 22 miles west of the affected area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Black-backed Woodpecker
There is concern that timber harvest activities would disturb black-backed woodpeckers. This species is most often associated with areas that recently experienced stand-replacing fire (Hutto 1995). The 2003 fire season produced approximately 83,224 acres of burned habitat within a 43-mile radius of the proposed project area that may be suitable for black-backed woodpeckers. Thus, with the abundance of habitat, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Common Loon
The common loon is a fish-eating bird that breeds and nests on lakes and ponds. The nearest known observation for common loons is approximately 12.5 miles north of the project area on Salmon Lake (Montana Natural Heritage Database). Thus, this area is not connected through the stream network with the proposed project area. Therefore, low risk of direct, indirect, or cumulative effects would be expected to common loons as a result of the proposed project and this species will not be analyzed further in this document.

Townsend's Big-eared Bat
There is concern that timber harvest activities would disturb Townsend's big-eared bats. This species requires caves, caverns, or old mines for hibernacula. The nearest underground mine is located >500 feet south of the project area in section 15, T 13 N, R 14 W. Current conservation strategies for this species indicate that a 500-ft radius buffer be installed around mine entrances to partially mitigate for the effects of timber harvest (Pierson et al. 1999). Thus, with the proposed action located >500 feet from the mine entrance, there would be low risk of direct, indirect, or cumulative effects to this species.

Northern Bog Lemming
There is concern that timber harvest activities could affect this species. The sphagnum meadows, bogs or fens with thick moss mats required by this species are not present within the harvest area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Columbian Sharp-tailed Grouse
There is concern that timber harvest activities could affect this species. The nearest known population of Columbian Sharp-tailed grouse occurs near Ovando, MT. Thus, the

proposed action would have low risk of direct, indirect, or cumulative effects to this species.

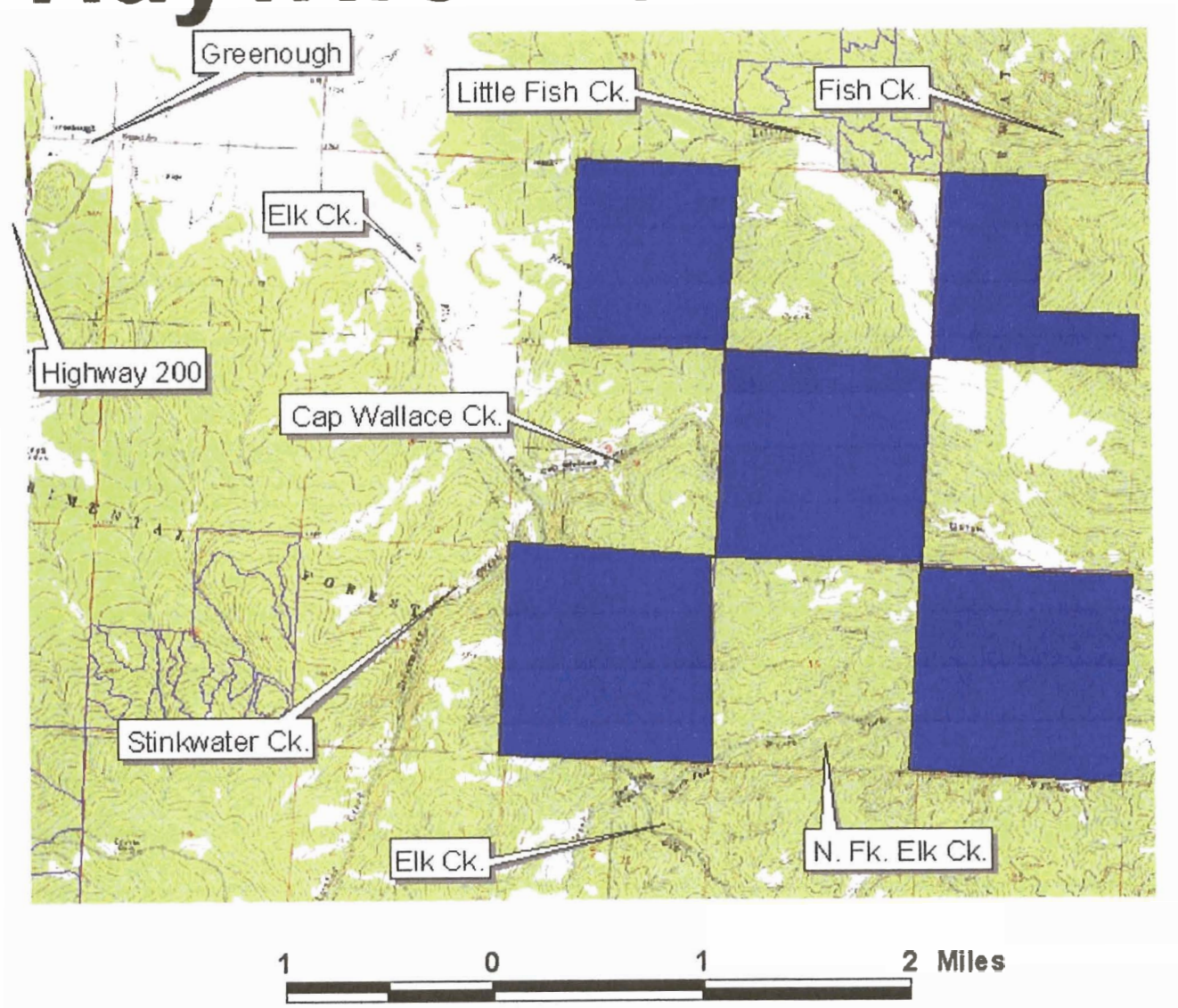
Coeur d'Alene Salamander
There is concern that timber harvest activities could affect this species. This species requires waterfall spray zones, talus, or cascading streams. There are no known areas of talus, waterfalls, or splash zones within the affected area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Mountain Plover
There is concern that timber harvest activities could affect this species. The short-grass prairie habitats required by this species are not present within the harvest area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

Harlequin Duck
Harlequin ducks require white-water streams with boulder and cobble substrates, as well as dense riparian vegetation. Such conditions do not exist within, or downstream of the analysis area. Thus, there would be low risk of direct, indirect, or cumulative effects to this species.

Fig. I-1

Vicinity Map
Haywire Wallace TS



Haywire Wallace TS

CVN 6-29-05

CHAPTER 2
ALTERNATIVES

CHAPTER II - ALTERNATIVES

Introduction

This chapter is intended to describe the alternatives developed and considered in this EA. It contains summaries and comparisons of the actions and effects involved with each alternative. The environmental consequences of each alternative are listed here for comparative purposes. However, more detailed information can be found in Chapters III and IV, which follow.

Initial Stages of Development

The DNRC has planned harvest within these sections for almost ten years. Originally, a project was scoped in 1995 and again in 1997. Shortly after the second scoping, the DNRC joined the BLM and LEF in studying the Elk Creek drainage. The first projects to come from those meetings were the DNRC Elk 36 Timber Sale and the BLM Elk Creek Vegetative Management Timber Sale. It is now the second stage of this basin management study. Although the DNRC is not mandated nor halted by this study, it is their decision to propose management of this area. It was decided that these sections (2, 4, 10, 14, and 16) would be included in this Haywire Wallace EA (see Table 2-1 below). The intent of this project was to treat these sections and achieve the objectives of maximizing revenue over the long-term from timber resources for the School Trust accounts. This project also provides a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield that states the DNRC must manage intensively for healthy and biologically diverse forests. Timber stand growth and vigor will be improved and the threat of future losses is decreased. These objectives come directly from the State Forest Land Management Rules that the DNRC is required to follow. The initial proposal, which was scoped in October of 2002, proposed the harvest of 6.5 MMBF and included the construction of 7 miles of road. Comments were received from various individuals, organizations, and agencies and grouped into the concerns listed in Chapter I. These concerns as well as issues that were identified internally within the DNRC were used to help guide the development of the action alternative.

TABLE 2-1

Legal Descriptions	Section	DNRC Acres Owned	ac. planned for harvest	ac. planned for PCT (pre-commercially thinned)	School Trust
Lots 3, 4, SW1/4 NW1/4, SW1/4	2	283.9	71.9 ac. **G** 10.9 ac. **L**	26.6 ac.	P.B (split)
S1/2 SE1/4	2	80	0	0	C.S. (split)
Lots 1, 2, 3, S1/2 NE1/4, SE1/4, SE1/4 NW ¼, E1/2 SW1/4	4	421.8	328.8 ac. **G**	*328.8 ac.**	P.B.
ALL	10	640	299.5 ac. **G** 81.3 ac. **L**	333.0 ac	P.B.
ALL	14	636.9	176.5 ac. **G** 42.2 ac **L**	94.3 ac	P.B.
ALL	16	634.1	85.9 ac. **G** 21.7 ac. **L**	52.7 ac	C.S.
-	ALL	2,696.7	967.1 ac. **G** 156.2 ac. **L** **1,123.3 ac. total**	**500.9 ac**	-

*Many areas harvested (see section 4) will be PCT'd after harvest. Section 4 #'s are not included in total.
In the above table, **"G"** refers to ground skidding, and **"L"** refers to line skidding.
Area harvested is approximately 42% of DNRC ownership involved with this project.
Area harvested and pre-commercial thinned (1,624.2 ac.) is approximately 60% of project area.

Development of Alternatives

To perform analysis of existing conditions and the effects of the proposed action, an interdisciplinary team was formed to develop alternatives and address the issues. This interdisciplinary team is comprised of DNRC specialists, the project leader, and the decision maker.

Public comments were received and were grouped into the concerns listed in Chapter I. Existing condition information was then compiled. Using this information, the team met to develop alternatives. The largest issues the team built this project around were forest health, threatened and endangered species, water quality, and fisheries. Some of these issues led to a larger no-harvest buffer along the tributary streams of the Blackfoot. Other issues led to dropping of harvest areas and closure of roads after construction. The team decided with the stated and other applied mitigations that one action alternative would suffice to address issues and concerns while meeting project objectives. So a balance was reached that meets the project objectives and resulted in the harvest plan of the proposed action alternative.

Description of Alternatives

Alternative A - No Action

Under the Alternative A - No Action Alternative none of the proposed timber harvesting, road construction and reconstruction, prescribed burning or forest improvement work would take place at this time. In this case, the DNRC would move to other project areas on the Clearwater Unit and begin environmental analysis for timber harvest and other associated activities. With regard to overall priority and available funds, improvements to existing roads (on State ownership) and road closures would be accomplished over time with the SWLO road maintenance program. Human activities occurring in the area, such as recreational use, fire suppression, road maintenance, firewood gathering, etc. would continue. Natural events, including plant succession, windthrow, and wildfire starts, would continue to occur. There would continue to be limited funding and opportunity to manage existing noxious weed populations, and introduction of new weed species would still be present. Future actions, which include timber harvesting, could be proposed and would go through the proper environmental analysis prior to implementation.

Past, Present, and Reasonably Foreseeable Relevant Actions:

Past relevant management activities include historic timber harvesting, road building, pre-commercial thinning and the salvage of trees. Leasing of current grazing rights is expected to continue. Other activities that are likely to continue in the area at similar levels as in the past are those such as firewood gathering, special use permits, fire suppression, recreation, and road maintenance. Timber harvesting has occurred in the past on private, state and federal and this activity is likely to continue in the future although the extent is unknown.

Alternative B – Action Alternative

Alternative B proposes to harvest approximately 7.0 MMBF to 9.0 MMBF of timber from 1,123 acres of forested land with primarily even-aged silvicultural prescriptions (see Figure II-1 for unit locations and Chapter IV for descriptions of prescriptions). Approximately 12 miles of road would be constructed while all of it would remain closed to public travel. All of the roads used by this project would receive road maintenance and be brought up to BMP's, and most would receive weed control. See Figures 2-1 and 2-2 and the following Table 2-2 for treatments specific to each section.

Mitigations For Action Alternative

< A majority of slash in areas immediately adjacent to roadways would be treated to reduce available fuels. This would allow the roads within the project area to continue to be used as fuel breaks in the event of wildfires. This also would help decrease effects to aesthetics in many treated areas within the foreground view.

< Winter harvesting and / or harvest during dry summer conditions would decrease soil compaction and general soil disturbance.

< Equipment and hauling operations would be limited to periods when soils were relatively dry, frozen or snow covered to minimize soil compaction, displacement, rutting, erosion and maintain drainage features.

< All road construction and off-road harvesting equipment would be cleaned of plant parts, seeds, and mud to prevent the introduction of noxious weeds. Equipment would be subject to inspection by the forest officer prior to moving equipment on site.

< Noxious weeds on existing roads would be sprayed prior to timber harvesting and post-harvest. Weed infestations would be mapped.

< DNRC will continue to release biological control agents known to feed on spotted knapweed.

< Promptly reseed new disturbed soils on road cuts and fills to site adapted grasses to reduce weed encroachment and stabilize roads from erosion.

< Provide for adequate road surface drainage on all roads that would not receive periodic maintenance.

< Proper and adequate road drainage such as drain dips or water diverter flappers to control erosion from roads would be installed.

< The SMZ, HRA, and water quality laws would be complied with as well as any other applicable federal, state, or local laws.

< Implement Forestry BMP's as the minimum standard for all operations associated with the proposed timber sale.

< Plan, design and improve existing road systems to meet long-term access needs and to comply with BMP's. Identify the existing sources of sediment associated with the road system and mitigate where feasible to improve water quality.

< Skidders would be limited to slopes less than 45%.

< 5-15 tons/acre large woody debris would be retained as feasible for nutrient cycling and long-term productivity.

< Use designated skid trails and equipment restriction zones to avoid damage to sensitive areas (ie. wet areas, seeps, bogs, sensitive soils etc.) and steeper slopes where adverse skidding would occur.

< Installation of gates and "Kelly-humps" will be used to decrease any non-DNRC use of roadways by vehicle. In areas where roads are shared by DNRC by other agencies or companies (Bureau of Land Management, Lubrecht Experimental Forest, Plum Creek

Timber Company, and The Nature Conservancy) roadways are primarily still gated to decrease public us and this would continue.

< Snags and snag recruits would be retained where safe to do so.

Alternatives Considered but Eliminated from Detailed Study

There appear to be no other alternatives that can realistically offer an equivalent opportunity to meet the project objectives for the following reasons:

1. Harvesting as proposed in all or parts of the described sections would seek to maximize revenue for the school trust.
2. The proposed action would ensure that the long-term potential for harvesting timber from these sites would be enhanced. This is done by improving current growth rates by the timber harvest or by the pre-commercial thinning.
3. Through an interdisciplinary team, revisions were made to the initial proposal to mitigate unresolved conflicts that may have required additional alternatives or created greater impacts.
4. Any alternatives that proposed to harvest more acres would not meet biological and resource goals, and likewise any alternatives that proposed to harvest less acres would not meet revenue and forest health objectives. So a balance was reached that meets the project objectives as well as possible and resulted in the harvest plan of the proposed action alternative.

Comparison of Alternatives

Alternative A – No Action

As previously stated, this alternative can be used as a baseline for comparing the environmental consequences of the action alternative, because it defers treatment of all sections at this time. Existing conditions would remain primarily the same. All the road systems would remain in their current poor to fair condition and would not meet BMP's or receive road maintenance in the near future by the DNRC. Therefore erosion would continue in localized areas. Additionally, stands targeted for treatment in the action alternatives would go untreated and continue to age and decline in vigor as competition for growing space and diseases increased. There would also be increased risk of mountain pine beetle attack in the ponderosa pine stands and Douglas-fir bark beetle in stands of older Douglas-fir. This is often caused as stand vigor declines and an increased chance of a stand replacing fire as fuel loadings continue to build. No road would be constructed. Wildlife security cover would not be changed from its current state and hydrologic conditions in the watersheds and fisheries would not be affected by any of the activities proposed by the action alternative.

Alternative B – Action Alternative

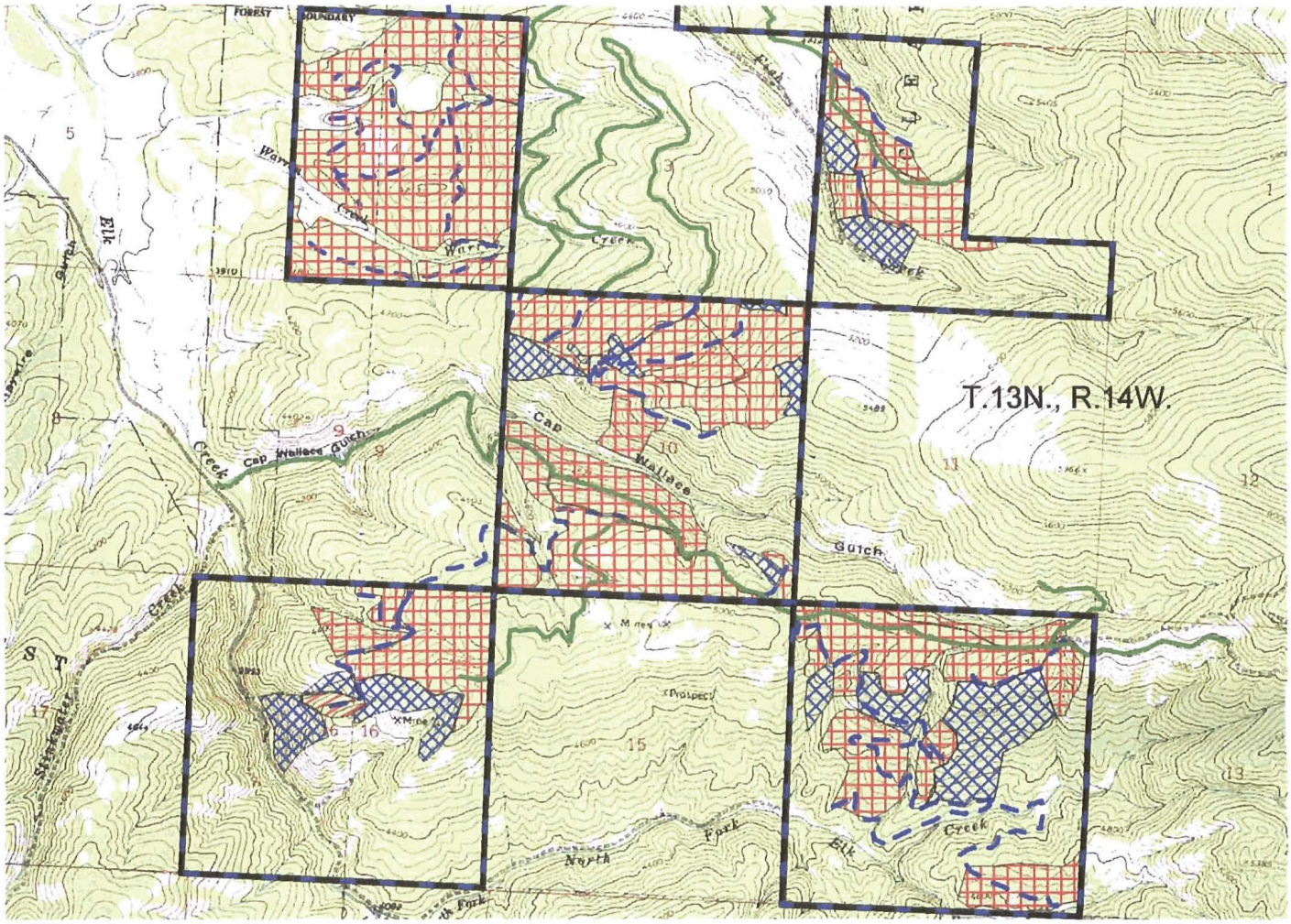
Under this alternative, timber harvesting, road building, and other associated management activities would occur. Table 2-2 summarizes the environmental effects of each of the alternatives. A more detailed explanation of environmental effects can be found in Chapter IV.

TABLE 2-2
Comparison of Environmental Effects by Proposed Alternative

	Alternative A (No Action)	Alternative B (Action)
Volume Harvested (MMBF)	0	Up to 9.0
Acres Harvested	0	1,123
% Timbered Ownership Receiving Treatment	0	60%
New Road Construction (miles)	0	12
Open Roads (miles)	0	0
Approximate Average Basal Areas in Harvest Units	60-160	20-60
Risk of Insect Attack	high	low
Risk of Stand Replacing Fire	Moderate - high	low
Forest Health and Growth Rates	Poor to good	good
Risk of blowdown	low	Low - moderate
Risk of Noxious Weed Spread	slow	Increased / moderate
Occurrence of Noxious Weeds	Moderate to high	Moderate to high
Weed Spraying	Some roads	roads and key infestations
Changes in Aesthetics	none	Low - moderate
Harvesting in Old Growth (acres)	0	0
Effects to Soils	none	low risk
Effects to Water Quality	none	low risk
Effects to Water and Sediment Yield	none	low risk
Effects to Fisheries	none	low risk
Effects to Threatened and Endangered Species	none	low risk
Effects to Sensitive Species	none	low risk
Effects to Big Game Species	none	low risk
Effects to Archeological Resources	none	None known
Estimated Revenue to the State	$929.67/year	$1,229,985.00 plus $929.67/year
Maximization of Revenue	No	Yes

Fig. 2-1

Potential Harvest and Pre-commercial Thinning Units



1 0 1 2 Miles

LEGEND

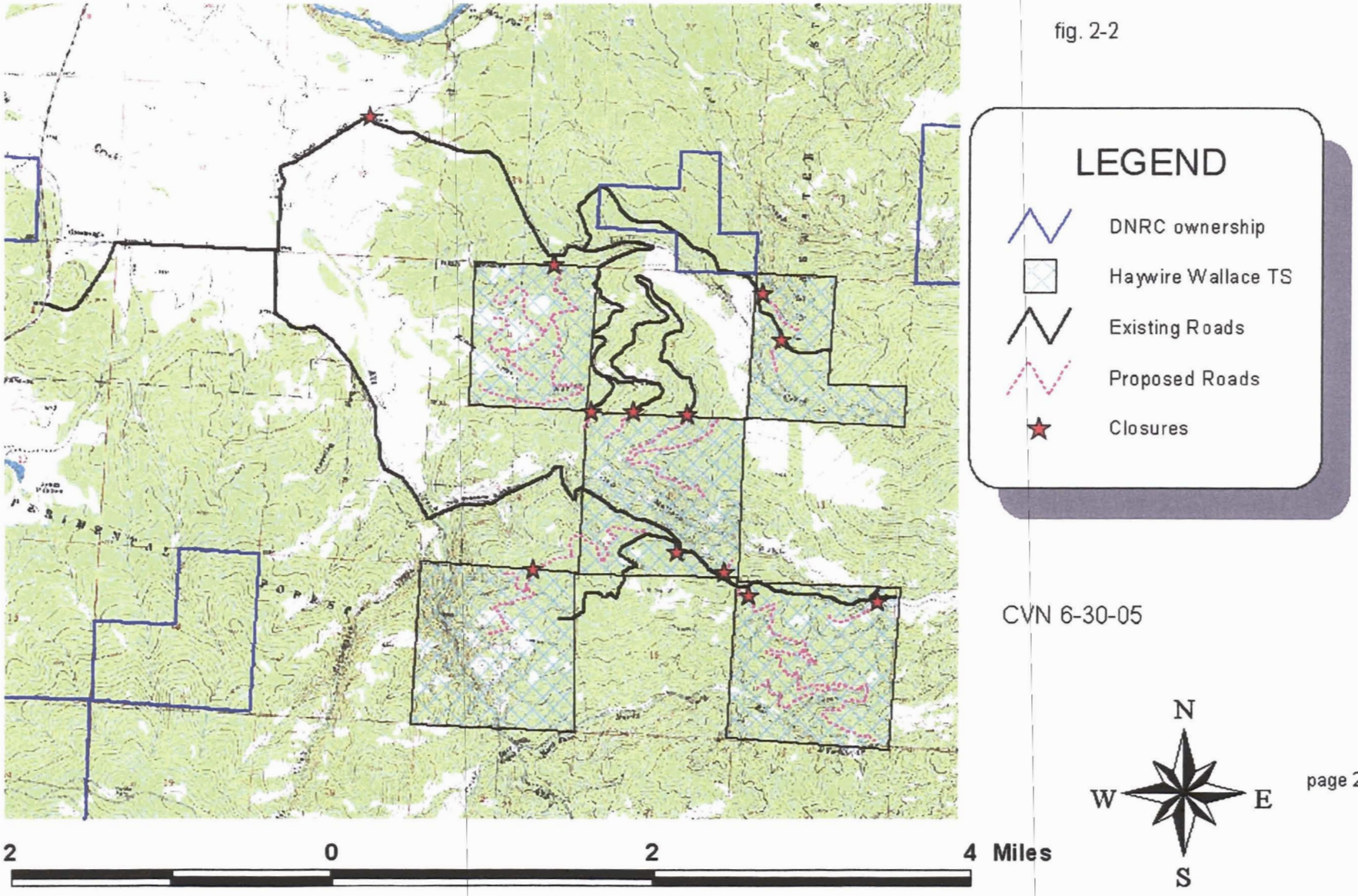
- DNRC ownership
- Existing Road
- Proposed New Road
- Proposed PCT Unit
- Proposed Harvest Unit

N
W E
S

CVN 3-8-06

Road Plan for Haywire Wallace TS

fig. 2-2



CVN 6-30-05

CHAPTER 3
AFFECTED ENVIRONMENT

Gold mining has also shaped the area. Surface mining, and a former barite mine in section 16, have occurred in this area, particularly within the Elk Creek drainage. Some signs of mining have also been found in the North Fork of Elk Creek and Cap Wallace Creek. At one time the ghost towns of Coloma and Garnet were thriving communities fed by the mining industry. Much of the mainstem of Elk Creek has been dredged several times. The large piles of debris found at Yreka Flats and along each bank of Elk Creek serve testimony to the mining days on Elk Creek. Many of the main lodes of ore were found in the drainages to the south and west of Elk Creek. In some cases, "quicksilver" (mercury) was used to separate the gold from the overburden. As much of the mining occurred prior to the stricter mining rehabilitation laws, they were simply left to revegetate without recountouring.

Although the DNRC has not harvested timber from much of the area recently, there has been some harvest activity within the project area. The most notable recent harvests have been done by Plum Creek (previously Anaconda and Champion International). Currently this area may possibly be sold to The Nature Conservancy. Due to this past harvest and other uses, a road system was put into place.

The main Elk Creek County Road is located adjacent to Elk Creek along much of its route through the canyon. This was originally a wagon road, later a railroad, and over time it has become a main travel route. Unfortunately, it is poorly located and on poor material. Each spring, large amounts of sediment find their way into the stream. It is planned that Missoula County will do major repairs to a segment below Yreka Flats in the future. The large amount of sediment from this road is a main reason that his stream is listed as a 303d impaired watershed.

Description of Relevant Affected Resources

Stand Health, Risk of Insect and Disease Outbreaks, Overstocking, and Blowdown

Timber Stand Health:

Currently, a majority of the proposed Haywire Wallace Timber Sale shows the signs of past harvesting and fire suppression. Many areas, such as section 4, show the certain progress from a ponderosa pine stand to a Douglas-fir stand without the natural fire regime of the inland northwest (Pfister et al.,1977) .

A recent study has shown the fairly dramatic increase in trees per acre, basal area per acre, and description of the density of stands in the past. In almost all areas studied showed an increase in the basal area per acre and all areas showed an increase in the stand density index. (Arno et al., 1997)

Within this general area, large wildfire occurrence has been "stopped" since the 1920's (Clearwater Unit records) (Colin Moon pers. com.). As is true of many areas, this proposed project area has been harvested in the past:

Table 3-1

Section	Years of Harvest	Approximate volume removed
2	1951, 1954, 1994 - 97	2.623 mmbf. (million board feet)
4	1925 - 34	7.113 mmbf.
10	1925 - 34	7.971 mmbf.
14	1925 - 34	9.100 mmbf.
16	1924 - 34, 1952	6.889 mmbf.

As was the common practice during these times, larger members of the seral species such as ponderosa pine and western larch were often removed. By removing these larger trees, the species shift attributed to fire suppression has been exacerbated. As often in the past, much of the harvest removed a large percentage of the seral species that existed on the sites (Mutch 1994, Metlen and Fiedler, 2005). This removal of much

CHAPTER III – AFFECTED ENVIRONMENT

Introduction

Chapter III describes the affected environment in terms of issues and concerns, and is organized by resource and affected issues. This description of the affected environment can be used as a baseline to compare the effects of alternatives described in Chapter IV.

General Description of the Project Area

The land base within the project area is between 2.5 miles east and 6 miles to the southeast of Greenough, Montana. The project area also lies along Elk Creek and its tributaries (Cap Wallace Creek, Warren Creek, and North Fork of Elk Creek), and some tributaries to the Blackfoot River such as Fish Creek and Little Fish Creek. These are all tributaries of the Blackfoot River. The term "project area" refers to each DNRC parcel where activity associated with the proposed action would occur. The term project area does not necessarily indicate that harvest treatments would occur across all portions of State Trust Land listed.

The parcels where management activities would occur under this proposal are limited to sections 2, 4, 10, 14, and 16 of T13N R14W. There would be road construction on an adjoining portion of Lubrecht Experimental Forest (section 9 T13N, R14W), and what will be owned by The Nature Conservancy (currently Plum Creek Timber Company, L.P.) within section 3 T13N R14W. These areas are portions of easements secured previously by the DNRC. There are also areas where this proposed action would improve and use areas of existing roads. These roads have been secured as well by the DNRC with the easement across TNC and Bureau of Land Management, the Memorandum of Understanding with Lubrecht Experimental Forest, or a temporary right-of-way with the Paws Up Ranch. The combined sale area equals approximately 1,123 acres of harvest area, approximately 501 acres of area for pre-commercial thinning, and 12 miles of road construction.

Aspects on this sale area vary greatly due to the brokenness of the ground. Slopes range from 0-70% with gentle to moderate topography being the normal. Elevations within the project area range from 4,000 to 5,360 feet. Characteristic weather patterns generally originate from the Pacific Ocean, and air masses move from west to east.

Although the DNRC does not have any cabin sites or development plans within these tracts of land, some of the project area is leased for grazing. These leases will remain in effect and will not be changed by this proposed project.

Cumulative Impacts of Past Management Activities

Timber harvesting was common historically in the area, and continues to be the dominant industry locally. Portions of the project area have been treated in the past (please see table 3-1). The project area is typical of state-owned lands administered by the Clearwater Unit. Although there are other portions of DNRC ownership within the Elk Creek drainage, much of it is scattered full or partial sections. The lower portion of the drainage is mainly comprised of three main owners; Plum Creek, Lubrecht Experimental Forest, and the Montana DNRC. Areas of the drainage were logged heavily during the first part of the 20th century. Portions of the project area have been treated in the past. Treatments within the project area were primarily selection harvests. Typical logging practices of this time targeted the largest trees, and often the seral species. As a result, the area historically covered by large seral species (Ponderosa pine and western larch) was much greater than the area covered today. This has created a type that is termed a fine scale mosaic. Simply put, the variations within a stand are barely discernable. The stands also cover a large area. Historically, it was unnatural in this drainage to have such large areas (patches) without variability. These large adjoining patches formed a coarse scale mosaic (the ability to easily discern one stand from another). This historical diversity was important in that it made it unlikely the entire drainage would burn in one single large fire. The current conditions have set the stage for the large fire scenario.

Gold mining has also shaped the area. Surface mining, and a former barite mine in section 16, have occurred in this area, particularly within the Elk Creek drainage. Some signs of mining have also been found in the North Fork of Elk Creek and Cap Wallace Creek. At one time the ghost towns of Coloma and Garnet were thriving communities fed by the mining industry. Much of the mainstem of Elk Creek has been dredged several times. The large piles of debris found at Yreka Flats and along each bank of Elk Creek serve testimony to the mining days on Elk Creek. Many of the main lodes of ore were found in the drainages to the south and west of Elk Creek. In some cases, "quicksilver" (mercury) was used to separate the gold from the overburden. As much of the mining occurred prior to the stricter mining rehabilitation laws, they were simply left to revegetate without recountouring.

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As was the common practice during these times, larger members of the seral species such as ponderosa pine and western larch were often removed. By removing these larger trees, the species shift attributed to fire suppression has been exacerbated. As often in the past, much of the harvest removed a large percentage of the seral species that existed on the sites (Mutch 1994, Metlen and Fiedler, 2005). This removal of much

of the seral overstory reduced the availability of seed needed to reforest these areas. Douglas-fir in many cases has reseeded in these areas and has made the possibility of regeneration of ponderosa pine minimal at best. In addition, as Douglas-fir is more shade tolerant than ponderosa pine, it is able to continue to successfully regenerate as the canopy closes, preventing the regeneration of ponderosa pine which requires much more sunlight. As this cycle continues; i.e. the loss of large, old ponderosa pine in the overstory, and the lack of pine regeneration, the percentage of ponderosa pine within these stands decreases.

***Increased Risk of Insect and Disease*:**

As a result of the decrease in large fire occurrence, the risk of insect attack, and disease establishment increases (Arno et al., 1995). Within a Fire Group described by Fischer and Bradley as Group Six (the most common fire group within this proposed timber sale), "The tendency toward overstocking and the development of dense understories result in high-hazard fuel conditions in many stands (Fischer and Bradley, 1987) As the understory and portions of the overstory increase, they continue to use vital nutrients, water, and sunlight as well as the increase in fuel conditions. As a system is stressed, it becomes more available to attack by outside sources. Insects and disease become a larger potential as a mortality factor (Hagle et al., 2003).

A majority of the insects and disease pests that will cause the largest potential devastation or have the largest opportunity to increase population and affect primarily Douglas-fir stands or heavily stocked stands of mixed species. Diseases such as *Armillaria* root rot and insects such as mountain pine beetle (*Dendroctonus ponderosae*) and the Douglas-fir beetle (*Dendroctonus pseudotsugae*) can be treated by some silvicultural treatment. As mentioned previously, stands in the project area are overstocked as compared to historical averages. This overstocking not only changes the fire regime, it also stresses trees due to the lack of vital resources (water, nutrients, and light). As these resources become limited, inter-tree competition for the limited resources takes place. Trees will decrease growth and their vigor will also decrease as competition increases. As vigor decreases they become more susceptible to various insect and disease agents (Mutch, 1994).

***Increased competition stress from overstocking*:**

As mentioned earlier, their has been a steady change in forest stands from seral to climax stands. Forest areas within sections 4, 10, parts of 14, and 16 have shown that they are continuing toward being controlled by Douglas-fir. Other areas such as within section 2 and the north part of section 14, the non-seral trees that are progressively taking over the stands are subalpine fir. These stands also have lodgepole pine (a short-lived seral) that have generally grown up with the seral overstory, but generally have not regenerated as well.

As these stands continue along their current paths, they will continue to regenerate shade tolerant species (Douglas-fir and subalpine fir). This will continue to decrease available nutrients. Currently within section 4, the Douglas-fir regeneration is often too thick to move through. Unfortunately, this was historically a ponderosa pine stand and currently they are not regenerating (Losensky, 1997). The "drain" of the large amounts of Douglas-fir regeneration will continue to affect the overstory ponderosa pine.

***Susceptibility to blowdown*:**

Windthrow (or blowdown) may occur after harvest. This often results when individual trees are exposed to higher wind after protection of neighboring standing trees is reduced. Often, tree species having shallow root systems, trees growing in unstable soils, trees growing on exposed ridge tops and trees with decaying root systems are the most susceptible to windthrow.

Existing stand conditions include both open-grown and grouped trees. The tree species that are proposed to be left have stable root systems, but of these, Western larch and Ponderosa pine have superior wind-firm characteristics. Many small or intermediate sized trees exist. These trees are often Douglas-fir. Stands proposed for harvest are generally on stable soils. Topography changes from relatively flat or gently sloping topography (section 4) to moderately sloping ground (sections 2, 10, 14, and 16) with some steeper sections within sections 10, 14, and 16. Obviously wind directions and speeds change across this proposed sale, but generally wind patterns follow the normal weather patterns. Those stands on the higher elevations and on steeper slopes would have the most exposure to high wind events.

Increase of potential of high intensity stand replacing fires:

"Fires and ecosystems have interacted throughout time, establishing fire as an influence in such ecosystem functions as: recycling of nutrients, regulating plant succession and wildlife habitat, maintaining biological diversity, reducing biomass, and controlling insect and disease populations" (Mutch, 1994). Since fires have been a major controlling factor of stand development (Losensky, 1997, Gruell, 1983), fire control has changed fuel levels and therefore, fire behavior. Factors such as fire suppression, grazing, logging, have encouraged stand densification, development of ladder fuels, and increased composition of shade tolerant species. These are all stand structural changes that favor intense crown fires and ecosystem function (Metlen and Fiedler, 2005; Gruell et al., 1982; Arno and Brown, 1989; Brown et al., 1994). As this proposed sale area has seen many of these stand development factors, it has also started to see structural changes that favor the potential of intense crown fires (Gruell, 1983).

The most predominant historic fire frequencies in the project area are the warm, dry Douglas-fir and moist Douglas-fir habitat types, which had a mean fire interval of around 5-25 years and a mean of 42 years respectively in presettlement stands. Fire was an important agent in controlling density and species composition (Gruell, 1983). Low to moderate severity fires converted dense stands of pole-sized or larger trees to a more open condition, and subsequent light burning maintained stands in a park-like state. Frequent low or moderate fires favored larch and ponderosa pine over Douglas-fir in stands where these species occurred. Severe fires probably occurred on dense, fuel-heavy sites and resulted in stand replacement. Stand replacement fires favored lodgepole pine on sites where this species was present (Fischer and Bradley, 1987). In the ponderosa pine dominated stands the fire frequency is expected to be shorter between fires and was typically a lower intensity event except in areas where fuels had built up.

Although much of the proposed timber sale are is gentle ground and would not generally contribute to severe fire behavior and crown fire runs, there are several areas that are higher energy slopes. These higher areas correspond with a majority of the line skidding areas. For example, please see the map of section 10 and notice the Cap Wallace canyon. Given that fires on a slope will heat the fuel it will consume by radiant heat (the heat you will feel as you stand next to a campfire) and by convective heat (heat that moves up a slope ahead of the fire), these fires can often use the topography to grow from low-severity (creeping and a small flame front) to a moderate fire (burns surface fuels and occasionally trees if fuel ladders are present) and finally to a severe fire (fire that will move through the overstory, consume much of the surface woody fuels, and can often cause damage to soil layers and may cause problems with watersheds (Fischer and Bradley, 1987). These steep areas do not have any "breaks" to stop the forward movement of a wildfire. It is believable that a fire that would begin in the bottom of Cap Wallace Creek or the North Fork of Elk Creek, while conditions are favorable for large fire development, could easily become a larger severe wildfire. Although the south-facing slope is primarily ponderosa pine (the historical timber type) and the fire would primarily move through flashy fuels, the other side of the canyon is not. The north facing slope is

Douglas-fir / western larch or lodgepole pine. In this type of fuel, it is easily believable that a large fire could easily happen (Brown, 1995). As this canyon is fairly large, the potential of a major wildfire would exist. As there are several Montana DNRC sections within the area, this is a concern.

Within sections 4 and 10, the high amount of Douglas-fir regeneration and large amounts of ladder fuel present a wildfire concern (Gruell, 1983). Although in normal summer conditions, a fire within this section would probably be moderate. Two of the largest fire concerns in this area are: the safety of individuals fighting this fire and the potential of a large fire in the event of a large wind event.

Parts of section 16 and small parts of section 14 have broken ground. These sites are primarily found within the areas of granite outcroppings and soil. Historically, fire behavior in this type within the sale area would have been controlled more by topography than by the forest type and fuel loading. Due to the extremely broken terrain, fires were unable to accomplish large crown fire runs. The high-energy steep slopes are very short lived.

Areas within portions of section 2 and section 14 are actually becoming dominated by subalpine fir. Generally downed dead woody material on the forest floor averages about 25 tons per acre. With this large amount of fuel on the forest floor, severe fire can often result, even in stands where the fire doesn't reach the overstory. Fire intervals of approximately 121 years were noticed in this type in the Coram Experimental Forest. In the stands that were studied, small moderately severe fires that occasionally crowned, especially near ridgetops. These areas would thin stands and provide a mineral seedbed for conifer regeneration (Fischer and Bradley, 1987).

Water Quality and Fishery

Water Quality

Analysis Area: Refer to hydrology map for watershed boundaries and location.
The proposed analysis area is located on five different state sections, including sections 2, 4, 10, 14 and 16 of Township 13 North, Range 14 West. Each Section is located in a different drainage. The North Fork Elk Creek, Cap Wallace Creek and Warren Creek are all tributaries to Elk Creek. Section 2 contains Little Fish Creek and Fish Creek, which are tributaries to the Blackfoot River.

Elk Creek

The Elk Creek Watershed drains approximately 33,000 acres and 142 miles of stream channel. The Geologic composition of the watershed varies. Approximately 88% of the watershed consists of limestone, granitics, precambrian belt, and tertiary sediments (BLM Report). Approximately 36% of the watershed has granitic parent material. Because these soils are more prone to erosion they are naturally more sensitive to management activities, including timber, road construction and mining.

Vegetation characteristics vary from dry and warm at lower elevations to cold and wet at higher elevations and northerly aspects, thus changing the riparian habitat types. Channel stability also changes throughout the drainage depending on management activities. In the lower portion of the drainage, stream stability has decreased as a result of grazing practices on Private land. Overgrazing has caused bank damage increasing width to depth ratios and reducing riparian vegetation

The middle and upper portion of the drainage has been impacted from mining. Miles of stream channel were placer mined and tailings are present along many reaches of Elk Creek. The tailings have formed a rock berm in some areas. Placer mining operations have reduced the amount of riparian vegetation and large woody debris, increasing bank instability at mine sites. There is also a road that runs adjacent to Elk Creek, which has

detrimental or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife. Naturally occurring includes conditions or materials present from runoff on developed where all reasonable land, soil and water conservation practices are applied (75-5-306(2) MCA).

Analysis Methods

A watershed analysis was completed by a DNRC hydrologist for the proposed sale area to determine the existing direct, indirect and cumulative effects to water quality, soils, fisheries and noxious weeds.

These areas were evaluated using a course filter and fine filter approach. A fine filter approach, including a water yield analysis was conducted for this timber sale, because of the size and resource value of each watershed.

The existing cumulative effects of past timber harvest activity and road construction on water yield and watershed conditions were analyzed using the Equivalent Clearcut Area (ECA) methodology. This methodology estimates existing water yield increases (WYI) and predicts water yield increases of proposed harvest activities. The ECA model calculates WYI using total treated acres, percent crown cover removal, precipitation, hydrologic recovery, and habitat type and road miles (Forest Hydrology II). Water Yield calculation input data for Elk Creek were obtained through information collected by the University of Montana, BLM and DNRC in 1997 and entered into a current water yield analysis. Increases in water yield and equivalent clearcut acres are based on the assumption that the entire watershed was once 100% forested. It does not take into consideration natural fire regime or portions of the watershed that may be grassland and not forested. These numbers are just an approximation, not exact.

Reconnaissance level surveys were used to observe existing conditions of soils, noxious weeds and water quality. Existing conditions of fisheries habitat was obtained through data collected by the Montana Department of Fish Wildlife and Parks, BLM and observing stream channel habitat conditions.

All existing roads in the proposed project area were evaluated by a DNRC hydrologist for past and potential impacts.

Methods used for determining Riparian Management Zones (RMZ's) followed Forest Management Rule 36.11.425 Watershed Management, Streamside Management Rules and Riparian Management Rules.

Existing Water Quality and Water Yield

One of the main concerns within the project area is an increase of sediment delivery, which can affect channel stability and function as well as the physical and biological components of water quality. Roads are the main contributor to sediment within the project area throughout each watershed. Areas with the highest risk of sediment delivery are those locations where roads are directly adjacent to the stream channel with a limited vegetative buffer (such as the main Elk Creek, managed by Missoula County).

Existing impacts to water quality are those impacts caused by timber harvest, roads and in Elk Creek, mining. High water yield increases in excess of 20% can increase peak flows. Peak flows may change in magnitude and duration, but are dependant on intensity and duration of rainstorms as well as snowpack conditions, making it difficult to predict and calculate increases. Stream channel reactions to these flows vary, depending on geomorphology and stream channel stability.

Douglas-fir / western larch or lodgepole pine. In this type of fuel, it is easily believable that a large fire could easily happen (Brown, 1995). As this canyon is fairly large, the potential of a major wildfire would exist. As there are several Montana DNRC sections within the area, this is a concern.

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Parts of section 16 and small parts of section 14 have broken ground. These sites are primarily found within the areas of granite outcroppings and soil. Historically, fire behavior in this type within the sale area would have been controlled more by topography than by the forest type and fuel loading. Due to the extremely broken terrain, fires were unable to accomplish large crown fire runs. The high-energy steep slopes are very short lived.

Areas within portions of section 2 and section 14 are actually becoming dominated by subalpine fir. Generally downed dead woody material on the forest floor averages about 25 tons per acre. With this large amount of fuel on the forest floor, severe fire can often result, even in stands where the fire doesn't reach the overstory. Fire intervals of approximately 121 years were noticed in this type in the Coram Experimental Forest. In the stands that were studied, small moderately severe fires that occasionally crowned, especially near ridgetops. These areas would thin stands and provide a mineral seedbed for conifer regeneration (Fischer and Bradley, 1987).

Water Quality and Fishery

Water Quality

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Elk Creek

The Elk Creek Watershed drains approximately 33,000 acres and 142 miles of stream channel. The Geologic composition of the watershed varies. Approximately 88% of the watershed consists of limestone, granitics, precambrian belt, and tertiary sediments (BLM Report). Approximately 36% of the watershed has granitic parent material. Because these soils are more prone to erosion they are naturally more sensitive to management activities, including timber, road construction and mining.

Vegetation characteristics vary from dry and warm at lower elevations to cold and wet at higher elevations and northerly aspects, thus changing the riparian habitat types. Channel stability also changes throughout the drainage depending on management activities. In the lower portion of the drainage, stream stability has decreased as a result of grazing practices on Private land. Overgrazing has caused bank damage increasing width to depth ratios and reducing riparian vegetation

The middle and upper portion of the drainage has been impacted from mining. Miles of stream channel were placer mined and tailings are present along many reaches of Elk Creek. The tailings have formed a rock berm in some areas. Placer mining operations have reduced the amount of riparian vegetation and large woody debris, increasing bank instability at mine sites. There is also a road that runs adjacent to Elk Creek, which has

confined the stream channel, leaving less than a 20 foot buffer in some locations. Some placer mining excavations were reclaimed and stabilized on state land in section 16.

Tributaries to Elk Creek located in the project area are Warren Creek, North Fork Elk Creek and Cap Wallace Creek. Some harvest has occurred in these tributaries, but a majority of the management impacts have occurred along the main stem of Elk Creek.

Warren Creek
Ownership in Warren Creek is a combination of Plum Creek, State and Private. The headwaters begin on Plum Creek, the middle portion flows through State Land and the bottom section of the stream channel runs through private land. Warren Creek is an intermittent and discontinuous Class 2 stream channel with a drainage area of approximately 1,263 acres. The lower portion of the drainage is located on gentle slopes and the middle and upper portions of the drainage are located on moderate to steep terrain. There are two isolated wetlands greater than 0.25 acres located in the proposed project area.

Portions of Warren Creek are B channel types until they go subsurface and no channel is present. Some reaches of Warren Creek have surface water, wetland vegetation and soils, but no defined channel. The upper reaches, where a defined channel is present does provide adequate riparian vegetation for bank stability. Some reaches in the lower sections are lacking adequate vegetation for bank stability, most likely a result of historic grazing practices. Harvest in this drainage has occurred on private industry lands in the upper portion of the watershed in Section 3.

North Fork of Elk Creek
Ownership in this drainage is a mixture of State, Lubrecht Experimental Forest, Private and BLM. Minimal harvest has occurred on State and Lubrecht, the majority of harvest occurring on BLM. The North Fork Elk Creek is a Class 1 Perennial Tributary to Elk Creek. North Fork Elk Creek has a drainage area of approximately 4,717 acres. Most of the terrain in this watershed consists of moderate to steep slopes between 35- 70%. It is drained by Class1, Class 2 and Class 3 stream channels as well as ephemeral draws and draws with no discernable stream channel. Reaches of North Fork Elk located in the project area are Rosgen B4 and B5 channel types. Most of the riparian areas in the project area are in good health, with sufficient bank vegetation for stability and thermal protection. Riparian health in the lower portion of the drainage has been impacted in some reaches by historic cattle grazing. Willow communities are not as vigorous and adequate bank vegetation for stability is minimal. Most of the harvest has occurred on BLM and Lubrecht.

There is a class 1 tributary to the North Fork Elk Creek in the project area. Most of the stream channel is in good condition, well vegetated and stable. There is a diversion type structure in the lower end, near the confluence of the mainstem. It is unknown what purpose this structure served. It has however, caused sediment to collect in the structure and resulted in a drop in stream gradient and degradation of this portion of the channel.

Cap Wallace Creek
The Cap Wallace drainage is a mixture of ownership between State, Lubrecht, Plum Creek and BLM. Harvest has occurred in this watershed on Lubrecht, Plum Creek and State Land. Most of this watershed is located on moderate to steep slopes, ranging from 30- 75%.

Cap Wallace is a Class 1 perennial tributary to Elk Creek and has a drainage area of approximately 1,969 acres. This stream is mostly dominated by Rosgen B4 channel types, with some reaches having a high granitic component, most likely deposition from a large flow event. The riparian area in the project section is in good condition. The banks

are well vegetated and stable, with sufficient canopy cover for thermal protection is present. There are two draws with ephemeral channels located in the SW ¼ of section 10. It appears that these channel-like features were formed from game trail use on top of old roads that were constructed in the draw.

Fish Creek
Ownership in the Fish Creek drainage is a checkerboard of State, Lubrecht, Plum Creek, BLM and Private. Most of this drainage is located on moderate to steep slopes ranging from 20-70%. There has moderate to heavy amounts of harvest in the Fish Creek watershed, mostly on Private industry land.

Fish Creek is an intermittent Class 1 tributary to the Blackfoot River. The mid to lower sections of Fish Creek are dominated by Rosgen B4 channel types (Rosgen 1996) and the upper portions of the drainage are more entrenched and dominated by mostly A3 and A4 channel types. The Montana Department of Fish, Wildlife and Parks (FWP) surveyed the stream at mile 0.7, 1.8 and 2.8. Surveys at 0.7 and 1.8 found a well- supported overstory of ponderosa pine, aspen and Douglas-fir-larch communities with a dense understory of alders, red osier dogwood, grasses, forbes and ferns. At mile 2.8, the overstory was predominately Douglas-fir with alder, dogwood, ferns, forbes and grass understory. All 3 sites found adequate vegetation to provide good shade, and large woody debris. (Monitoring Progress Report 2001). Stream shading of vegetation can moderate stream temperatures.

Little Fish Creek
Little Fish Creek flows through several ownerships including: BLM, Plum Creek, Lubrecht, State and Private. Most of the middle and upper portions of the drainage are located on moderate to steep slopes between and 20 and 70%. The lower part of the drainage is located on gentle forest and pasture ground. The upper portions of the watershed are high gradient A3 channel types and the middle and lower sections are predominantly B4 (Rosgen) channel types.

The Montana DFWP surveyed 3 sites on Little Fish Creek at 0.3, 0.9 and 3.8. The upper site and 3.8 was a mixture of Douglas-fir, ponderosa pine, western larch and aspen overstory with an understory consisting of rocky mountain maple, red osier dogwood, alder, forbes and grasses. The lower elevation sites were primarily ponderosa pine, larch and aspen with a grass/forbe mixed understory. The upper sites had adequate vegetation for stability, shade and woody debris. The lower sections however, showed moderate to high levels of sediment due to intensive grazing impacts. (Restoration Progress Report 2002 and 2003)

Regulatory Framework
Elk Creek was listed on the 1996 and 2000 TMDL list as a water quality impaired stream. Probable causes of impairment are cadmium, nitrate, siltation and other habitat alterations. Probable sources are logging road construction and maintenance, erosion and sedimentation and placer mining. Elk Creek was listed as partially supporting aquatic life and cold water fisheries, but fully supporting swimming, agriculture and industry.

The waters contained within the entire Elk Creek watershed are classified as B-1 by the Montana Surface Water Quality Standards. The B-1 classification is for waters that are considered suitable for domestic use after conventional treatment, as well as recreation, swimming and bathing. They are also suitable for growth and propagation of salmonid fish and other associated aquatic life, waterfowl, furbearers, agricultural and industrial water supplies. Another criteria for a B-1 classification is; no increases are allowed above naturally occurring concentrations of sediment, settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful,

detrimental or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife. Naturally occurring includes conditions or materials present from runoff on developed where all reasonable land, soil and water conservation practices are applied (75-5-306(2) MCA).

Analysis Methods

A watershed analysis was completed by a DNRC hydrologist for the proposed sale area to determine the existing direct, indirect and cumulative effects to water quality, soils, fisheries and noxious weeds.

These areas were evaluated using a course filter and fine filter approach. A fine filter approach, including a water yield analysis was conducted for this timber sale, because of the size and resource value of each watershed.

The existing cumulative effects of past timber harvest activity and road construction on water yield and watershed conditions were analyzed using the Equivalent Clearcut Area (ECA) methodology. This methodology estimates existing water yield increases (WYI) and predicts water yield increases of proposed harvest activities. The ECA model calculates WYI using total treated acres, percent crown cover removal, precipitation, hydrologic recovery, and habitat type and road miles (Forest Hydrology II). Water Yield calculation input data for Elk Creek were obtained through information collected by the University of Montana, BLM and DNRC in 1997 and entered into a current water yield analysis. Increases in water yield and equivalent clearcut acres are based on the assumption that the entire watershed was once 100% forested. It does not take into consideration natural fire regime or portions of the watershed that may be grassland and not forested. These numbers are just an approximation, not exact.

Reconnaissance level surveys were used to observe existing conditions of soils, noxious weeds and water quality. Existing conditions of fisheries habitat was obtained through data collected by the Montana Department of Fish Wildlife and Parks, BLM and observing stream channel habitat conditions.

All existing roads in the proposed project area were evaluated by a DNRC hydrologist for past and potential impacts.

Methods used for determining Riparian Management Zones (RMZ's) followed Forest Management Rule 36.11.425 Watershed Management, Streamside Management Rules and Riparian Management Rules.

Existing Water Quality and Water Yield

One of the main concerns within the project area is an increase of sediment delivery, which can affect channel stability and function as well as the physical and biological components of water quality. Roads are the main contributor to sediment within the project area throughout each watershed. Areas with the highest risk of sediment delivery are those locations where roads are directly adjacent to the stream channel with a limited vegetative buffer (such as the main Elk Creek, managed by Missoula County).

Existing impacts to water quality are those impacts caused by timber harvest, roads and in Elk Creek, mining. High water yield increases in excess of 20% can increase peak flows. Peak flows may change in magnitude and duration, but are dependant on intensity and duration of rainstorms as well as snowpack conditions, making it difficult to predict and calculate increases. Stream channel reactions to these flows vary, depending on geomorphology and stream channel stability.

Elk Creek
Elk Creek was listed on the 1996 and 2000 303(d) list of impaired waterbodies. The largest existing impacts to water quality are caused by the county road, which runs along the mainstem of Elk Creek for almost the entire length of the watershed. In some areas the buffer is less than 10 feet from the road to the stream channel. Mining tailings have created a berm between the road and the stream in some locations.

The stream has been channelized in some areas due to the existing road locations restricting the natural stream meanders and access to its natural floodplain. Most of Elk Creek through the middle reaches is a B channel type (Rosgen 1996). This limits access to the floodplain and can cause channelization of a stream.

In the lower sections of Elk Creek, water quality has been impacted from extensive grazing management. Overgrazing has cause some reaches to be over widened, increasing width depth ratios, reducing riparian vegetation, decreasing bank stability and increasing thermal temperatures. In other reaches, bank trampling has caused sloughing and bank erosion resulting in channel incision and loss of floodplain access.

Table 3-2 Existing Water Yield

Stream	Existing WYI %	Existing ECA Acres
Elk Creek	3.6%	3,120 Acres

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

** % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction.

The existing water yield increases in Elk Creek is relatively low at 3.6%. Although many reaches of Elk Creek are not in stable condition, water yield increases of this amount are not expected to have had impacts on stream stability or magnitude and duration of peak flows. The existing equivalent clearcut acres, has increased approximately 10% from baseline conditions.

Warren Creek
There is approximately 5 miles of road located in the upper portion of the Warren Creek drainage in section 3. The only roads located in the project area in section 4 are old logging roads, which were observed to be stable, well vegetated and started to reshape to the natural contours of the landscape. Some of these roads have sections, which are located adjacent to the stream channel. Because they are well vegetated, no direct delivery to the stream channel was observed.

Old skid trails were also observed and some located directly adjacent to the stream channel, where skidding had occurred in the draw. Most of the trails have revegetated and started to return to the natural contour of the slope. No direct sediment delivery was observed from these historic skid trails.

Grazing in the lower section has had some impacts on water quality. Signs of bank trampling and sloughing were observed which has caused areas of direct sediment delivery to the channel. Warren Creek is intermittent and discontinuous and any increases in sediment are most likely filtered out down stream. Warren Creek does not have continuous surface flow to any body of water.

Existing Water Yield
Water yield was not calculated for Warren Creek because there is no return flow to any other body of water and the existing channel is intermittent and discontinuous.

North Fork Elk Creek
The North Fork Elk Creek has approximately 4.6 miles of road located in the watershed. The only road located adjacent to the stream channel is located in the lower portion of the drainage, starting at the confluence of Elk Creek and continuing approximately 3 miles. A drivable road bed is present for about 1 mile until it turns into more of a trail like feature. The road was observed to be stable and well vegetated in most areas. Some areas are within 10 feet of the stream with eroding fill slopes. Direct sediment delivery is occurring at these isolated locates, but was observed to be minimal. The section is gated and the road currently receives administrative use only by Lubrecht and the DNRC.

Downstream beneficial uses for this stream are stock and fish and wildlife.

Table 3-3 Existing Water Yield

Stream	Existing WYI %	Existing WYI Acres
North Fork Elk Creek	0.6%	67 Acres

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

** % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction.

Existing water yield in the North Fork Elk Creek is very low at 0.6%. This drainage has seen limited harvest, which has occurred in the upper portion of the watershed on BLM ownership. Increases in total ECA are approximately 1.5%. The stream channel is stable and existing water yield has not affected stream form or function.

Cap Wallace Creek
Cap Wallace Creek has approximately 8.3 miles of existing roads in this drainage. There is only a small section of road that is located adjacent to Cap Wallace Creek near the lower end of the drainage at the junction of Elk Creek road. There are some roads in this drainage that do not meet BMP standards. The main road is very steep in some locations and does not provide adequate relief of surface flow, causing road surface erosion to occur.

Downstream beneficial uses include stock and fish and wildlife.

Table 3-4 Existing Water Yield

Stream	Existing WYI %	Existing WYI Acres
Cap Wallace	5.7%	188 Acres

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

** % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction.

Existing water yield in Cap Wallace Creek is low. Increases in ECA are approximately 11%. This stream channel is well vegetated and has stable bed and banks. The existing effects of water yield increases are minimal if any.

Fish Creek
There are approximately 19.3 miles of road in the Fish Creek drainage. Road building has been extensive as a result of timber harvest management on private industry ground. Not all roads meet BMP standards and some roads have drainage and erosion problems. There are sections of road, which run adjacent to the stream channel. These sections of road were observed to have a well vegetated riparian buffer to filter sediment and only received occasional use with some vegetation present on the road surface. Other sections of road were not revegetated, but did have a well vegetated riparian buffer.

Downstream beneficial uses include stock, irrigation, domestic, lawn and garden and fish and wildlife.

Table 3-5 Existing Water Yield

Stream	Existing WYI %	Existing WYI Acres
Fish Creek	8.2%	90 Acres

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

** % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction.

Existing water yield in Fish Creek is low to moderate. Total ECA increases are approximately 2%. Increases in water yield have occurred from timber harvest on private industry land and State Trust Land. However, they are still well below threshold and effects to stream stability have been minimal. The bed and banks were observed to be stable and well vegetated in most areas.

Little Fish Creek
Road densities in the little Fish Creek drainage are high with approximately 12 miles of road. The main road does run adjacent to the channel for approximately 4 miles. Some areas have a well vegetated buffer sufficient for adequate filtration before reaching the stream channel. Other reaches have a well vegetated buffer, but lack adequate distance from the road to channel, some within 20 feet of the channel.

Access to these roads is behind a locked gate and use is currently restricted to administrative use only. Minimal use has caused the risk of sediment delivery to be low and some portions of road have revegetated with grasses. Some roads do have insufficient drainage and surface erosion is a problem.

Downstream beneficial uses include fish and wildlife, stock and irrigation.

Table 3-6 Existing Water Yield

Stream	Existing WYI %	Existing ECA Acres
Little Fish Creek	4.8%	288 Acres

* Equivalent ECA is a function of total area roaded and harvested, % crown cover removal in harvest areas and the amount of vegetative recovery that has occurred in the harvest area.

** % water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction.

Existing water yield increases in Little Fish Creek are low. Harvest has occurred on private industry land, but has been minimal across the entire watershed. Water yield increases have had minimal effects if any, on stream form and function. The bed and banks are stable and well vegetated, except in the low portions of the watershed, where poor grazing management has increased channel instability and sediment delivery, having adverse effects on water quality.

Fisheries

Elk Creek

In 2000, the BLM produced a watershed assessment of the Elk Creek drainage (Elk Creek Ecosystem Analysis at the Watershed Scale). From this watershed assessment an Environmental Assessment was created. All of the BLM finding referred to in this EA, were referenced from that document. As part of the Elk Creek assessment three sections of the mainstem Elk Creek were surveyed. The lower segment reaches from the Blackfoot River to the confluence of Elk Creek and Cap Wallace Creek. The middle reach extends between Cap Wallace Creek and Yreka Flats. The upper reach lies between Yreka Flats and the headwaters of Elk Creek. Fish passage barriers were observed in the Yreka flats area, characterized as old dredge cuts and ponds.

According to BLM findings, fish populations in the mainstem downstream from Cap Wallace Creek include eastern brook trout, rainbow trout, brown trout and mountain whitefish. The upper reaches above Cap Wallace to Yreka flats were only found to contain eastern brook trout. Surveys completed by FWP found rainbow trout, brown trout, brook trout and westslope cutthroat trout (Restoration and Progress report 2002 and 2003).

Westslope cutthroat are currently listed as a Class A sensitive species by the State of Montana: defined as having limited number and/or limited habitats both in Montana and elsewhere in North America; elimination from Montana would be a significant loss to the gene pool of the species and subspecies.

The long history of management including placer mining, channelization, road construction with associated drainage structures, and cattle grazing have had negative impacts on fish population and habitat. Habitat condition in the mainstem of Elk Creek lack habitat diversity. Riffle habitat is extensive, while pool habitat is low. Surveys concluded insufficient amounts of large woody debris to be present in this channel (Elk Creek Environmental Assessment 2000).

Channelization due to roads and mining has limited habitat diversity. Direct sediment is occurring along many sections of the Elk Creek road due to poor road location and drainage features.

The Montana DFWP collected population data in 2003 that showed significant reductions in trout densities in the lower reaches of Elk Creek, compared with upper sites Restoration Progress Report 2002 and 2003. This is most likely due to extensive damage to riparian habitat and stream function as a result of historic cattle grazing. The highest numbers of cutthroat are most likely in the headwaters and tributaries, due to extensive management and degradation on the mainstem of Elk Creek.

The mainstem Elk Creek has also been tested for whirling disease. Between 1999 and 2002, samples tested negative. However, more recent tests indicate a rapid escalation in

the disease, as infected levels were detected at a mean grade of 2.86 in 2003. (Restoration Progress Report 2002 and 2003)

Warren Creek
There are no known fish located in Warren Creek therefore; Warren Creek will not be address as a fisheries issue.

North Fork Elk Creek
The North Fork Elk Creek was found to have desirable fish habitat. Most reaches of the mainstem have stable banks that are well vegetated. Isolated areas of stream bank have been trampled by wildlife and cattle in the lower reaches. Some of the lower reaches lack sufficient willow populations for bank stability and thermal protection. Studies completed by the BLM rated the fisheries habitat in the North Fork Elk Creek as excellent and its tributaries as good to excellent. There are a variety of habitat units with pools, large woody debris and ranging Rosgen channel types. Boulders and granite serve as fish barriers in the upper section of this drainage and it is unknown whether resident populations exist in this section. (Elk Creek Environmental Assessment 2000)

There have been no fisheries surveys officially completed for this drainage. During riparian habitat assessments, the BLM did observe cutthroat trout in the upper drainage. The DNRC also observed cutthroat trout in the middle and lower reaches during surveys. It is assumed for this project that the North Fork Elk creek is an important tributary for cutthroat fisheries habitat.

Cap Wallace Creek
Cap Wallace Creek is relatively channelized with a fairly steep entrenched valley. The overall health rating of Cap Wallace Creek is good to excellent, with good habitat diversity and dense vegetation cover. There are a fairly large number of pocket pools and dense overhanging vegetation providing thermal protection.

Surveys completed by the BLM found that the upper reaches contained more riffle habitat and the lower reaches more pool habitat. Substrate composition is mostly gravels, with some reaches having a high content of sand and silt. In the reach surveyed by the DNRC, deposition of granitics was found in the assessment reach.

There have been no fish surveys completed on Cap Wallace Creek. During the BLM assessment westslope cutthroat were observed in the middle portion of the drainage. Brook trout were observed at the mouth where it flows into Elk Creek. For this project, it is assumed that Cap Wallace Creek is an important tributary for fisheries habitat.

Fish Creek
Riparian habitat surveys were conducted by the Montana DFWP on three reaches of Fish Creek at mile 0.7, 1.8 and 2.8. The three survey sections were found to be in good health. The lower survey sections were moderately entrenched, gravel dominated systems with a gradient of 2-4% slopes and classified as Rosgen B4 channel types (Rosgen1996). (FWP 2001) Survey reaches at 0.7 and 1.8 provide good overstory cover and a dense understory riparian community. (Monitoring Progress Report 2001)

The third survey reach at mile 2.8 resembles an A3 channel type (Rosgen 1996) characterized as a high gradient, deeply entrenched stream channel. This reach supports a good overstory and dense thick understory, providing bank stability, good shade and large woody debris to help maintain thermal regulation and provide habitat complexity.

Sediment levels in this stream were observed to be low to moderate. Most likely levels are slightly elevated above natural conditions due to some areas of poor road location,

which have resulted in direct sediment delivery to the stream channel where filtration buffers are inadequate. Dewatering has occurred in the lower 0.3 miles of the stream channel resulted in a disjointed fishery in this lower reach. There is also a reservoir dam, which has created a fish barrier at stream mile 1.0 (FWP 2001).

Surveys completed by the Montana DFWP in 2001 found a relatively low density of cutthroat trout that increases in the upstream direction. Densities at mile 0.7 were the lowest and only one fish was recorded. Fish populations increased about 100% between mile 1.8 and 2.8. No other fish were observed in the study reaches and genetic sampling collected at the time of survey has not been analyzed due to lack of funding.

Little Fish Creek

The Montana DFWP established three survey sites on Little Fish Creek in 2003 at mile 0.3, 0.9 and 3.8. The lower sections at mile 0.3 and 0.9 are B4 (Rosgen 1996) channel types, which are moderately entrenched, gravel dominated stream systems. The overstory primarily consisted of ponderosa pine, larch and aspen with an understory of mainly forbes and grasses. The upper survey section at mile 3.8 is an A3 high gradient, cobble dominated system. The overstory consists of Douglas-fir, ponderosa pine and larch, with a thick diverse understory of woody stem plants, forbes and grasses. (Restoration Progress Report 2002 and 2003)

Population surveys at each site found only westslope cutthroat present. Populations decreased approximately 96% from mile 3.8 to 0.3(FWP). Genetic samples were taken at these sites, but the results have not been analyzed.

Management in the Little Fish watershed including road construction and grazing has caused adverse impacts to the stream channel. Intensive grazing has occurred in the lower sections resulting in increased sediment levels from bank trampling and sloughing. Poor road location in some areas of the upper watershed has resulted in direct sediment delivery to the stream channel.

Existing Conditions of Soils

Soils

The Haywire-Wallace project area is located on moderate to steep slopes with residual soils weathering from bedrock of argillites and granitics, and localized old surface soils of tertiary age in Warren creek area. There are no especially unique or unusual geologic features in the sale area, except there are mineralized zones that have supported historic mining. No areas of active slope instability were noted, except for localized areas of instability associated with past mining.

Elk Creek

Soils in the Elk Creek drainage are a variation of Winkler soils ranging from 8-80% slopes. The Winkler series consists of somewhat excessively drained soils that formed in colluvium derived from argillite and quartzite. The average annual precipitation ranges from 17-30 inches. The surface layer is 0-3 inches and composed of very gravelly sandy loam. The subsoil layer is >40 inches deep and consists of extremely gravelly sandy loam.

Winkler soil types located n the project area are 130- Winkler very gravelly sandy loam, 8-30% slopes, 131- Winkler very gravelly sandy loam, 30-60% slopes, 132- Winkler very gravelly loam, cool 8-30% slopes. 133- Winkler gravelly loam cool, 30-60% slopes, and 134- Winkler rubble land complex, 50-80%. See chart 1 for specific soil details.

Winkler very gravelly sand loams on 8-30% slopes have a low erosion hazard due to gentle slopes and easy operability for ground based operations. Displacement and compaction hazard is moderate. Map unit 132 Winkler gravelly loam, cool 8-30% slope

has a low erosion hazard, but moderate compaction and displacement hazard. Winkler very gravelly sandy loams 30-60% slopes, Winkler gravelly loam cool, 30-60% slopes and Winkler rubble land complex 50-80% slopes have a moderate erosion hazard that increases as slope increases. Compaction hazard is low, but displacement hazard is high due to shallow surface soils and cable harvest is recommended for slopes >45%.

Warren Creek
The project area consists of two soils series, Winkler and Lubrecht. See Elk Creek soils and chart 1 for Winkler descriptions ad characteristics. The Lubrecht series have moderately deep, well drained soils that formed in material derived mainly from consolidated siltstone. The average annual precipitation is 16-22 inches. The Lubrecht series have a silt loam surface layer of 0-4 inches and have a gravelly silt loam subsoil layer >40 inches. Lubrecht silt loams 4-15% slopes have a moderate to high erosion hazard. Compaction and displacement hazard is high as a result of fairly shallow surface layers and high available water holding capacity. These soils stay moist late into the year and can remain extremely wet after a rain event. Moisture content is a concern for these soils before and during harvest operations.

North Fork Elk Creek
The project area in section 14 is a combination of soils (see chart 1 for specific details). The north end of the section in the project area is predominantly Winkler soils, types 130,131,132 and 133. See Elk Creek soils for Winkler soils descriptions. The rest of the project area is a combination of 3-Ambrant Rochester, warm-rock outcrop complex 30-60% slopes and Ovando-Elkner rock outcrop complex 30-60% slopes.

The Ambrant Series consists of very deep, somewhat excessively drained soils that formed in colluvium derived from granite. The average annual precipitation ranges from 17-25 inches. These soils have a surface layer of 0-4 inches consisting of gravelly sandy loam and a very gravelly course sand subsoil > 40 inches.

Map unit 3 Ambrant Rochester, warm-rock outcrop complex 30-60% slopes has a high erosion hazard due to its granitic composition and high sand content. Erosion risk increases as slope increases. Because these soils are excessively drained and contain low clay content, compaction hazard in considered low. The primary concern for soil productivity on these soils is maintaining the shallow topsoils and displacement hazard is high. Soils are shallow on the ridges Ambrant) and deeper in the draws (Rochester). These soils are best suited for winter harvest or cable operations.

The Ovando and Elkner series consists of very deep excessively drained soils that formed in igneous colluvium. The average annual precipitation is 20-30 inches. The Ovando series has a surface layer of 0-6 inches consisting primarily of gravelly sandy loam and a subsoil layer of extremely gravelly loamy course sand >40 inches. The Elkner series has a sandy loam surface layer of 0-7 inches and a subsoil layer >40 inches consisting of gravelly loamy course sand.

The Ovando-Elkner rock outcrop complex on 30-60% slopes (74) has a high erosion and displacement hazard, but a low compaction hazard. These soils contain granitics, which are very sensitive to erosion, especially as a result of management activities. Because these soils contain a high sand and fine content, surface layers are easily displaced. These soils are best suited for winter conditions or cable harvest systems.

Cap Wallace
Soil types in the project area in section 10 include; various types of Winkler (130,131,132,133,134), Crow silt loam (33), Mitten Gravelly Silt loam (69) and Tevis Mitten Complex, 8-30% slopes (103). The Winkler series descriptions can be found under Elk Creek soils and specifics in chart 1.

The Crow series consists of very deep, well drained soils that formed in alluvium and have an average annual precipitation of 16-22 inches. They have a shallow surface layer 0-1 inches of silt loam and a sandy clay loam subsoil >40 inches. Map unit 33 Crow silt loams, 4-15 % slopes have a low erosion hazard, moderate compaction, but high displacement hazard. This high displacement hazard is due to a very shallow surface layer and the soils ability to hold moisture. These soils are very sensitive to skidding on steep slope and are best suited for tractor ground on slope no greater than 40%. Moisture can also be a limiting factor to these soils, remaining wet later in the year and after rain events.

The Mitten series consists of very deep somewhat excessively drained soils that formed in Colluvium derived from argillite and quartzite bedrock and a mean annual precipitation of 25-40 inches. The surface layer of these soils is approximately 2 inches and contains a high content of volcanic ash. The subsoil layer is > 40 inches and comprised of extremely gravelly sandy loam. The primary concern to soil productivity on these soils is maintaining the shallow surface soils consisting primarily of volcanic ash. Volcanic can easily be displaced, reducing greatly the soil productivity of the site. Compaction hazard is considered low. Erosion hazard on this site is considered moderate and increases as slopes increases. These soils are suited for tractor harvest on slopes <45%.

The Tevis series consists of very deep somewhat excessively drained soils that formed in Colluvium derived from argillite and quartzite. These soils have a surface layer of 0-3 inches consisting of gravelly loams and an extremely gravelly loam subsoil layer >40 Inches. The Tevis-Mitten complex on 30-60% slopes located in the project area, have a low compaction hazard. Because the Mitten portion of these soils have volcanic ash in the surface layer and the surface layer is <3 inches, displacement hazard is high. Erosion hazard is moderate.

Fish Creek and Little Fish Creek
Soils located in the project area in section 2 are a variation of Winkler Soils including; 131Winkler very gravelly sandy loams, 30-60% slopes, 132 Winkler gravelly cool, 8-30% slopes and 133 Winkler gravelly loam cool, 30-60% slopes. Soil characteristics and specifics on these soils can be found in the Elk Creek soils section above and in chart 1.

Existing Cumulative Effects to Soils
Cumulative effects can occur from repeated disturbance in the harvest area as an additive process with each entry. Within the proposed project area, DNRC has conducted timber harvest operations since the 1940's with equipment, and early mining activities were likely by mules or horses. A majority of the proposed harvest areas was previously entered with skid trails and roads. Past harvest and mining are estimated to affect 10 to 20% of the land depending on location. These pre- Best Management Practice harvests resulted in substantial impacts to soils. Skid trails on steeper slopes resulted in rutting and soil displacement. Main skid trails are still evident from over 40 years ago, but most dispersed skid trails are barely evident. Field reconnaissance shows that the existing trails from past management are well- vegetated, relatively stable and have continued to ameliorate over time from frost and vegetation.

Table 3-7

Map unit	Parent material	Topsoil	Subsoil	WHC	Erosion Hazard	Displacement Hazard	Comp. Hazard	Notes
3	Colluvium (granitics)	Gravelly sandy loam 0-4"	Very gravelly course sand >40"	Ambrant 3.8 Rochester 2.6	H Check SMZ Bndry	H	L	Boulders common. Above avg. surface drainage needed
33 Crow 4-15%	Alluvium	0-4 Silt loam	Clay loam >40"	9.3	L	H	H	Sensitive to wet operations Productive site
68 Lubrecht 4-15%	Consolidated Siltstones	Silt loam 0-4"	Silty loam >40"	6.1	M	H	H	Sensitive to wet operations Productive site
69	Colluvium derived from argillite and quartzite	0-9" silts loams from Volcanic ash	Extremely gravelly sandy loam >40"	3.2	M	H	M	Tractor suitable up to 45% Avoid excess soil displacement
74	Igneous colluvium	Gravelly sandy loam 0-6"	Extremely gravelly loamy course sand >40"	Ovando 2.1 Elkner 4.7	H H Check SMZ Bndry	H	L	Boulders common. Above avg. surface drainage needed
102	Colluvium derived from argillite and quartzite	Gravelly loam 0-3"	Extremely gravelly sandy loam >40"	2.8	Mod- H	H	M	
103	Colluvium derived from argillite and quartzite -	Tevis- 0-2" Gravelly loam Mitten- 0-9" Volcanic ash	Tevis Extremely gravelly loam>40" Mitten- Extremely gravelly sandy loam>40"	9Tevis- 2.8 Mitten-3.2	Tevis M Mitten M	Tevis M Mitten H	Mod to hi if wet	Volcanic ash surface is intermittant
130	Colluvium derived from argillite and quartzite	Very gravelly sandy loam 03"	Very gravelly sandy loam >40"	Droughty 3.0"	L	M	M	
131	Colluvium derived from argillite and quartzite	Very gravelly sandy loam 03"	Extremely gravelly sandy loam >40"	Droughty 3.0"	M	H	L	Tractor suitable up to 45% Avoid excess soil displacement
132	Colluvium derived from argillite and quartzite	Gravelly loam 0-4"	Extremely gravelly sandy loam >40"	Droughty 3.0"	L	M	M	Similar to 130 with slightly deeper topsoil and more productive
133	Colluvium derived from argillite and quartzite	Gravelly loam 0-4"	Extremely gravelly sandy loam >40"	Droughty 3.0"	M	H	L	Tractor suitable up to 45% Avoid excess soil displacement
134	Colluvium derived from argillite and quartzite	Gravelly loam 0-4"	Extremely gravelly sandy loam >40"	Droughty 3.0"	M	H	L	Rocky site limits plant growth

Threatened, Endangered, and Sensitive Sp[ecies

Threatened and Endangered Species Existing Conditions

Bald Eagle (Federally threatened)

Bald eagles typically nest and roost in large diameter trees within 1 mile of open water. They are sensitive to a variety of human caused disturbances, ranging from residential activities to resource use and heavy equipment operation, among others (Montana Bald Eagle Working Group 1994). Bald eagle response to such activities may range from spatial and temporal avoidance of disturbance activities to total reproductive failure and abandonment of breeding areas (MBEWG 1994). While foraging, they typically perch within 500 m of shoreline habitat (Mersmann 1989); and roost in trees ranging in diameter from 12 to 39 inches and 49 to 200 feet in height (Stalmaster 1987). Eagles are generally associated with aquatic foraging habitat. However, roost trees are located away from houses and roads throughout their range (Buehler 2000). The project area is located approximately 1.7 miles southeast of a bald eagle nest. The nest is located along

the Blackfoot River, and is located approximately 0.5 mile from a road that could be used for hauling.

Grizzly Bear (Federally threatened)
Grizzly bears are the largest terrestrial predators in North America, feasting upon deer, rodents, fish, roots and berries, as well as a wide assortment of vegetation (Hewitt and Robbins 1996). Depending upon climate, abundance of food, and cover distribution, home ranges for male grizzly bears in northwest Montana can range from 60 - 500 mi^2 (Waller and Mace 1997). The search for food drives grizzly bear movement, with bears moving from low elevations in spring to higher elevations in fall, as fruits ripen throughout the year. However, in their pursuit of food, grizzly bears can be negatively impacted through open roads (Kasworm and Manley 1990). Such impacts are manifested through habitat avoidance, poaching, and vehicle collisions.

The project area is approximately 14.5 miles southwest of the Northern Continental Divide Ecosystem grizzly bear recovery area. The nearby Blackfoot Clearwater Wildlife Management Area (hereafter Game Range) and Baldy Mountain, have had repeated grizzly bear activity in recent years (J. Jonkel, MT FWP, personal communication, 2003). Thus, the proposed project area may be part of one or more grizzly bear home ranges. Therefore, the cumulative effects analysis area for grizzly bears encompasses 655 square miles (419,382 acres), including the Game Range and Baldy Mountain.

Grizzly bears are known to be more vulnerable to human interaction in areas with high open road densities or ineffective road closures. Currently there are 1.33 miles of open road per square mile (simple linear calculation; 869 miles of open road), and 2.9 total miles of road per square mile (1,910 miles of road), within the 655 square mile grizzly bear analysis area. Within the project area, there are approximately 2.47 miles of open road per square mile (project area is approximately 4.25 square miles), and approximately 3.9 miles of total road per square mile (simple linear calculation).

Gray Wolf (Federally endangered)
Wolves were recently classified as endangered under the Endangered Species Act. Cover, and road and prey densities likely have some influence on wolves (road densities reported under grizzly bear). For cumulative effects analysis, the analysis area will be the same as that of the grizzly bear. Wolf activity within the analysis area is restricted to the Blanchard pack, located approximately 2 miles north of the project area, near Clearwater Junction (U. S. Fish and Wildlife Service 2002). Mule deer, white-tailed deer, elk, and moose are known to use the area. Currently, no known wolf den or rendezvous site is located within 1 mile of the project area.

Canada Lynx (Federally threatened)
Lynx are currently classified as threatened in Montana under the Endangered Species Act. In North America, lynx distribution and abundance is strongly correlated with snowshoe hares, their primary prey. Consequently, lynx foraging habitat follows the predominant snowshoe hare habitat, early- to mid-successional lodgepole pine, subalpine fir, and Engelmann spruce forest. For denning sites, the primary component appears to be large woody debris, in the form of either down logs or root wads (Squires and Laurion 2000, Mowat et al. 2000, Koehler 1990). These den sites may be located in regenerating stands that are >20 years post-disturbance, or in mature conifer stands (Ruediger et al. 2000, Koehler 1990).

Elevations in the project area range from 3,940 to 5,600 feet, and habitat types (Pfister et al. 1977) suitable for potential foraging occur in the area. Snowshoe hares are associated with dense young stands in subalpine fir habitat types, as well as mature stands with subalpine fir understories. Recent research (Squires et al. 2003) indicates that the only known lynx population in the Garnet Mountain Range is located on the

northern fringes of the project area. In Montana, the annual average home range for male lynx is 42 square miles and 35 square miles for female lynx (Squires and Laurion 2000). Unpublished results of the Squires et al. (2003) research suggests that wintering lynx tend to rely most heavily on pole to mature stands with high levels of vegetative structure at snow level in order to survive the winter. Further, snowshoe hare densities tend to be greatest in these habitats, and lynx seek out hares in these habitats (J. Squires, U. S. Forest Service, personal communication, February 2005). Table 3-8 displays the quantity of potential lynx habitat within the project area. Table 3-9 describes the land ownership within the 525 sq. mile cumulative effects analysis area (335,768 ac.). Over one-third of the analysis area is managed by Plum Creek Timber Company, and approximately 9% is managed by DNRC. Table 3-10 breaks down the type of lynx habitat within the project area and on School Trust lands within the cumulative effects analysis area. Temporary non-lynx habitat denotes: seedling stands; sapling to old age class stands with <40% canopy closure; non-stocked clearcuts; and stand-replacement burns which are likely to develop future habitat characteristics through forest succession that are important to lynx. Lynx other habitat means forest lands in lynx habitat that do not meet the habitat definitions for denning, mature foraging, young foraging, or temporary non-lynx habitat, but serve to provide cover to facilitate movement and acquisition of alternative prey species, such as red squirrels.

Table 3-8 Potential lynx habitat within the project area.

Lynx Habitat	Acres
Temporary Non-lynx Habitat	32
Other	131
Young Foraging	0
Mature Foraging	164
Denning	0
Total	**327**

Table 3-9 Land ownership within the 525 square mile lynx cumulative effects analysis area.

Land Owner	Acres
The Nature Conservancy	13
U. S. Forest Service	25
Water	100
Montana Department of Transportation	556
Montana Fish, Wildlife, and Parks	554
Lubrecht Experimental Forest	19,774
Montana DNRC	29,838
BLM	72,287
Private lands	91,978
Plum Creek Timber Company	120,657
Total	**335,782**

Table 3-10 Distribution of lynx habitats on School Trust lands within the project area and cumulative effects analysis area. Data are from DNRC Stand Level Inventory database (after accounting for habitat changes due to 2003 "Dirty Ike fire salvage", "Elk 36" and "Lost Bear" timber sales).

Lynx Habitat	**Project Area (ac.)**	**Analysis Area (ac.)**
Temporary Non-lynx Habitat	32	1,084
Other	131	1,563
Young Foraging	0	52
Mature Foraging	164	742
Denning	0	22
Total	**327**	**3,463**

Sensitive Species Existing Conditions

Fisher

The fisher is a medium-sized animal belonging to the weasel family. Fishers prefer dense, lowland spruce-fir forests with high canopy closure, and avoid forests with little overhead cover and open areas (Powell 1978, Powell 1978, Powell 1977, Kelly 1977, Powell 1977, Kelly 1977, Clem 1977, Coulter 1966, Coulter 1966). For resting and denning, fishers typically use hollow trees, logs and stumps, brush piles, and holes in the ground (Coulter 1966, Powell 1977).

Within a 1-mile radius of the project area, there are approximately 1,163 acres of fisher preferred habitat types on School Trust parcels. Of these acres, approximately 1,058 acres occur within the project area.

Flammulated Owl

The flammulated owl is a tiny forest owl that inhabits warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and is a secondary cavity nester. Nest trees in 2 Oregon studies were 22-28 inches dbh (McCallum 1994). Habitats used have open to moderate canopy closure (30 to 50%) with at least 2 canopy layers, and are often adjacent to small clearings. It subsists primarily on insects and is considered a sensitive species in Montana. Periodic underburns may contribute to increasing habitat suitability for flammulated owls because low intensity fires would reduce understory density of seedlings and saplings, while periodically stimulating shrub growth. Within the project area there are approximately 2,317 acres of flammulated owl preferred habitat types, and an active nest was located in section 16 in 2005.

Pileated Woodpecker

The pileated woodpecker is one of the largest woodpeckers in North America (15-19 inches in length), feeding primarily on carpenter ants (*Camponotus* spp.) and woodboring beetle larvae (Bull and Jackson 1995). The pileated woodpecker nests and roosts in larger diameter snags, typically in mature to old-growth forest stands (McClelland et al. 1979, Bull et al. 1992)(McClelland et al. 1979). Due primarily to its large size, pileated woodpeckers require nest snags averaging 29 inches dbh, but have been known to nest in snags as small as 15 inches dbh in Montana (McClelland 1979). Pairs of pileated woodpeckers excavate 2-3 snags for potential nesting sites each year (Bull and Jackson 1995). Snags used for roosting are slightly smaller, averaging 27 inches dbh (Bull et al. 1992). Overall, McClelland (1979) found pileated woodpeckers to nest and roost primarily in western larch, ponderosa pine, and black cottonwood. The primary prey of pileated woodpeckers, carpenter ants, tend to prefer western larch logs with a large end diameter greater than 20 inches (Torgersen and Bull 1995). Thus, pileated woodpeckers generally prefer western larch and ponderosa pine snags > 15 inches dbh for nesting and roosting, and would likely feed on downed larch logs with a large end diameter greater than 20 inches.

The most abundant habitat type (Pfister et al. 1977) within the affected area is Douglas-fir/snowberry (Stand Level Inventory database). Within the affected parcel, there are approximately 717 acres that are predominately ponderosa pine or western larch, with average stand diameter $\geq$ 15 inches dbh that would be considered suitable pileated woodpecker habitat (SLI database). The cumulative effects analysis area will encompass the project area and the sections between the affected School Trust parcels. Pileated woodpeckers have been seen and/or heard throughout the project area during several field visits (M. McGrath, Wildlife Biologist, personal observations). Potential nest cavities were identified in ponderosa pine snags in Section 10.

Other Issues

Sharp-shinned Hawk

The sharp-shinned hawk is a forest habitat generalist whose primary prey consists of small songbirds (e.g., thrushes, warblers, and sparrows; approximately 70%) and small mammals (Johnsgard 1990). Sharp-shinned hawk nesting habitat is typically in younger forest stands, but may vary in average stand diameter (range: 4" to 11" dbh) and average tree height (range: 28 ft to 89 ft; (Siders and Kennedy 1996, Siders and Kennedy Patricia L. 1994, Moore and Henny 1983, Reynolds et al. 1982). In general, the sharp-shinned hawk will prey on species that inhabit all forest seral stages, and seems adaptable in its nesting habitat requirements. An active sharp-shinned hawk nest was located in section 14 during the summer of 2003. However, no sign of use of the 2003 was observed in 2004 (M. McGrath, SWLO Wildlife Biologist, personal observation).

The analysis area for the sharp-shinned hawk is 43,705 acres in size. Within the analysis area, approximately 5,210 acres have recently been harvested on Plum Creek land, approximately 300 acres will be harvested on School Trust lands under the Lost Bear Timber Sale, and approximately 2,400 acres have been harvested on BLM lands, to an extent that would not meet sharp-shinned hawk nesting habitat requirements. Thus, approximately 35,000 acres of the analysis area (approximately 80%) have forested stands with canopy closure >50% (using orthophotos from 1995 at a scale of 1:81,218). Much of the forested area within the project area could be used by sharp-shinned hawks for either foraging or nesting habitat.

Northern Goshawk

The northern goshawk (hereafter goshawk) is a forest habitat generalist with specific nesting habitat requirements (McGrath et al. 2003, Squires and Reynolds 1997, Reynolds et al. 1992). The goshawk forages on a wide range of species, with the most predominant prey being snowshoe hare, Columbian ground squirrels, red squirrels, blue and ruffed grouse, northern flickers, American robins, gray jays, and Clark's nutcrackers (Squires 2000, Clough 2000, Watson et al. 1998, Cutler et al. 1996, Boal and Mannan 1996, Reynolds et al. 1992). Thus, given the diverse array of prey species, goshawks forage from a diverse array of habitats. However, (Beier and Drennan 1997) found goshawks to forage in areas based primarily on habitat characteristics rather than prey abundance. Beier and Drennan (1997) found goshawks to forage selectively in forests with a high density of large trees, greater canopy closure, high basal area, and relatively open understories. For nest stands, goshawks will nest in pine, fir, and aspen stands on north-facing slopes that are typically in the stem exclusion or understory reinitiation stages of stand development, with higher canopy closure and basal area than available in the surrounding landscape (McGrath et al. 2003, Finn et al. 2002, Clough 2000, Squires and Reynolds 1997, Reynolds et al. 1992). Nests are typically surrounded by stem exclusion and understory reinitiation stands (with canopy closure $\geq$ 50%) within the 74 acres surrounding the nest; higher habitat heterogeneity than the surrounding landscape, and an avoidance of stands in the stand initiation stage of stand development typify habitat in the 205 acres surrounding goshawk nests (McGrath et al. 2003). Goshawk home ranges vary in area from 1,200 to 12,000 acres depending on forest type, prey availability, and intraspecific competition (Squires and Reynolds 1997).

Within the 43,705 acre analysis area for goshawks, approximately 5,210 acres have recently been harvested on Plum Creek land, approximately 300 acres will be harvested on School Trust lands under the Lost Bear Timber Sale, and approximately 2,400 acres have been harvested on BLM lands, to an extent where they would not meet goshawk nesting habitat definitions. Thus, approximately 35,000 acres of the analysis area (approximately 80%) have forested stands with canopy closure >50% (using orthophotos from 1995 at a scale of 1:81,218). Much of the forested area within the project area could be used by goshawks for either foraging or nesting habitat. A potential goshawk nest was located in section 14 and an adult goshawk was seen in section 16 during the

summer of 2003. However, no sign of recent use of the nest site was observed (M. McGrath, SWLO Wildlife Biologist, personal observation).

Big Game

White-tailed and Mule Deer

Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and hiding cover for deer in winter, which can reduce energy expenditures and stress associated with cold temperatures, wind, and human-caused disturbance. Areas with densely stocked mature trees are also important for snow interception, which makes travel and foraging less stressful for deer during periods when snow is deep. Dense stands that are well connected provide for animal movements across wintering areas during periods with deep snow, which improves their ability to find forage and shelter under varied environmental conditions. Thus, removing cover that is important for wintering deer through forest management activities can increase their energy expenditures and stress in winter. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local deer herds.

Within the project area, there are approximately 894 acres of densely canopied forest, which could provide snow-intercept, and possibly thermal cover for deer. Within the larger cumulative effects analysis area, an approximately 135,158 acre area that encompasses both the Lindbergh and Chamberlain elk herds, there are approximately 29,935 acres of snow intercept/thermal cover (determined using orthophotographs dated July to August 1995). Additionally, grazing has historically occurred on parcels in sections 4 and 10, with 133 AUMs between the two parcels.

Elk

Elk generally avoid open roads, but become more tolerant of closed roads in the area over time (Lyon 1998). Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and hiding cover elk in winter, which can reduce energy expenditures and stress associated with cold temperatures, wind, and human-caused disturbance. Additionally, extensive (e.g., ≥250 acres) areas of forest cover ≥0.5 miles from open roads serve as security for elk. Thus, removing cover that is important for wintering elk through forest management activities can increase their energy expenditures and stress in winter. Reductions in cover could ultimately result in a reduction in winter range carrying capacity and subsequent increases in winter mortality within local deer herds.

Within the project area, there are currently approximately 1.43 miles of closed road per square mile (see explanation in under grizzly bears; simple linear calculation), and 894 acres of forest cover that could be used for snow-intercept cover. There are approximately 250 acres of forest cover within the project area (all in section 14) that could currently be used for security cover during the hunting season.

The cumulative effects analysis area encompasses approximately 211 square miles, and corresponds to the combined seasonal home ranges of the Chamberlain and Lindbergh elk herds (Burcham et al. 1998). Within the analysis area, there are approximately 497 miles of open road, for a total of 2.36 miles of open road per square mile (simple linear calculation), and at least 764 miles of total road, for a total of at least 3.62 miles of total road per square mile (simple linear calculation). There are 29,935 acres of forest cover that could be used for snow-intercept cover, and approximately 4,745 acres (3.5% of cumulative effects analysis area) of forest cover that could be used for security cover during the hunting season.

Moose

Moose are the largest ungulate in North America, distributed throughout Alaska, Canada, and many of the border states. In general, moose habitat includes: areas of abundant high-quality winter browse; shelter areas that allow access to food; isolated sites for calving; aquatic feeding areas, young forest stands with deciduous shrubs and forbs for summer feeding; mature forest that provides shelter from snow or heat; and mineral licks (Thompson and Stewart 1998). As such, much of the project area receives use by moose. The analysis area for moose corresponds with an 85,733 acre winter range mapped by MT FWP, of which approximately 2,494 acres overlaps the affected School Trust parcel. There are approximately 33,397 acres of seed-tree/shelterwood harvest, clearcuts, and grassland within the analysis area, and none of these acres are located within the project area.

Noxious weed concerns:

There has been a concern raised regarding noxious weeds and their spread. Noxious weeds, mainly knapweed (*Centaurea maculosa*) and spots of thistle (*Cirsium arvense*) and houndstounge (*Cynoglossum officinale*) occur within the project area, mainly along existing roads. Spotted knapweed has aggressively invaded areas of the Northern Rockies (Rice, et al., 1992). Knapweed occurs as spot infestations on roadside edges within these State sections. South slopes are droughty and at higher risk of weed establishment. Cattle grazing and timber harvest are most likely the reason for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds.

Knapweed was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides and stream banks with isolated spot infestations found within the forested area. Thistle was mostly found along roadsides with very few spot infestations found within the forested areas.

Existing Recreational Opportunities

Concerns were posed regarding the effects of this potential project on recreational opportunities within this area. Currently, many people use this area as hunting access (part of a walk-in area administrated by the Montana Dept. of Fish, Wildlife, and Parks).

Within section 16, there is access into the section along the Elk Creek road. All other areas are accessed behind gates set up as portals for the walk-in area. Cap Wallace road is open during the dates of December 2nd and August 31st. During this time many people access the Garnet Mountain Range via this road. This is a BLM road, and it is closed during hunting season. Typical use includes simple driving, huckleberry harvest, firewood cutting. This road travels through sections 10 and 14. Sections 2, 4, and the northern portion of section 10 are accessed by way of roads that leave the main road that is gated on Sunset Hill access point.

People also have been noted mountain biking, walking / jogging, horseback riding, and searching for shed antlers within these areas. These activities (with the exception of searching for shed antlers) occur upon existing roads or on trails that have been developed by big game and human use.

Aesthetics of the proposed sale area:

This proposed project has several areas that would be visible to the viewing public.

The landscapes in the greater area are influenced by glaciation (such as Seeley Lake or areas near Ovando, Mt.) with steep glaciated peaks and lower rolling ridges, or have been carved and formed by the Blackfoot River. The landscape within the project area is mountainous with deep canyons formed by the streams that still occupy the bottom areas.

The Blackfoot River is located west and northwest of the proposed project. The river itself is free flowing with frequent riffles and meanders. The terrain gently slopes upward in a series of

benches moving upward in elevation to the east and southeast of the river. These benches are moderately to heavily timbered. Slopes range from relatively flat (closer to the river) to roughly 60 - 70 percent. Portions of sections 2, 4, 10, and 16 face Highway 200. Several primary road systems such as Elk Creek and Sunset Hill are present, and roads such as Cap Wallace road are seasonally open to public travel. See the end of this chapter for picture of "visible areas" the proposed project area.

Analysis Methods

The visual resource analysis was conducted by utilizing the Visual Management System (USDA 1977a, USDA 1977b, USDA 1980a, USDA 1980b), and the Scenery Management System (USDA 1995). Both of these were developed by the U.S. Forest Service and have been used to describe the existing conditions, effects of actions, and mitigations for projects. Information used in this analysis was gathered from field visits, analysis of photographs and seen area maps, and the study of landscape patterns in the area.

Existing Scenic Integrity

"Scenic integrity" has to deal with the "state of naturalness" or state of disturbance created by human activities or alterations". This project area has been inventoried as having a MODERATE scenic integrity level overall. Areas within the drainage are however inventoried much lower.

Areas with moderate scenic integrity "appear slightly altered, however, noticeable deviations to the landscape must remain visually subordinate to the overall viewed landscape". "Unacceptably Low" is where "deviations from the landscape are extremely dominant and borrow little from natural color, line, texture, form or scale".

Visual Absorption Capacity

This area was inventoried to determine its Visual Absorption Capacity or VAC. VAC is defined as the "physical ability of the land to support management activities and to maintain scenic integrity". Factors that aid in determination of the VAC are: the natural forms, lines, colors, and textures; the distance between the project area and the viewpoints; the estimated number of viewers; and the relative sensitivity of those viewers to the scenery around them.

As just stated, one of the factors that determines VAC is the distance between the project area and the viewpoints. This is generally categorized into three groups; foreground viewing (distances from the viewer's position out to around 2 mile), middle ground viewing (distances from 2 mile to 4 miles from the observer), and background viewing (distances greater than 4 miles from the viewer's position). A subgroup of foreground viewing is the detailed feature landscape within the first few hundred feet of the observer.

Often slope impacts the amount of VAC by enhancing any changes in form, line, color, or texture. In the most simple terms: the steeper the slope, the lower the VAC. This means that a harvest prescription that is barely visible on gently sloping ground can be highly visible when on steep ground.

Scenic Inventory

The inventory gathered includes viewing the project area from; Elk Creek road within section 16, the Cap Wallace road as it travels within section 10 and 14, the town of Greenough, Montana and the location of Sunset school, and Highway 200 along the route from Elk Creek east to Woodchuck canyon. The following is a scenic inventory of each location named above.

Elk Creek road: Within the canyon in section 16, visible areas are limited. Harvested areas have a high VAC, but are mostly hidden from view. Areas

planned to be pre-commercially thinned is currently HIGH, but again given the steep slope adjacent to the road, the VAC would be similar to a "flat" view elsewhere. In places where the viewer can see up the open south facing ridges, the VAC again is similar to that mentioned previously, but again is HIGH, but these areas are not within the proposed project area.

Cap Wallace road: From the Cap Wallace road there are views into portions of the north portion of section 10. The scenic integrity currently is MODERATE. The viewer can still see skid trails from the last harvest (1920's and 30's). These are straight trails directly downhill or to a sidehill "trail" that is still noticeable. Adjacent to the Cap Wallace road, currently the scenic integrity is MODERATE – HIGH given the large amount of trees and large woody debris. However, you can still see skid trails and old stumps that will decrease the "naturalness" of the view. Within section 14, a majority of the existing scenic integrity would be MODERATE. This is primarily because of old skid trails, two track roads created by public drivers, logging adjacent to the section lines, and old roads that junction with the main road.

Sunset school: Sunset school area has a good view of the project area. From here you can see section 4, the north half of section 10 and portions of the southern part (section line with section 9). Small portions of section 2 can be seen as with portions of section 16. The area seen of section 16 is along a ridgetop. Standing trees within section 9 will block much of this area. Currently these areas are all MODERATE to MODERATE – HIGH. Portions of section 4 are primarily flat with a low VAC. The north portion of section 10 is very obvious (due to increased slope) and faces to the northwest. This is obvious to both the highway and Sunset school.

Highway 200 Elk Creek: The scenic integrity from the highway from the Elk Creek area is MODERATE-LOW. This is generally because of the drastic changes between DNRC, small private, and Lubrecht Experimental Forest land and the ground currently owned by Plum Creek Timber Company (PCTC). There is a definite line (section lines) that can be seen between the above ownerships. From this location you can see section 4 and 10 (see above), the top of section 2 and 16. Regarding the areas viewed of section 2, 4, and 16, they are flat and have high VAC.

Highway 200 Woodchuck canyon: The scenic integrity from this portion of the highway is generally MODERATE – LOW. Again, there is a large difference between the PCTC land and the surrounding owners. This creates large obvious lines, and the open nature of the PCTC land. View from this area includes; a larger view of the ridge feature in section 2, the north face of section 10, and the northeast corner of section 16. The main ridge feature that runs along the section line is between section 16 and section 9. At this distance, everything within the sale is "background viewing".

Economics

Currently, revenue is not being generated from the sale of timber on this section. The costs related to the administration of the forest product sales program are only tracked at the Land Office and statewide level. DNRC does not track project level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by Land Office and Statewide. The following revenue-to-cost ratios are a measure of economic efficiency.

Table 3-11

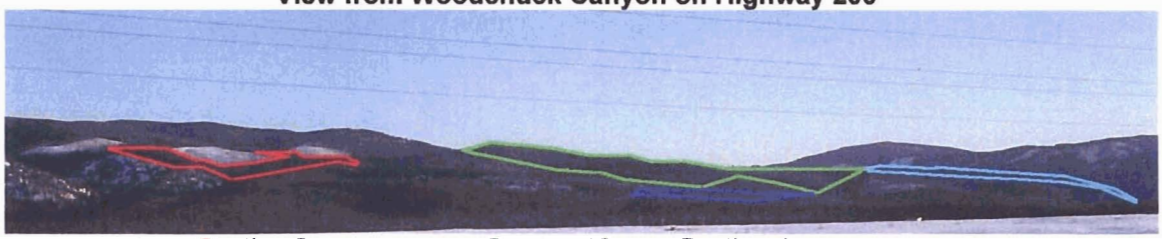
Revenue – Cost ratios*					
Location	**FY00**	**FY01**	**FY02**	**FY03**	**FY04**
SWLO	2.36	2.69	2.57	1.61	2.74
State	2.78	1.62	1.75	1.75	1.82

* FY05 (July 1, 2004 – June 30, 2005) has not been released at this time

Total revenue is revenue from timber sales, permits, FI and road maintenance, and total cost is the sum of timber operating and general administration costs. Net return is total revenue less total cost.

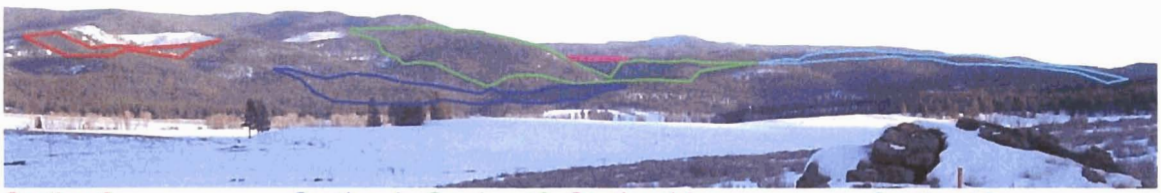
VIEWSHEDS OF THE PROPOSED HAYWIRE WALLACE TIMBER SALE

View from Woodchuck Canyon on Highway 200*



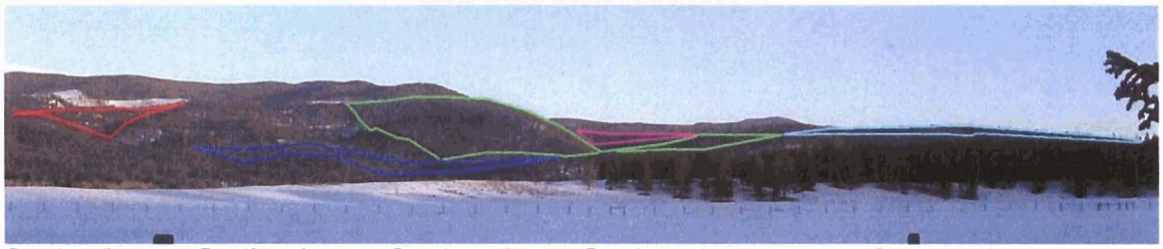
Section 2 Section 10 Section 4

View from Elk Creek on Highway 200*



Section 2 Section 4 Section 10 Section 14 Section 16

View from Sunset School*



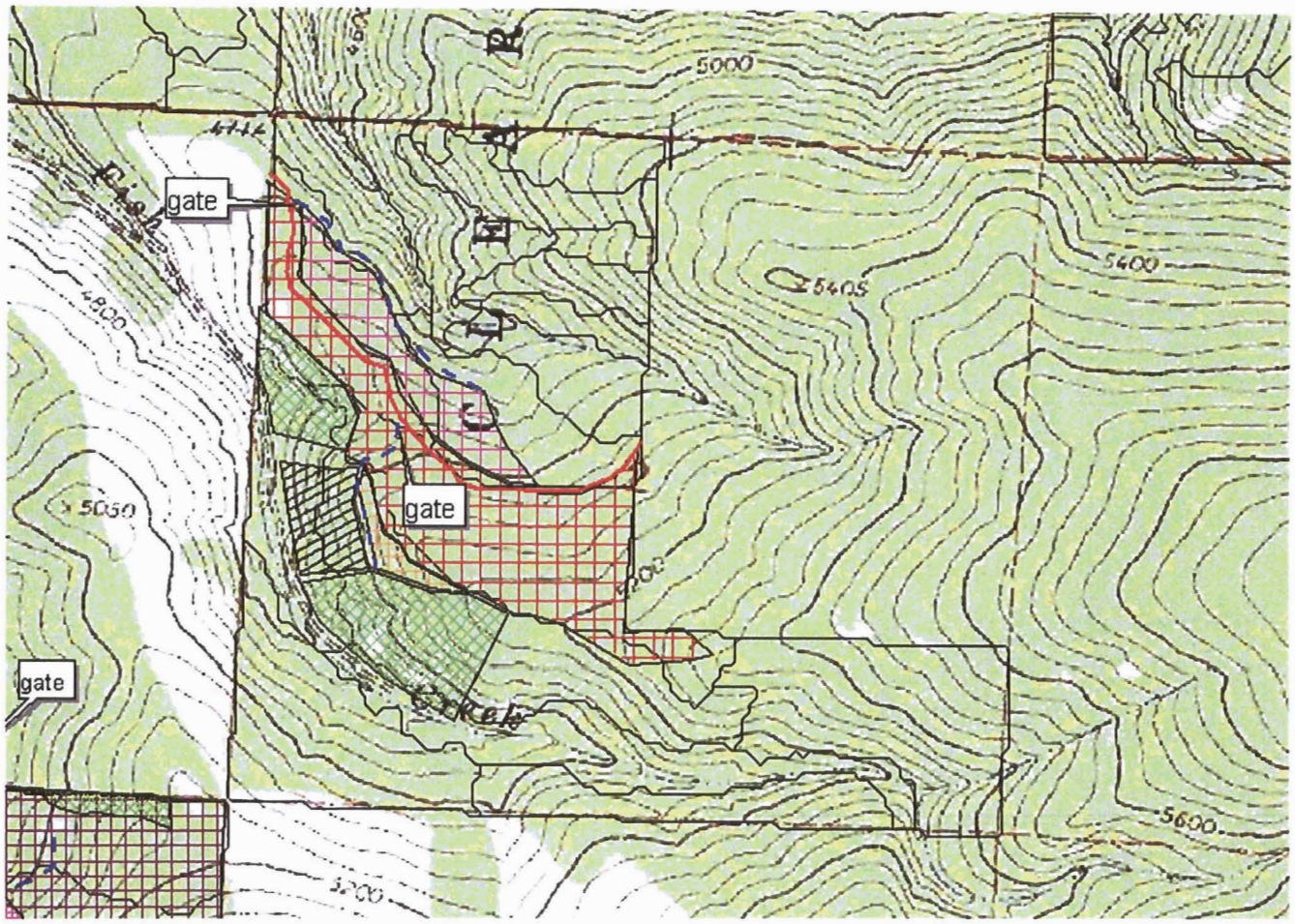
Section 2 Section 4 Section 10 Section 14 Section 16

View of Section 16 from Elk Creek Road

*** The sections lines drawn on above pictures and highlights are estimated, these are provided to help display proposed project area and what potentially may be seen.**

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Proposed Action
Section 2
T.13N. R.14W.



0.3 0 0.3 0.6 Miles

CVN 8-29-05

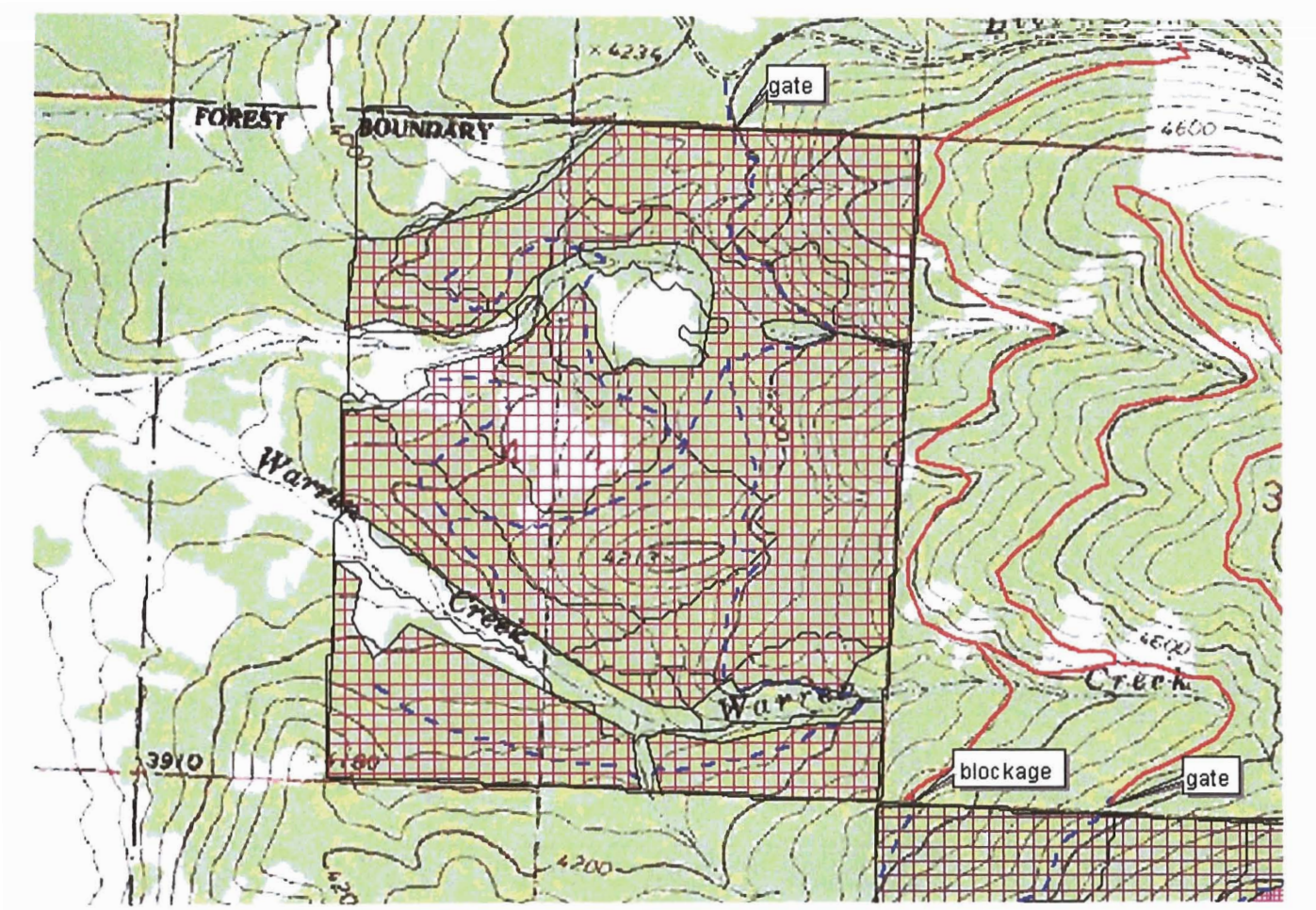
LEGEND

- example of harvest unit
- pre-commercial thinning
- existing road
- proposed road

APPENDIX A-1

N
W E
S

Proposed Action
Section 4
T.13N. R.14W.



0.3 0 0.3 0.6 Miles

CVN 8-29-05

LEGEND

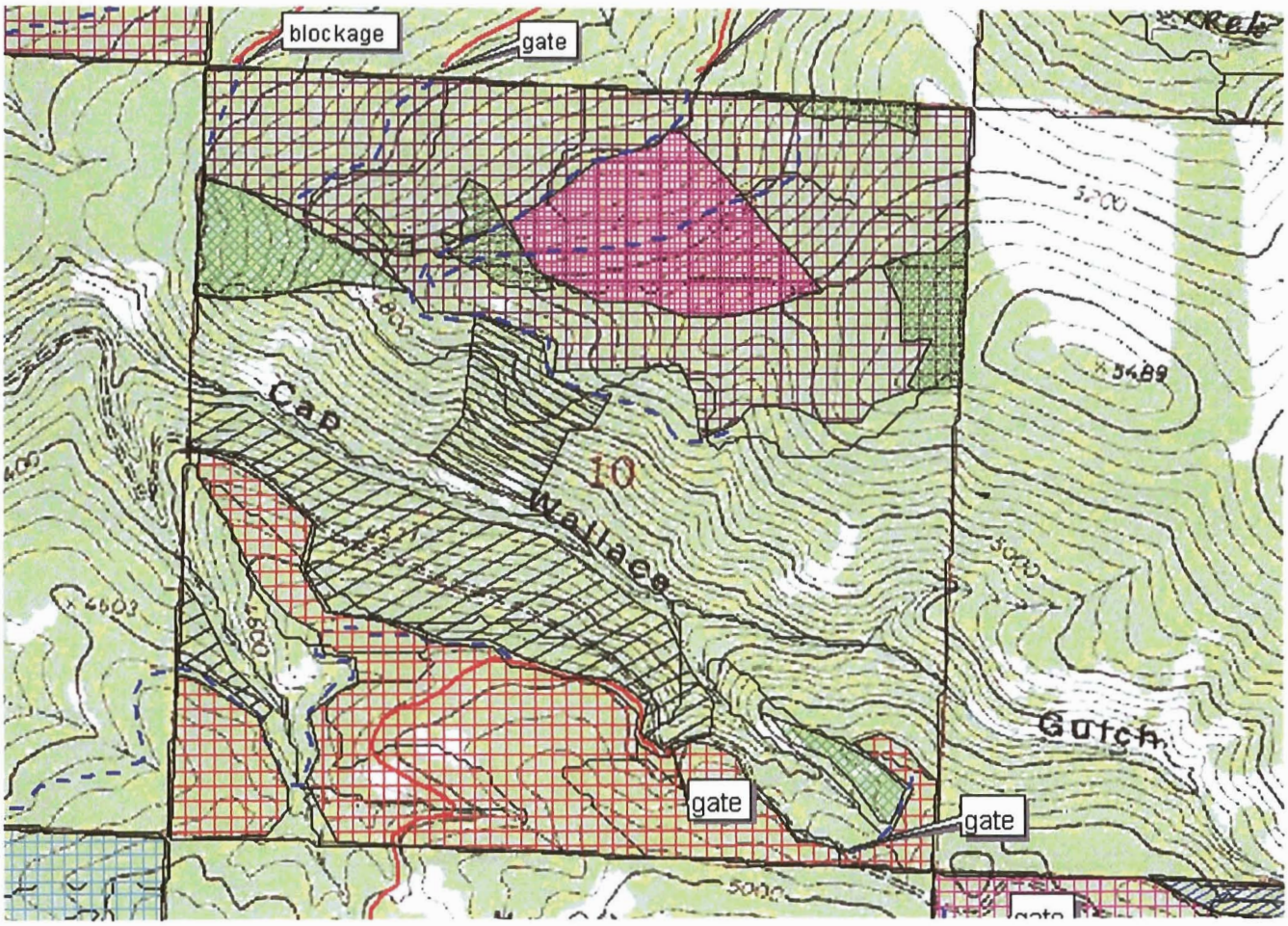
example of harvest unit

proposed road

N
W E
S

APPENDIX A-2

Proposed Action
Section 10
T.13N. R.14W.



0.3 0 0.3 0.6 Miles

CVN 8-29-05

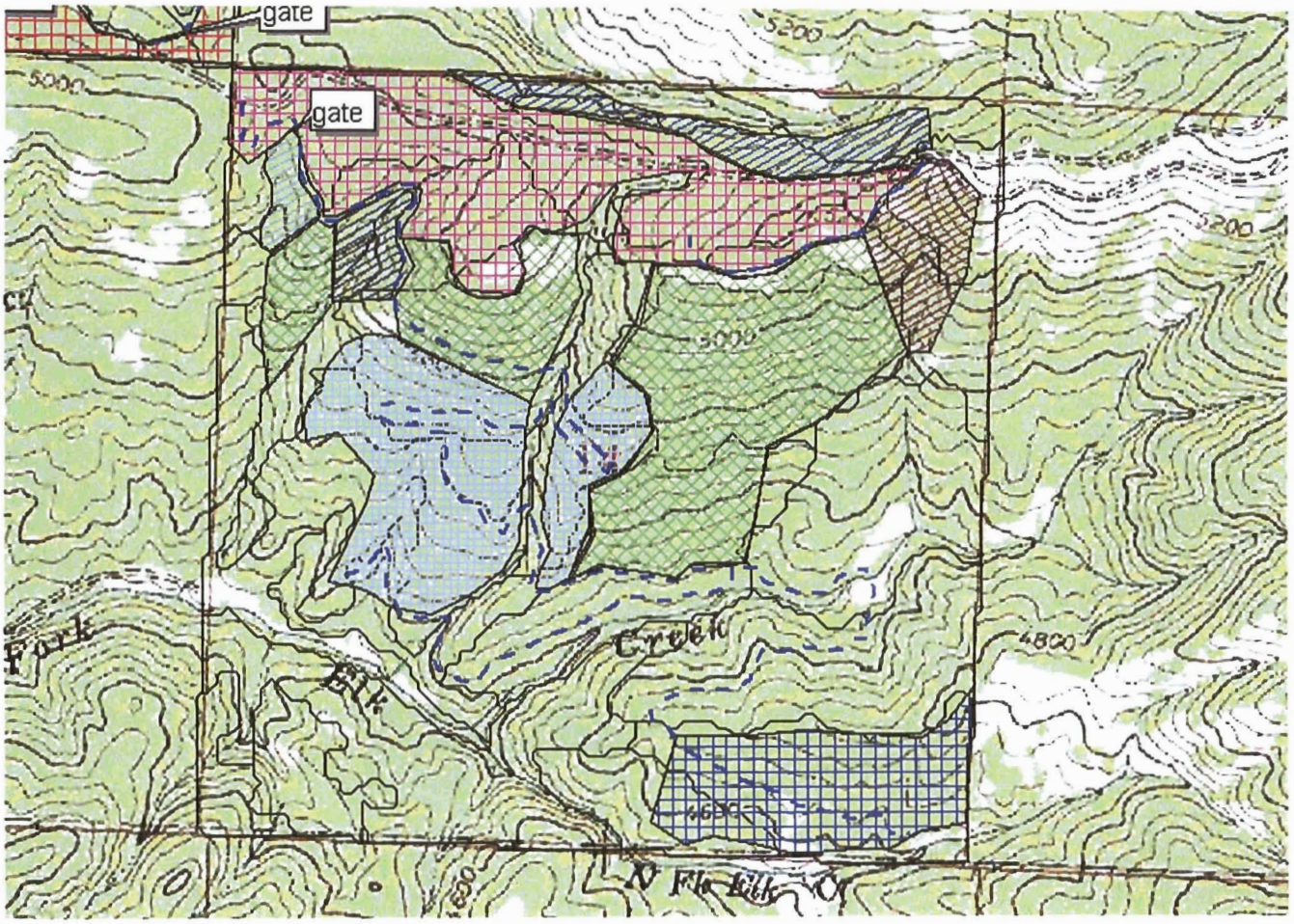
LEGEND

- example of harvest unit
- pre-commercial thinning
- existing road
- proposed road

N
W E
S

APPENDIX A-3

Proposed Action
Section 14
T.13N. R.14W.



CVN 8-29-05

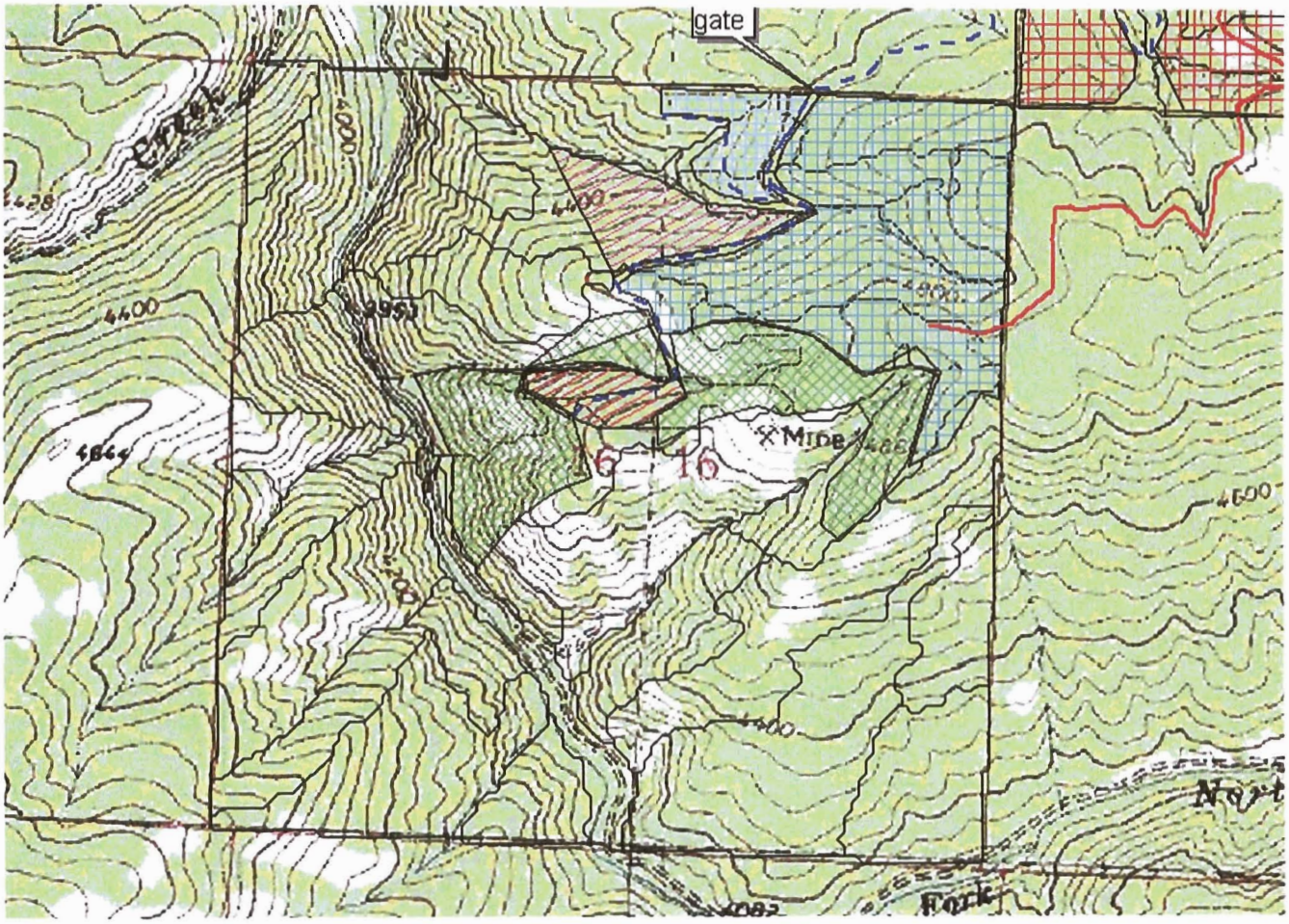
LEGEND

- example of harvest unit
- pre-commercial thinning
- existing road
- proposed road

APPENDIX A-4

N
W
E
S

Proposed Action
Section 16
T.13N. R.14W.



0.3 0 0.3 0.6 Miles

CVN 8-29-05

LEGEND

example of harvest unit

pre-commercial thinning

existing road

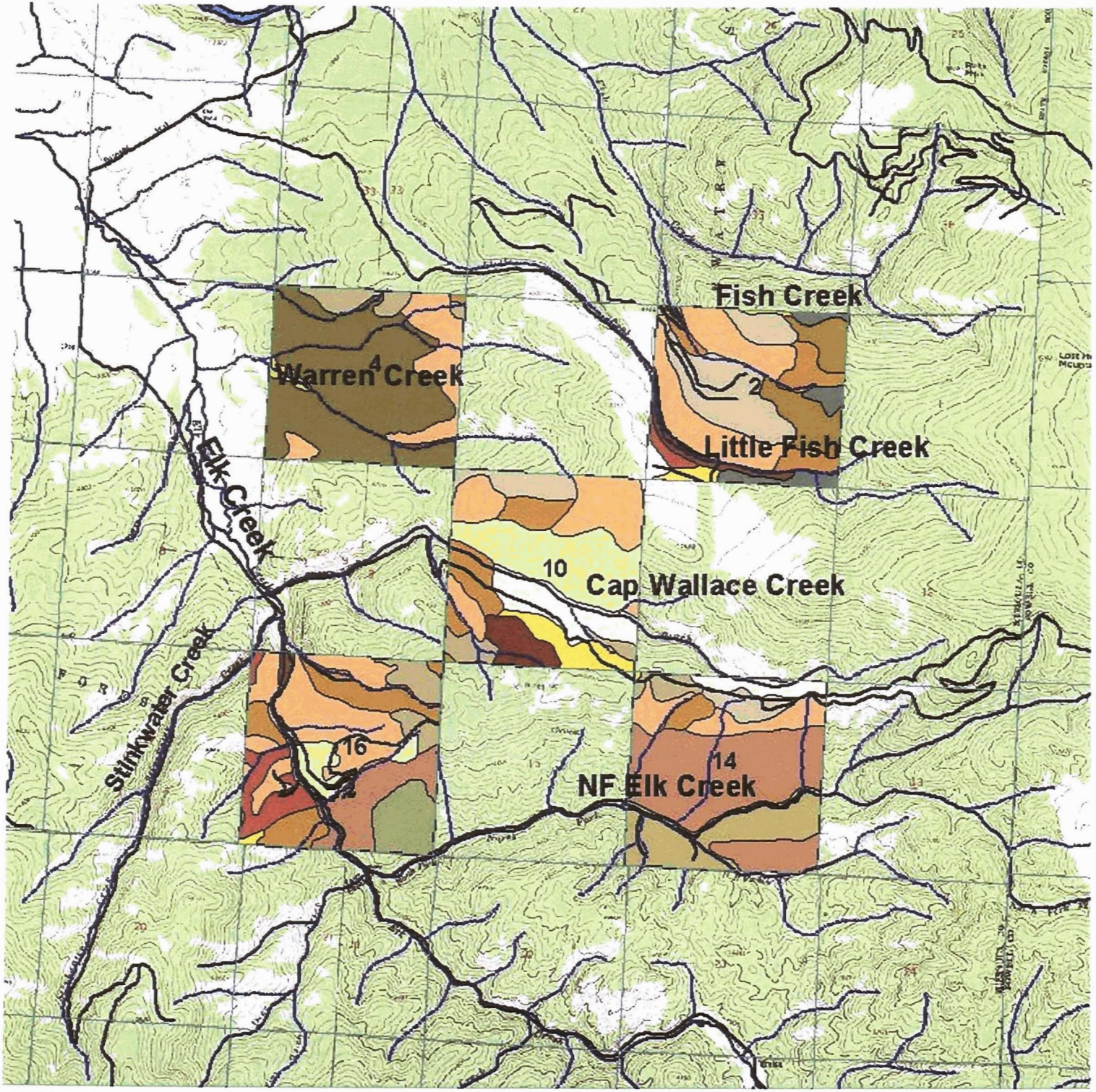
proposed road

APPENDIX A-5

N

W E

S



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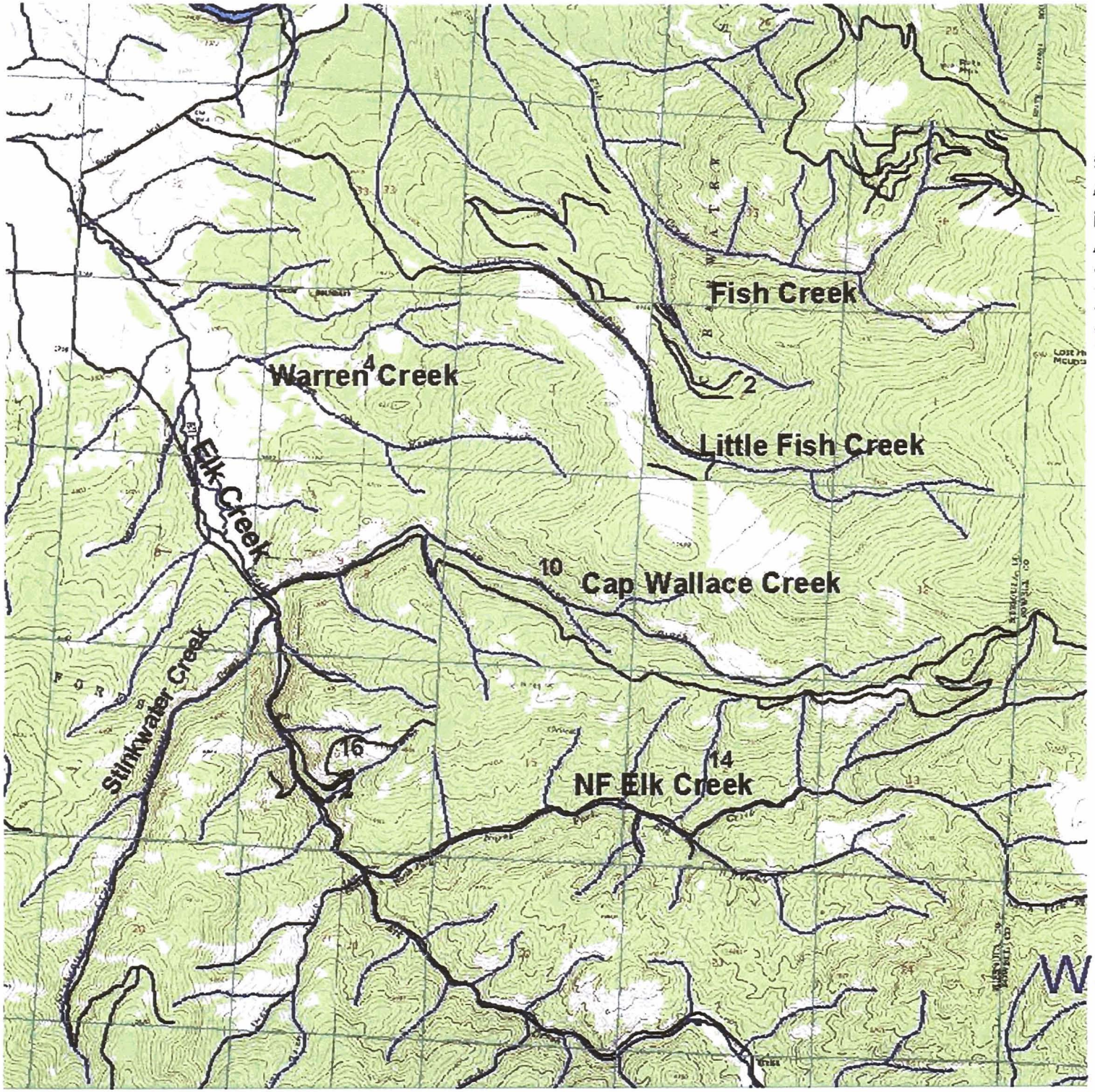
Streams_06142001_mtsp83_24k.shp
Intermittant Water
Perennial Water
Roadnet_02052001_mtsp83_24k.shp
Highway/County
Open, Unedited CFF
Easement
Closed
Reclaimed, Brushed In, Obliterated
Soils.shp
102
103
130
131
132
133
134
2
3
33
36
37
6
68
69
74
75
Section_polygons_mtsp83_24k.shp

N

Soils Map

APPENDIX A-6



Section_outlines_mtsp83_24k.shp
Streams_06142001_mtsp83_24k.shp
Intermittant Water
Perennial Water
Roadnet_02052001_mtsp83_24k.shp
Highway/County
Open, Unedited CFF Easement
Closed
Reclaimed, Brushed In, Obliterated
Section_polygons_mtsp83_24k.shp

N

Watershed Map

APPENDIX A-7

CHAPTER IV – ENVIRONMENTAL CONSEQUENCES

INTRODUCTION:
The purpose of Chapter IV is to disclose the environmental consequences of implementing the alternatives that are described in Chapter II. The environmental effects presented in this chapter form the scientific and analytical basis for the comparison of the various alternatives.

ENVIRONMENTAL CONSEQUENCES BY RESOURCE (effects upon driver issues)

Stand Health, Risk of Insect and Disease Outbreaks, Overstocking, and Blowdown

Timber Stand Health:

Alternative A No Action Alternative:
Under this alternative, stand health would remain the same in the short-term, but continue to decline as the stands continue to age and competition becomes more intense. Diseases including root rot, and mortality due to bark beetles as time goes on and stand vigor continues to decrease.

Alternative B Action Alternative:
Generally, the proposed harvests and the pre-commercial thinning would open and "sanitize" the stands and greatly increase growth rates and tree vigor. These harvests are primarily single cohort, although there are often larger ponderosa pine that can occur in these stands and should be considered relics of previous stands. Stocking levels and competition would be reduced by removing the poorer growing trees including trees with poor form (double tops, poor shape, crook and sweep), have with thin or small crowns, trees infected by disease or infested by insects, or trees that are otherwise contributing to overstocking. This would tend to improve stand vigor and initiate new growth and possibly regeneration. The overall stand health would be improved which would make the stands much less susceptible to future insect and disease outbreaks and may likely increase tree growth. Harvesting in areas where root rot is present would be likely to increase the spread and intensity of this disease in the remaining trees, however prescriptions are designed to leave healthier trees that are more resilient to attack away from major pockets of the root rot and promote less susceptible species such as ponderosa pine and western larch. The silvicultural prescription also calls for; removal of much of the pulp size material, cutting of the Douglas-fir regeneration, piling of slash and cut material, and planting of ponderosa pine and western larch. Mortality that occurs due to the possible increase in root rot may be salvaged as part of this project. In other areas, prescription that would call for a "shelterwood" or possibly a "seedtree" harvest would be done in areas to promote the trees left as reserve. Generally, the basal area left after harvest within the "shelterwood" areas would range from 30 sq. ft./ac. to 70 sq. ft./ac.. That basal area would range between 20 to 50 trees per acre in these stands (given an average diameter of leave tree stumps at 16 inches, or 1.396 sq. ft.). These stands are primarily single cohort stands, or single cohort stands with relic overstory trees.

Cumulative Effects:
No negative cumulative effects are expected to occur to forest health as a result of this project. The proposed treatments would reduce insects and disease populations in the area directly and would greatly improve forest health and vigor. Cumulatively these harvest and thinning areas would serve to reduce the risk of insect and disease outbreaks in the area, minimize the risk of populations building on state ownership that could affect DNRC or adjacent landowners in the near future, decrease available fuel and potential wildland fire concerns, and decrease potential competition stress from overstocking.

Increased Risk of Insect and Disease:

Alternative A No Action Alternative:

Under this alternative, risk of insect infestation or disease spread would remain the same in the short-term, but continue to increase as the stands continue to age and competition becomes more intense. Diseases including root rot and mortality due to insects such as bark beetles would continue as time goes on and stand vigor continues to decrease.

Alternative B Action Alternative:

As the stands within this proposed timber sale continue to get older and continue to regenerate non-seral species, the effects will become more prominent. Currently there are small areas that are affected by bark beetles and/or root rot.

The crowded stand conditions within the project area if left untreated will eventually contribute to conditions which favor an infestation of Mountain Pine Beetle (MPB) (*Dendroctonus ponderosae)* in the ponderosa pine and lodgepole pine overstory. The aforementioned conditions are primarily lowered vigor due to increased inter-tree competition and the existence of the cool, dark stand conditions favored by the beetle. DNRC hopes that by alleviating these unfavorable conditions within existing stands, and emulating stand conditions that existed prior to organized fire suppression, forest health within the project area would be improved, and biologically sustainable conditions would be created.

The areas that contain larger populations of root rot (*Armillaria spp.*) have been given a silvicultural prescription that would remove a large percentage of the Douglas-fir. As Douglas-fir is the primary "food" for this disease, it is hoped by doing this treatment that we can establish and grow species such as ponderosa pine and western larch.

It is hoped that by: decreasing the stems per acre; increasing the amount of available nutrients, water, and sunlight; and increasing the overstory importance of seral species, that these stands will become "healthier" and have the ability to ward off incursions by insects and disease.

Cumulative Effects:

Only positive cumulative effects are expected to occur to the risk of loss due to insects and disease as a result of this project. The proposed treatments would reduce insects and disease populations in the area directly and would greatly improve forest health and vigor. Cumulatively these harvest and thinning areas would serve to reduce the risk of insect and disease outbreaks in the area, minimize the risk of populations building on state ownership that could affect DNRC or adjacent landowners in the near future.

Increased competition stress from overstocking:

Alternative A No Action Alternative:

As no harvest would occur, the likelihood of these stands to see a reduction of stress without the total replacement (wildfire) is unlikely. Without a mechanical treatment, the stands within this proposed project area to continue to regenerate to non-seral species, the inter-tree competition would increase, the possibility of insect and disease attack and infestation would increase, and the existence of high fuel conditions would again increase. This would provide a cumulative risk.

Alternative B Action Alternative:

In the book *The Practice of Silviculture*, Smith et.al. wrote the following: "One of the primary objectives of thinning is to manage the production of wood by the individual trees and the aggregated yield of the forest stand. As unmanaged stands develop, the growing space on the site is reallocated to different trees mostly as a result of competition. Thinning is a direct intervention in this reallocation process by eliminating some individuals and thereby adding to the competitive strength of other individuals. Removing

weak competitors, small trees, will have little effect on the overall growth of the stand. Removing large trees will shift growing space to weak competitors that will not immediately, if ever, be able to use the additional growth factors efficiently. Removing large trees therefore reduces growth, resulting in lower yields over any fixed period of time. Yield is, in other words, regulated by thinning certain trees out of a stand and shifting growth to other trees."

All of the proposed silvicultural treatments have been designed to reduce competition within stands. Although some treatments would remove larger members of the stand, it is generally done for one of two reasons. Either the trees would be removed to help delete areas affected by insects (*Dendroctonus pseudotsugae*) or disease (*Armillaria*), or to help make a conversion back to a historical species (harvesting of Douglas-fir to provide a greater possibility of ponderosa pine seedlings becoming established). Through the removal of trees (therefore basal area) the limited factors (nutrients, water, and sunlight) become more available to remaining trees. This will increase the standard tree health within the stand. The proposed harvest and regeneration would move these stands closer to "appropriate conditions". By reducing stand density and altering species composition to levels more typical of pre-settlement times, we would expect an increase in growth and vigor.

Cumulative Effects:
The general decrease in stresses from overstocking and the lack of critical elements would promote stand and tree health. The general analysis area shows treatment differences according to the landowners. Around section 2, 4, and 10, Plum Creek Timber Company has managed their ownership (preceded by the Anaconda Mining Company and Champion International) to a higher degree than the DNRC has. Currently, it appears that much of this ground would be sold to The Nature Conservancy. The active intensive harvests would for all purposes remain halted by the land purchase. Around section 14 and 16, the primary adjoining landowner is Lubrecht Experimental Forest. Although they have treated much of their ground along the Cap Wallace road, Lubrecht has primarily left much of the larger stems per acre. The proposed harvests within this area would link many of these areas together. Proposed harvest would likely have minimal negative effects until regeneration has filled in harvest units. Improved stand health would provide a benefit to the management of this section for School Trust needs in the future.

***Susceptibility to blowdown*:**

Alternative A: No Action Alternative:
No harvest would occur, thus there would be no direct, indirect or cumulative effects as a result of improper leave tree selection.

Alternative B: Action Alternative:
All proposed silvicultural treatments pose a potential of blowdown after the harvest has been completed. None of the sections have experienced measurable amounts of windthrow during large wind events and it therefore does not appear to be a chronic problem on the project area at the current time. To help prevent remedial causes of blowdown, timber markers will follow these ideas.

Seral tree species that have wind-firm root systems would be favored to leave. Additionally, individual trees displaying over-all, healthy visual characteristics would be favored to leave. This type of tree exists across much of the project area and would be expected to have a low to moderate exposure to high winds.

Leave tree selection should consider these factors using these ideas to guide tree markers: not leaving trees with large crowns (imagine a large sail in the wind), by leaving several trees together (strength in numbers), and by choosing proper seral species that

would generally be able to withstand the more open conditions. The risk of direct, indirect and cumulative effects would be expected to be low to moderate.

Depending on timing and location, the potential for blowdown harvest is likely. Unless this harvest happens during the proposed timber sale, all other proposed sales may need specialist input.

Cumulative Effects:
As stated above, there is always a potential of blowdown after harvest. On other state parcels of the Clearwater area, windthrow of residual trees post-harvest has been a problem. A low amount of windthrow could be expected in the residual stand post-harvest on the project area although very little blowdown is more likely. Windthrow is most likely to occur in the more open areas with shallow soils and along property lines where adjacent stands have been heavily harvested in the past where the wind could pick up speed in the more open areas and then hit the more dense edges of improvement harvests with greater force. The majority of the blowdown that could occur as a result of the proposed project would be expected within the first several years following harvesting. After the first several years, the residual trees tend to expand their root systems with the new found growing space as a result of the thinning effects of harvesting and become more root-firm over time

Increase of potential of high intensity stand replacing fires:

Alternative A No Action Alternative:
Under this alternative, the current trend of increased fire severities and consequences would continue. Although fire suppression would continue, the risk of a stand replacement wildfire increases. A stand replacement wildfire would return the stands affected to an early successional state. If wildfire were to continue to shape the stands from that point, eventually they would reach pre-settlement conditions. Fire suppression will however continue, so stands would actually develop back into what exists today without management (pre-commercial thinning, etc). There is potential of a large wildfire (8,000 to 10,000 acres) if a stand replacement fire was to occur under the proper conditions (very-high to extreme fire conditions and atmospheric conditions conducive to large fire growth) and escape initial containment in the proposed project area (Colin Moon, pers. com.). This would be similar to the 1994 East Fork Chamberlain Fire approximately 5 miles northeast of the proposed project area. If such a fire were to happen, it would change the fire ecology landscape of the surrounding area for many decades. No roads would be built to assist with fire suppression efforts, but may be constructed as part of a fire salvage event.

Alternative B Action Alternative:
As part of the Action Alternative, silvicultural treatments would be used to approximate a lower intensity medium severity fire. The resulting species composition would return to a closer approximation of pre-settlement conditions. The trees remaining would generally be of the classic "fire-hardy" species of the area including ponderosa pine, western larch, and large thick barked Douglas-fir. This species mix would be expected to regenerate and continue the species composition with continued management. The reduction in ladder fuels and other available forest fuels would be expected to decrease potential fire intensity across the area. Lower fire intensity increases the ability to suppress fires. Inherently, the lower intensity fires would have less direct effects upon the ecosystem. Roads built under the Action Alternative would assist in fire suppression. This proposed action would increase the cumulative benefit of decreased risk of large, stand replacement wildfires within the greater analysis area.

Although activity fuels burn with high intensity, this is generally within a few years of harvest. Energy release component numbers for logging slash is quite high, although generally only during the "red slash" phase. Treatments of logging slash would include

prescribed burning, piling, trampling, slashing (cutting remaining slash to a level closer to the ground), or potentially chipping. Chipping is generally not realistic on a large scale unless it is an "in woods" pulp chipping operation.

Several areas would also be treated with prescribed fire or pile burning of slash piled in the woods to decrease fuel loadings and to reintroduce fire into the proposed project area. Risks involved with prescribed fire include: loss of containment, loss of higher numbers of reserve trees than expected, smoke related concerns, fire burning to lesser or greater severity than prescribed, and damage to improvements such as culverts. All areas proposed for treatment with prescribed fire would require a completed burn plan (a plan designating purpose, personnel and equipment levels, weather and fuel conditions needed, and an escaped fire plan). The prescribed burning would provide a benefit by decreasing the amount of fuel available for a wildfire, promoting regeneration, and regenerating grass and forage species for wildlife (especially big game such as moose, elk, and deer). Larger burn units also increase the amount of smoke released. This could cause short-term cumulative effects. The DNRC is a member of the Montana Airshed Group, which helps regulate slash burning by "large burners". DNRC would receive an Air Quality Permit and perform the proposed burn when conditions are deemed appropriate by the Montana Airshed Coordination Group.

Cumulative Effects:
Currently, the risk of a stand replacing fire, or a fire that would burn more intensively than expected under natural conditions historically within the proposed project area is moderate. With the near exclusion of fire in the 20th century, stand dynamics, succession, and fuel loadings have all changed. With increased fuel accumulations on the forest floor, stand densities, and amounts of ladder fuels (especially Douglas-fir in the understory) in these stands, fires burning today are much more likely to be more intense. These more intense fires tend to replace entire stands that would not have typically been replaced historically often times with negative effects of soil damage, species composition changes, difficulty regenerating the site, and sometimes very unnatural conditions for entire drainages from those of historic conditions. The decreased risk of stand replacement wildfire and insect and disease infestations would provide a cumulative benefit.

Water Quality and Fisheries

Water Quality

The primary risk to water quality is roads, especially at road crossing or roads that are poorly located. The risk of erosion or sediment delivery is highest when roads are constructed with insufficient buffers for filtration, inadequate drainage features, erosive soils or unstable slopes. Risks to water quality may increase when road drainage is not maintained or season of use restrictions are not implemented. All existing roads within or accessing the project area have been inventoried and reviewed. The existing roads were evaluated to determine both existing and potential risks of impacts to water quality. This evaluation includes road location, function and number of drainage features, gradient and locations of direct sediment delivery.

All roads used under the Action Alternative include plans to address any existing road problems and reduce any long-term erosion and sediment delivery concerns. These plans would include installation of sufficient road surface drainage features and repair non-functional drainage features. The proposed road construction and road improvement activities are not expected to result in any long-term or substantial short-term impacts to water quality.

All proposed harvest stands have been evaluated and reviewed. Selection of appropriate operating seasons have been recommended to reduce erosion as well as limiting

equipment operations to suitable slopes, appropriate ground conditions and implementation of BMP's to reduce the risk of erosion and potential for sediment delivery to the stream channel.

Existing impacts to water quality are those impacts caused by timber harvest, roads and in Elk Creek, mining. High water yield increases are anticipated to increase peak flows. Peak flows may change in magnitude and duration, but are dependant on intensity and duration of rainstorms as well as snowpack conditions, making it difficult to predict and calculate increases. Stream channel reactions to these flows vary, depending on geomorphology and stream channel stability. A water yield threshold of 15% was set for the Elk Creek drainage and its tributaries. This threshold was determined by assessing acceptable risk level, watershed sensitivity, resource value, stream channel condition and riparian habitat conditions. Channel and riparian habitat conditions were evaluated by completing channel inventories and stability ratings for all streams within the project area.

Equivalent Clearcut Acres are a good indicator of the extent to which watersheds have been altered by past and present activities. Research has shown that a watershed having at least 30 % ECA have a higher risk of altered magnitude and timing of runoff. This is caused by changes in the evapotranspiration process, snow accumulation and snow-melt rates. A study done by King (1989) recorded changes in both annual and peak flows due to timber harvest in north central Idaho. The prescription was clearcut harvesting and broadcast burning 20.9 to 32.6 percent of 4 study watersheds. As a result, average annual water yields increased between 52 and 80 % and instantaneous peak flows increased as much as 30 percent.

Elk Creek

Alternative A No Action Alternative:

Many roads located in and accessing the project area are poorly located and do not meet BMP standards. Several segments of existing road were determined to contribute direct sediment delivery to Elk Creek or at risk of delivering sediment. These road segments would continue to be a source of delivery or risk of delivery without adequate surface drainage of maintenance.

Alternative B Action Alternative:

There is approximately 3.7 miles of existing road in the project area in section 16. Under the Action Alternative approximately 0.5 miles of new road would be constructed as part of a long-term transportation plan. As part of the new road construction 2 draw crossings would be installed with 18" pipes to provide for ephemeral flows. There are no roads proposed for construction located next to Elk Creek. Road crossing locations were observed to be dry. Long-term impacts resulting from road construction are expected to be minimal. However, some short-term increases in sediment delivery are expected at these ephemeral crossings, during or after culvert installation.

New roads would be closed during and following timber harvest operations. Following timber harvest operations, roads would be utilized for administrative use only, allowing for revegetation of the road surface. This would decrease erosion risk and increase surface runoff filtration. Although soil disturbance as a result of road construction activities would be high, the risk of direct sediment delivery to the stream channel is low.

All SMZ Laws and Rules would be implemented. The harvest units located adjacent to Elk Creek are cable units. A 100 foot Riparian Management Zone (RMZ) would be developed to help maintain shade and large woody debris recruitment. No harvest would occur within 50 foot of the stream channel. Between 50 and 100 feet, a 50% tree retention would be required. Slash would be placed on Cable corridors if excessive use causes erosion. Slash aids in dissipating energy and filtering sediment.

As a result, direct, indirect and cumulative effects to water quality are expected to be minimal.

Table 4-1 *Water Yield*

Stream	Existing WYI%	Existing ECA Acres	Proposed WYI%	Proposed ECA Acres
Elk Creek	3.6%	3,120	4.2%	3,809 Acres

Water yield is expected to increase approximately 0.6% as a result of the proposed action. This increase is less than 1% WYI and not expected to have any effects on stream stability of magnitude and duration of runoff. Total ECA acres increased approximately 2% from existing conditions. 2% ECA acres over a watershed of approximately 33,123 acres is minimal and direct, indirect and cumulative impacts are expected be minimal if any.

Warren Creek
Alternative A No Action Alternative:
Under the No Action Alternative, no roads need to be maintained and access is restricted to foot traffic only. There would be no risk of direct, indirect or cumulative impacts to the resource.

Alternative B Action Alternative:
Approximately 3.5 miles of new road is proposed for construction in section 4 of the Warren Creek drainage. Because existing road densities are low in this section, proposed construction would dramatically increase road densities. There would be no roads located directly adjacent to any stream channel or draw. All roads would be constructed to meet BMP standards. All crossing site locations drain ephemeral channels and crossing sites would be dry at the time of installation. Four culverts, one 24" and three 18" culverts would be installed and the inlet and outlet rock armored with 6-12" rock to prevent erosion and sedimentation..

This portion of the project area is behind a locked gate. Following completion of harvest activities any damaged drainage features would be restored and roads allowed to revegetate.

All SMZ Law and Rules would be implemented. There would be no harvest within the SMZ. All springs and isolated wetland areas would have equipment restriction zones to prevent the operation of equipment within these areas and prevent impacts to wetlands.. There are 2 isolated wetlands greater than ¼ acre that would require 50 foot buffers around them. Under the Action Alternative minimal direct, indirect and cumulative effects are expected to be minimal with the implementation of recommended mitigation measures.

Water Yield
A water yield analysis was not completed for this watershed, because Warren Creek does not deliver surface flow to any body of water and there are very few reaches of Warren Creek that actually have a defined channel.

North Fork Elk Creek
Alternative A No Action Alternative:
There is approximately 1.25 miles of existing road on the ridge in the upper half of section 14, but outside the North Fork Elk Creek drainage boundary. A gated road that runs along the bottom of the Creek, but receives very limited administrative use. This road is well vegetated in most sections, but is located very close to the North Fork Elk Creek. The road in only passable for about a mile by vehicle and then turns into a trail like

feature. Some sections of the road are well vegetated, but offer minimal buffer. Other sections are directly adjacent to the stream channel and direct sediment delivery is occurring at site-specific locations, but is minimal. Limited use minimizes the amount of direct sediment delivery. Although some direct sediment delivery is occurring, the risk of direct, indirect and cumulative impacts of the existing conditions is low.

Alternative B Action Alternative:
Under the Action Alternative approximately 3.5 miles of road would be constructed in the North Fork Elk drainage in section 14. The roads would not be located next to any water, except for one crossing that would be installed in the NW ¼ of the SE ¼ of section 14. A bridge or culvert would be installed to allow for adequate bedload and debris flow as well as fish passage. The inlet and outlet would be rock armored and slashfilter windrowed to provide additional sediment filtration.

Roads would be required to meet BMP standards and gated following completion of harvest activities. Anticipated sediment delivery from new road construction is anticipated to be minimal.

All SMZ Law and Rules would be implemented. The harvest units located adjacent to the stream channel are cable units and are well outside of the SMZ. A 200 foot Riparian Management Zone (RMZ) would be implemented that would require no harvest within 75 ft of the stream channel. Between 75 and 200 foot, 35 to 65% of the trees would be retained, depending upon location and tree availability within the unit. This buffer should help maintain shade and large woody debris recruitment. Cable corridors would be slashed where necessary, if excessive use causes erosion to occur. As a result of implemented mitigation measures, direct, indirect and cumulative impacts are expected to be minimal.

Table 4-2 *Water Yield*

Stream	Existing WYI%	Existing ECA Acres	Proposed WYI%	Proposed ECA Acres
North Fork Elk Creek	0.6%	67	3.0%	458

Water yield is expected to increase approximately 2.4% as a result of the proposed action. Because existing and proposed water yield increases are low and within the range of the allowed 15% increase, the direct, indirect and cumulative impacts on water yield are expected to be low. Total ECA increases are approximately 10%, but well below threshold ranges of 25-30%.

Also, stream channel and habitat conditions were evaluated to be good condition. This well vegetated, stable channel is expected to withstand the proposed water yield increases with minimal or no effects to the stream channel.

Cap Wallace Creek
Alternative A No Action Alternative:
There is one maintained road in the project section that is located well outside the SMZ. The existing road would continue to be maintained and the risk of sediment delivery is anticipated to be minimal. Under the No Action Alternative, the risk of direct, indirect and cumulative impacts is minimal.

Alternative B Action Alternative:
Under the Action Alternative minimal direct, indirect and cumulative effects are expected with the implementation of proposed mitigation measures. These mitigation measures are expected to minimize potential impacts to water quality.

Approximately 1.5 mile of new road construction is proposed in the north half of section 10. This road would be located near the top of the ridge where no water is present and well above Cap Wallace Creek. The potential for sediment delivery from road construction to Cap Wallace Creek is highly unlikely.

In the south ½ of Section 10 and continuing into the SE ¼ of the SE ¼ another 1.5 miles of road would be constructed. Road construction would cross a perennial tributary to Cap Wallace Creek in the SW ¼ of the SW ¼ of Section 10. A 24" culvert would be installed with rock armor on the inlet and outlet. The crossing installation and associated road work is expected to cause short-term increase in sediment delivery, but minimal effects on long-term sediment delivery. A gate would be installed following harvest activities, restricting access to administrative use only, and allowing for revegetaion occurring. .

All harvest units located directly adjacent to Cap Wallace Creek on the south side of the stream in Section 10 are cable. Impacts to water quality as a result of cable activities are minimal with an adequate buffer. A 150 foot RMZ would be implemented on Cap Wallace Creek. The first 50ft would be a no harvest buffer and between 50 and 150 feet approximately 40-60% of the canopy cover would be retained depending on terrain and tree availability. Mitigations applying to all cable units and soil types would include slashing corridors where needed (bare soil in corridors) to slow runoff, control erosion and provide additional filtration. Sediment delivery from cable harvest units is expected to be minimal. The risk of direct, indirect and cumulative effects as a result of the proposed action would be minimal with implementation of recommended mitigation measures.

Table 4-3 *Water yield*

Stream	Existing WYI%	Existing ECA Acres	Proposed WYI%	Proposed ECA Acres
Cap Wallace	5.7%	188 Acres	13.5%	433

Water yield is expected to increase approximately 7.8%. This increase is quite significant for this size of drainage.

ECA for this stream channel is expected to increase approximately 25%. A 25% increase in ECA is reaching the threshold for a stream channel that is in stable condition. Studies have indicated that at 30% ECA, peak flows and water yields greatly increase (Bethlamy 1975). The impacts of these increases can result in increased channel instability, sediment delivery to stream channels and changes in upland soil moisture regimes. To minimize the risk to water quality, additional road drainage and road revegetation would be necessary to accommodate for increased surface runoff. Increases near or at threshold, would limit further entry into this watershed until recovery has occurred.

These increases do have the potential to change the magnitude and duration of peak flows depending on snowpack conditions and intensity and duration of peak flows. However, because the channel is stable, direct, indirect and cumulative impacts are expected to remain at or below moderate risk levels.

Fish Creek

Alternative A No Action Alternative:

Under the No Action Alternative no new roads would be constructed and direct, indirect and cumulative impacts to water quality would be minimal.

Alternative B Action Alternative:
Under the Action Alternative, approximately 0.4 miles of new road would be constructed and 0.8 miles of reconstruction within the project area. There is no water located near the new construction and risk of sediment delivery to Fish Creek from the new road is minimal. Reconstruction would occur on a section of road that does not meet BMP standards in its existing condition. All road construction and reconstruction would be required to meet minimum BMP standards.

The existing road system in Fish Creek is behind a gate and use following timber harvest would be restricted to administrative use only. Portions of the road system are currently vegetated with grass. Depending on compaction impacts, it is anticipated that the road would again revegetate and provide additional filtration for road surface runoff.

There are no harvest units located adjacent to Fish Creek. Ground based units located in the project are would be designed with adequate drainage to minimize erosion. Under the Action alternative, direct, indirect and cumulative impacts are expected to be minimal.

Table 4-4 *Water Yield*

Stream	Existing WYI%	Existing ECA Acres	Proposed WYI%	Proposed ECA Acres
Fish Creek	8.2%	90Acres	8.9%	152Acres

Under the proposed action, water yield is only expected to increase approximately 0.7%. Fish Creek is a stable, well vegetated channel and a 0.7% water yield increase is expected to have little or no effect. Total increases in ECA are anticipated to be 5%. As a result, the direct, indirect and cumulative effects are expected to be low.

Little Fish Creek
Alternative A No Action Alternative:
There is an existing road that runs adjacent to Little Fish Creek for approximately 2 miles. Not all sections of this road currently met BMP standards and some reaches are within 25 feet of the channel. This road is behind a locked gate and receives only limited use. Some sections of road are well vegetated with grasses, but do meet BMP standards. Direct sediment delivery is occurring at site-specific locations. Although direct sediment delivery is occurring in some locations, road vegetation and limited use is minimizing the amount of delivery reaching the channel. The existing direct and indirect impacts to water quality are minimal. Because the main road is directly adjacent to the stream in many location, sediment delivery over time in combination with sediment delivery from other roads in the drainage have caused moderate to moderate cumulative impacts to water quality in the middle ad upper portions of the drainage.

Grazing on the lower reaches of Little Fish Creek, have resulted in increased levels of chronic sediment delivery. Existing direct, indirect and cumulative impacts to water quality from grazing management is moderate to high in the lower reaches of the drainage.

Alternative B Action Alternative:
Under the proposed action alternative, approximately 0.3 miles of new road would be constructed. The new road would be located on top of the ridge, where no water is present. The risk of sediment delivery from the road to the stream channel is minimal.

Three harvest units are proposed adjacent to Little Fish Creek. Two are thinning and one is cable. The thinning units are not expected to have any impacts to water quality, as no equipment is used in the process. A no harvest buffer of 50 feet would be implemented for the cable units. Cable corridors with erosion problems would be slashed where

necessary to provide additional filtration. The risks of additional direct, indirect and cumulative impacts to water quality in Little Fish Creek are expected to be minimal with implementation of proposed mitigation measures.

Table 4-5 *Water Yield*

Stream	Existing WYI%	Existing ECA Acres	Proposed WYI%	Proposed ECA Acres
Little Fish	4.8%	288 Acres	5.5%	311 Acres

Water yield in Little Fish Creek is expected to increase approximately 0.7%. The middle and upper portion of Little Fish Creek are in stable condition. Grazing has impacted some reaches in the lower watershed, which have increased channel instability. Total increases in ECA are approximately 15%, but below threshold levels. Moderate increase in ECA of approximately 15% is expected to have minimal effects on stream stability. Additional drainage would be installed on existing and new road construction where necessary to compensate for increased runoff. As a result, the direct, indirect and cumulative effects of the proposed action are expected to be minimal.

Fisheries

Elk Creek

Alternative A No Action Alternative:

Under the No action Alternative existing impacts to Elk Creek would continue. Direct sediment delivery and channelization would continue to occur, effecting water quality and fish habitat. Grazing in the lower reaches of Elk Creek would also continue to erode banks, resulting in bank instability, increased width depth ratios and decreased thermal protection and habitat complexity.

Alternative B Action Alternative:

Under the Action Alternative, direct, indirect and cumulative impacts to fisheries are expected to be minimal if recommended mitigation measures are implemented. There is one unit located adjacent to Elk Creek in the project area in Section 16. This unit is cable harvest and the risk of sediment delivery is expected to be minimal. Elk Creek is lacking in large woody debris as a result of mining activity and road location. To help ensure large woody debris recruitment, a 100 foot buffer would be implemented in this unit. The first 50 feet would be a no harvest buffer, and between 50 and 100 feet, 50% of the trees would be retained. This buffer should help maintain thermal protection and provide large woody debris for habitat complexity. Implementation of this buffer should allow for minimal direct, indirect and cumulative impacts to Elk Creek.

There are some cable units located on the ridge, but are well outside of the riparian area and would not have impacts on fish habitat. There is a thinning unit located along the east side of Elk Creek, but outside of the SMZ.

North Fork Elk Creek

Alternative A No Action Alternative:

Under the No Action Alternative there would be no direct, indirect and cumulative impacts to North Fork Elk Creek.

Alternative B Action Alternative:

Under the Action Alternative, a majority of the harvest located adjacent to the stream channel would be cable operations. The risk of sediment delivery from cable operations is minimal if adequate buffers are implemented. A 200 foot RMZ would be established to help maintain thermal protection and potential large woody debris. The first 75 feet would be a no harvest buffer. From 75 to 200 feet, 35 to 65% of the trees would be retained.

Some of the areas adjacent to the channel have steep pitches and will be unable to be harvested. The Forest Officer would ensure that 50-65% would be retained in close to half of these units, based on tree availability.

There is one tractor unit located on the north side of North Fork Elk Creek, in the SW ¼ of the section. An RMZ of 150 foot would be established, with a no harvest buffer for the first 50 foot. Between 50 and 150 feet, approximately 50% of the trees would be retained. Skid trails within the RMZ would be minimized to reduce potential sediment impacts to the stream channel.

As part of the proposed road project, a stream crossing would be installed on the North Fork Elk Creek. North Fork Elk Creek provides habitat for Westslope cutthroat trout, and the crossing would be designed and installed to emulate streambed conditions and provide fish passage for all life stages. The inlet and outlet would be rock armored and slash filter windrowed to provide additional sediment filtration.

Roads would be required to meet BMP standards and gated following completion of harvest activities. Anticipated sediment delivery from new road construction is anticipated to be minimal. If recommended mitigation measures are implemented, the direct, indirect and cumulative effects to fisheries are expected to be minimal.

Cap Wallace Creek

Alternative A No Action Alternative:

Under the No Action Alternative there would be direct, indirect and cumulative impacts to fisheries.

Alternative B Action Alternative:

Under the Action Alternative one long unit proposed for harvest is located on the south side of Cap Wallace Creek. This unit is cable harvest and the risk of sediment delivery from cable operations is minimal. To ensure adequate large woody debris recruitment, a 150 foot RMZ would be established. There would be no harvest within the first 50 feet of the buffer. Approximately 40-60% of the trees, not including regeneration would be retained to allow for thermal protection and potential large woody debris recruitment. The 40-60% would not be uniform throughout the stand, but vary depending on tree availability and size.

This RMZ is expected to be adequate to help maintain potential large woody debris recruitment and thermal protection. Implementation of the RMZ is expected to have minimal direct, indirect and cumulative impacts.

Fish Creek

Alternative A No Action Alternative:

Under the No Action Alternative, poor road locations in some areas would continue to have isolated areas where direct sediment delivery is occurring. Dewatering in the lower 0.3 miles of the drainage would continue to result in a disjointed fishery and the reservoir dam at mile 1.0 is still a fish barrier. Under the No Action Alternative, no additional direct, indirect and cumulative impacts would occur.

Alternative B Action Alternative:

Under the Action Alternative, there would be no harvest in or near the riparian area and the risk of direct, indirect and cumulative impacts to fisheries is minimal.

Little Fish Creek

Alternative A No Action Alternative:

Under the No Action Alternative, poor road location and grazing management practices would continue to have adverse effects on fisheries habitat in Little Fish Creek. Sediment

delivery is expected to continue as site-specific locations and poor grazing management in the lower reaches would continue to result in bank trampling, sloughing and increased sediment delivery. There would no additional direct, indirect and cumulative impacts anticipated as a result of the No Action Alternative.

Alternative B Action Alternative:
There are three units proposed for harvest under the Action Alternative. Two are thinning units, which are expected to have no direct, indirect and cumulative effects on fisheries. The third unit is a cable harvest unit, in which no harvest is proposed within the SMZ (approximately 50 foot). Approximately 35-65% of trees would be retained in the rest of the unit. Implementation of mitigation measures, are expected to result in minimal direct, indirect and cumulative impacts to fisheries.

Soil Effects

Alternative A No Action Alternative:
The effects of No-Action would be the same as those described under the existing conditions and are not expected to cause direct, indirect and cumulative impacts to soils.

Alternative B Action Alternative:
The proposed Haywire Wallace harvest would use a combination of ground-based and cable-yarding harvest methods. There are many units in the project area that are cable and thinning units. Thinning units involve few trails with low volumes and are expected to have minimal direct, indirect and cumulative impacts to soils. Cable units are expected to have minimal direct, indirect and cumulative impacts to the project area, due to limited soil disturbance (2-5%) resulting from cable skidding activities. Mitigations applying to all cable units and soil types would include slashing corridors where needed (bare soil in corridors) to slow runoff and control erosion. Slash would dissipate energy of surface runoff and provide additional sediment filtration. Mitigations for cable harvest units present low risk of direct, indirect and cumulative impacts to soils.

Ground-based yarding can affect soil productivity through soil displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Erosion and displacement of surface soils is the primary concern for granitics and less on the argillite derived soils that are more resilient. Soil productivity can be greatly reduced with displacement of surface soils. Compaction is generally low, except in areas that may have higher clay content, such as in the Warren creek parcel.

To minimize soil displacement and erosion, skidding would be restricted to slopes of 45% or less and additional drainage installed where necessary to prevent or limit erosion. Skid trail planning would reduce the overall impacted surface area (displacement, compaction), by using suitable existing trails (to avoid additive impacts), avoiding draws and locating trails on appropriate spacing.

To minimize compaction the combination of skid trail planning to limit area disturbed and limiting season of use to dry frozen or snow covered conditions would be implemented consistent with BMP's. Soil moisture would be monitored and approved by the Forest Officer prior to harvest activities. Operations would cease if rain events occur that increases soil moisture above acceptable levels. Slash would be placed on trails to provide energy dissipation for surface runoff, increases sediment filtration and woody debris for nutrient decomposition for soils. Areas of past heavily impacted soils would be rehabilitated as part of scarification, site preparation and slash disposal efforts as feasible.

To compare effects, DNRC has completed soil monitoring throughout the state to extrapolate from similar parent materials and landscapes. As examples, where BMP's

and mitigations were applied, ground based skidding on glacial till slopes of 20-45% on the Double Arrow timber harvest in 1988 resulted in 13.4% area in detrimental soil effects and no observed soil erosion. Ground based skidding on moderate slopes (15-30%) with clay rich soils in the Cramer Creek project area had 8.3% soil impacts. With the implementation of BMP's and the recommended mitigation measures soil impacts are expected to be less than 20% of area. We expect that by protecting 80 to 85% of harvest area in non-detrimental soil impacts we will maintain soil productivity (DNRC 1998, 2004). Sale administrators will monitor on-going harvest activities to meet; contract requirements, BMP'S for soil and water protection and silvicultural objectives. The proposed harvest operations are expected to maintain soil properties important to plant growth and hydrologic function and present low risk of direct, indirect and cumulative impacts to soils. Refer to Soils Chart in table 3-7 in Chapter 3 for specific soils characteristics and standard soil mitigations at the end of this chapter.

Threatened, Endangered, and Sensitive species

Threatened and Endangered Species

Bald Eagle

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action may utilize a road for hauling logs that is within ½ mile of an active bald eagle nest (i.e., primary use area). However, each road segment that is within the primary use area is sufficiently blocked from direct view from the nest by tall vegetative screening, that there would likely be minimal risk of direct and indirect effects to bald eagles as a result of the proposed action.

Cumulative Effects

The proposed action would likely reduce the availability of perch trees within that portion of the territory's circular home range covered by the project area. However, this effect is likely to have minimal risk of cumulative effects because the project area is lacking in foraging areas (e.g., ponds, rivers, etc.) for bald eagles.

Grizzly Bear

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action may construct approximately 12 miles of new road, all of which would restrict motorized vehicle activity. As a result, open road density would likely not increase, however, total road density may increase from 3.9 miles of road per square mile to approximately 6.6 total miles of road per square mile (simple linear calculation). Additionally, the proposed action may harvest up to approximately 1,189 acres, through first-stage shelterwoods, traditional shelterwood, and thinning from below harvests, with an additional approximately 501 acres of pre-commercial thinning (PCT). Where harvest

units are adjacent to open roads, visual screening would be retained, where available, to break up sight distance for protection of grizzly bears. With the retention of visual screening cover along open roads, and restricting motorized activity on roads proposed for new construction, there would likely be low risk of direct and indirect effects to grizzly bears as a result of the proposed action.

Cumulative Effects
The proposed action may construct approximately 12 miles of new road, all of which would restrict motorized vehicle activity. As a result, open road density would likely not increase, however, total road density may increase from 2.9 miles of road per square mile to approximately 2.94 miles of road per square mile. There are currently several State actions that are on going and proposed for portions of this analysis area. These include: 1) timber harvest and road construction on the Lubrecht State Experimental Forest's Washoe Creek parcel; 2) the DNRC proposed Dry Gulch timber sale, which would include the Secret Gulch School Trust parcel; 3) the DNRC proposed Gambler Packer timber sale, which would include the Gambler Creek parcel; 4) the DNRC proposed Washoe Creek timber sale, adjacent to (1) above; 5) the on-going DNRC Lost Bear timber sale; 6) the DNRC proposed Headquarters timber sale, located near Sperry Grade; and 7) the on-going DNRC Clearwater River timber sale; 8) the DNRC Sour Fish timber sale. Each of these actions, or proposed actions, would regulate open road density through installation of locked gates to restrict motorized access on new road construction, or restrict existing open roads within the respective project areas. While the analysis area would have numerous overlapping State actions for several years, the proposed action would likely have low risk of cumulative effects to grizzly bears because it, and other similar proposed actions, would actively work to reduce open road density. As a result, there would be lower risk of potentially detrimental human-grizzly bear interactions.

Gray Wolf
Alternative A No Action Alternative:
Direct and Indirect Effects
No change from current conditions would be expected under the no action alternative.

Cumulative Effects
No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:
Direct and Indirect Effects
Wolves are generally most influence by prey densities, cover, and road densities. The project area is known to be used by deer, elk, and moose. Road densities, both existing conditions and proposed construction have been discussed under grizzly bears. Thus, with no proposed increase in open road densities, the proposed road construction would likely have minimal impact on wolves. The proposed timber harvest, may improve conditions within the project area for wolves through improvement in ungulate forage. The proposed timber harvest, by reducing canopy cover, would likely cause increased grass, forb, and shrub growth, which would potentially permit higher densities of big game. As a result, more prey may be available for wolves within the project area as a result of the proposed action. Thus, there would likely be low risk of negative direct and indirect effects to wolves as a result of the proposed action.

Cumulative Effects
Much of the private land within the analysis area is used for livestock grazing, with extensive private ranches in the Blanchard Creek and Sunset Hill areas. These areas, along with the region around Placid Lake and the Blackfoot Clearwater Game Range are known to receive extensive use by members of the Blanchard Pack. As discussed with grizzly bears, there are numerous State actions planned or occurring within the analysis

area. However, many, if not all, of these actions would maintain or reduce open road density, and thus, wolf susceptibility to poaching. Nevertheless, in 2003 a member of the Blanchard Pack was illegally shot along Blanchard Creek. The proposed action would likely result in only minimal increases in cumulative effects to wolves, largely through reductions in visual screening away from roads (open and closed). However, probably greater risk to wolves within the analysis area would occur on lands where open roads are not as well regulated.

Canada Lynx

Alternative A No Action Alternative:

Direct, Indirect, and Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action would harvest within approximately 55 acres (19%) of suitable lynx habitat (i.e., other, young, and mature foraging habitat) within the project area (Table 4-6). Where harvest units and lynx habitat overlap, and the normal prescription would typically convert suitable lynx habitat to non-habitat, the silvicultural prescription would require 40% retention of crown closure in any combination of sapling, pole or mature trees to ensure that post-harvest conditions would remain suitable as lynx "other" habitat. Thus, the proposed action would likely reduce the amount of lynx mature foraging habitat available within the project area by approximately 10 acres (Table 4-6); however, efforts would be made to maintain suitable lynx habitat, albeit in a different category (i.e., in this case "other"). As a result, there would likely be low risk of direct and indirect effects to lynx as a result of the proposed action.

Table 4-6 Potential effects of proposed harvest to lynx habitat within the project area.

Lynx Habitat	Acres Present	Proposed Acres (%)	Post-harvest Acres
Temporary Non-lynx	32	3 (9)	32
Other	131	45 (34)	141
Young Foraging	0	0 (0)	0
Mature Foraging	164	10 (6)	154
Total	**327**	**58 (17.7)**	**327**

Within the 335,782-acre analysis area, DNRC manages 29,838 acres (approximately 8.9% of analysis area), of which DNRC has, or has proposed to, silviculturally treat approximately 4,991 acres (approximately 17% of DNRC ownership within the analysis area, and approximately 1.5% of the analysis area) within a 10-year time frame. Table 4-7 describes the amount of lynx habitat acres, by proposed action, that are proposed for treatment or have recently been treated. Additionally, a large proportion of the 120,657 acres (approximately 35.9% of analysis area) of private industrial timber lands have been intensively managed during the last decade. Approximately 17,400 acres were burned by the Ryan Gulch Fire in 2000 and 776 acres were burned by the Dirty Ike fire in 2003 (approximately 5.4% of the analysis area has burned in the last 5 years). Thus, this portion of the Garnet Range has experienced much habitat alteration in recent years.

Individually, this proposed action, as well as the proposed Dry Bearmouth and Washoe timber sales would implement project-level mitigations to reduce potential impacts to lynx (see discussion in Direct and Indirect Effects). Such measures would include minimizing the risk of converting currently suitable lynx habitat to temporary non-lynx habitat. Thus, many of the acres currently classed as mature foraging that are proposed for timber harvesting would likely be converted to conditions typical of "other" lynx habitat. When proposed DNRC actions are put in the context of the analysis area, the scale at which

lynx use habitat, and examined in conjunction with past actions on private industrial timber lands, DNRC's mitigative efforts to retain affected lynx habitat in suitable conditions post-harvest would likely pose low risk of cumulative effects to lynx.

Table 4-7 Acres of lynx habitat proposed for treatment (or recently treated) by DNRC within the 525 square mile analysis area in the Garnet Mountain Range.

Habitat	Haywire Wallace	Lost Bear (Section 36)*	Elk 36*	Washoe[1]	Dry Bearmouth	Total
Temporary Non-lynx	3	1	0	222	27	**253**
Other	45	134	203	33	621	**1,036**
Young Foraging	0	0	0	0	0	**0**
Mature Foraging	10	50	21	268	230	**579**
Denning	0	0	0	0	0	**0**
Total	**58**	**185**	**224**	**523**	**878**	**1,868**

*These projects have been completed.

[1] Potential harvest units have yet to be identified for this project. The acres listed account for the acres of habitat present within the project area.

Sensitive Species

Fisher

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The existence of fishers in the Garnet Mountain range has been verified since 1989 (Vinkey 2003). The proposed action would harvest timber within approximately 662 acres of the approximately 1,058 acres of potential fisher habitat within the project area. Thus, canopy cover would not be reduced on approximately 396 acres of potential fisher habitat within the project area. However, probably only 227 acres of the "potential fisher habitat" (1,058 acres) would be suitable for fishers due to canopy closure and vegetative structure. Of these 227 acres, the proposed action would manipulate approximately 107 acres (47%), thereby reducing canopy closure and vertical structure. Due to elevation and moisture regime, most of the project area is marginal fisher habitat at best. While the proposed action would reduce canopy closure, vertical structure, and future coarse woody debris recruitment, there would likely be low risk of direct and indirect effects to fisher because of the marginality of existing and future habitat.

Cumulative Effects

Within the cumulative effects analysis area (1-mile radius surrounding project area), timber would be harvested on approximately 662 acres of the approximately 1,163 acres on School Trust parcels. The analysis area is typified with higher elevations and moister, more suitable habitats in the NE corner, and lower, drier habitats towards the south and west. As such, the proposed action would likely serve to further reduce the habitat suitability of already marginal habitats. Thus, there would likely be low risk of cumulative effects to fishers as a result of the proposed action.

Flammulated Owl

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct, Indirect, and Cumulative Effects

The proposed action would harvest timber within approximately 1,314 acres of the 2,317 acres of flammulated owl preferred habitat types within the project area (also the cumulative effects analysis area). Many of the affected acres are of the dry Douglas-fir habitat types (e.g., Douglas-fir/pinegrass, Douglas-fir/snowberry, Douglas-fir/bluebunch wheatgrass). Thus, many of the silvicultural prescriptions that would reduce the presence of Douglas-fir while retaining ponderosa pine and western larch (which would affect approximately 1,182 acres) would likely improve habitat conditions for flammulated owls, while retaining large diameter snags and snag recruits for nesting. Thus, there would be low risk of direct, indirect, and cumulative effects to flammulated owls as a result of the proposed action.

Pileated Woodpecker

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

Pileated woodpeckers have been seen and/or heard throughout the project area during several field visits (M. McGrath, Wildlife Biologist, personal observations). Potential nest cavities were identified in ponderosa pine snags in Section 10. The proposed harvest would greatly reduce the presence of Douglas-fir on approximately 1,182 acres, while retaining ponderosa pine and western larch. However, doing so would also reduce canopy closure and vertical structure across the project area that are favored by pileated woodpeckers. Therefore, the proposed action, while it would retain larger diameter ponderosa pine and western larch, would likely pose low to moderate risk of direct and indirect effects for one to a few pairs of pileated woodpeckers within the project area due to the likely reductions in canopy closure and vertical structure that would result from the proposed harvest. A way to partially mitigate these negative effects would be to commercially thin, rather than shelterwood, portions of the project area. Such mitigations would still reduce canopy closure and reduce some of the vertical structure, however, vegetation would respond quicker to the proposed harvest than a shelterwood, and the area would be usable by pileated woodpeckers sooner.

Cumulative Effects

Within the cumulative effects analysis area (the project area and 4 interstitial sections), there has been recent timber harvest on adjoining Lubrecht Experimental Forest (Section 9), Paws-Up (Section 4), and Plum Creek (Sections 3 and 11) lands. Much of this harvesting has been a combination of commercial thinning and seed-tree harvests. Thus, the proposed action would further reduce potential nesting and roosting habitat for pileated woodpeckers within the analysis area. The proposed harvest would likely have low to moderate cumulative effects for one to a few pairs of pileated woodpeckers due to

the reduction of suitable nesting and roosting habitat within the analysis area. A proposed mitigation measure would be to substitute commercial thinning on some of the proposed shelterwood acres to shorten the time where habitat would be less suitable for this species.

Other Issues

Sharp-shinned Hawk
Alternative A No Action Alternative:
Direct and Indirect Effects
No change from current conditions would be expected under the no action alternative.

Cumulative Effects
No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:
Direct and Indirect Effects
The proposed action would harvest approximately 50% of the current timber volume on approximately 251 acres, and construct approximately 4.25 miles of new road within 0.9 mile of the 2003 sharp-shinned hawk nest. However, the harvest would not occur within the riparian zone in which the nest is located. To partially mitigate effects of disturbance during the breeding season, construction on the two roads closest to the nest would not commence until July 15. Additionally, of the harvest units located SE of the 2003 nest: units located east and south of the new road construction would be harvested after July 15, and the unit located between the nest and the new road construction would be harvested the following winter. Thus, the trees located between the nest and new road would serve as a buffer from the harvesting, while also serving as post-fledging habitat for young of the year.

With the reduction in structural complexity that would accompany the proposed harvest, there may be an associated reduction in prey abundance and availability, which could negatively affect breeding output (i.e., number of successfully fledged young). Such reductions may last 15 to 20 years post-harvest, until vegetation has responded sufficiently to provide suitable habitat for prey (e.g., thrushes, warblers, and sparrows). The proposed action may also cause the territory occupants to relocate. Thus, there would likely be moderate risk of short-term (15 to 20 years) direct and indirect effects to a pair of sharp-shinned hawks as a result of the proposed action.

Cumulative Effects
The proposed harvest would further reduce the availability of suitable foraging habitat within the analysis area, in addition to previous and on-going harvest on Plum Creek and School Trust lands. However, the remaining habitat on Lubrecht Experimental Forest and BLM lands would suffice for sharp-shinned hawks. Thus, the proposed action would likely have a small amount of cumulative impacts through displacement and reduction in suitable foraging habitat. These effects would be partially mitigated by habitat on other nearby public lands.

Northern Goshawk
Alternative A No Action Alternative:
Direct and Indirect Effects
No change from current conditions would be expected under the no action alternative.

Cumulative Effects
No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action, as previously stated, would harvest approximately 1,189 acres through various degrees of shelterwood prescriptions, pre-commercially thin approximately 501 acres, and construct approximately 12 miles of new road within the project area. Of the affected acres, approximately 2 acres would be harvested within a circular 74-acre nest stand surrounding the unknown nest, and approximately 93 yards of new road would be constructed in the same area. Such actions would likely provide minimal habitat alterations to an area that may serve as important core habitat surrounding a goshawk nest (McGrath et al. 2003). Additionally, within a circular 205 acre post-fledging area (PFA) surrounding the unknown nest (inclusive of the 74-acre nest stand), the proposed action would construct approximately 0.49 mile of new road, shelterwood harvest approximately 25 acres, and pre-commercial thin approximately 1.5 acres. The post-harvest habitat within the 25 acre shelterwood would be expected to resemble an understory reinitiation stand (Oliver and Larson 1996), with canopy closure < 50%. Such post-harvest conditions would not be expected to reduce the nest site suitability of the unknown nest to a point where it would be unsuitable for nesting by goshawks (sensu McGrath et al. 2003). Beyond the scale of a goshawk PFA, the effects of the proposed action are less clear because it is unknown how goshawks would likely utilize the project area for foraging. Examining habitat only within the project area (5 School Trust parcels), the proposed harvest using varying intensities of shelterwood regeneration may temporarily (15 to 20 years) reduce foraging habitat suitability within the project area for goshawks. However, the proposed harvest would likely improve the long-term foraging suitability because the harvesting would: 1) favor retention of ponderosa pine and western larch, many of which are larger diameter; 2) foster conditions that would increase basal area; and 3) open the understory, which would subsequently make prey more readily available. Such effects describe habitat characteristics that goshawks select for foraging opportunities (Beier and Drennan 1997). Thus, within the project area, the proposed action may have low to moderate risk of reducing short-term (15 to 20 years) foraging habitat suitability, however, there may be greater long-term benefits.

Cumulative Effects

The proposed action would increase the amount of forest fragmentation from approximately 18.1% (7,910 acres) of the analysis area to approximately 20.8% (9,099 acres); fragmenting the central portion of the analysis area in the process. While much of the past harvest within the analysis area has largely been seed-tree and clearcut regeneration, which produces habitat unsuitable for nesting and foraging, the proposed action would harvest in varying intensities of shelterwood regeneration and retain forest structure throughout the harvest units. Habitat that would result from the proposed harvest would likely be marginally suitable foraging habitat in the short-term (15 to 20 years), and unsuitable nesting habitat within the harvest units. Current land management within the Lubrecht Experimental Forest and BLM roadless area would likely sustain local goshawk populations while the project area recovers. Thus, there would likely be low to moderate risk of cumulative effects to a few goshawk territories as a result of the proposed action.

Big Game

White-tailed and Mule Deer

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action would reduce snow intercept and hiding cover through shelterwood harvest and pre-commercial thinning on approximately 481 acres of the 894 acres that are currently providing such cover. Additionally, the proposed action would construct approximately 12 miles of new road within the project area that would restrict motorized access. However, research indicates many big game species avoid roads, open and closed, especially during hunting season (Lyon 1998). Thus, the proposed action would reduce snow intercept and hiding cover, as well as potentially alter deer movements, both spatially and temporally due to the extent of the proposed road system. Therefore, there would likely be low to moderate risk of direct and indirect effects to white-tailed and mule deer as a result of the proposed action.

Cumulative Effects

The proposed harvest would reduce the amount of snow intercept and hiding cover in the 135,158-acre analysis area by approximately 481 acres, or a reduction of approximately 0.2% from current conditions (22% down to 21.8%). However, the proposed action is adjacent to recent timber harvests on Paws-Up, Lubrecht Experimental Forest, and Plum Creek lands. Therefore, there may be a cumulative localized reduction in such cover as a result of the proposed action. As a result of the proposed action, there would likely be a low risk of cumulative effects to white-tailed and mule deer within the entire analysis area.

Elk

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action would reduce snow intercept and hiding cover through shelterwood harvest and pre-commercial thinning on approximately 481 acres of the 894 acres that are currently providing such cover. Additionally, the proposed action would construct approximately 12 miles of new road within the project area that would restrict motorized access. However, research indicates many big game species avoid roads, open and closed, especially during hunting season (Lyon 1998). Additionally, the proposed action would reduce the approximately 250 acres of security cover to approximately 141 acres through timber harvest. Thus, the proposed action would reduce snow intercept, hiding, and security cover, as well as potentially alter elk movements, both spatially and temporally due to the extent of the proposed road system. Therefore, there would likely be low to moderate risk of direct and indirect effects to elk as a result of the proposed action.

Cumulative Effects

The proposed harvest would reduce the amount of snow intercept and hiding cover in the 135,158-acre analysis area by approximately 481 acres, or a reduction of approximately 0.2% from current conditions (22% down to 21.8%). Additionally, the proposed harvest would reduce the amount of security cover in the analysis area from approximately 4,745 acres (3.5% of analysis area) to 4,636 acres (3.4% of analysis area). However, the proposed action is adjacent to recent timber harvests on Paws-Up, Lubrecht Experimental Forest, and Plum Creek lands. Therefore, there may be a cumulative localized reduction in such cover as a result of the proposed action. As a result of the

proposed action, there would likely be a low to moderate risk of cumulative effects to elk within the entire analysis area.

Moose

Alternative A No Action Alternative:

Direct and Indirect Effects

No change from current conditions would be expected under the no action alternative.

Cumulative Effects

No change from current conditions would be expected under the no action alternative.

Alternative B Action Alternative:

Direct and Indirect Effects

The proposed action, through timber harvest, would increase the amount of young palatable forage for approximately 10 to 20 years post-harvest, while retaining sufficient hiding cover for moose. Riparian zones would generally be avoided, as per the State SMZ law. Based upon the habitat requirements of moose, and their wide-ranging nature, there would be low risk of direct and indirect effects to moose as a result of the proposed action.

Cumulative Effects

The proposed action's timber harvest would reduce the amount of snow intercept cover in portions of the analysis area, although at lower elevations. Because the action would occur at lower elevations, where snow may not be as plentiful, such action may not have as much impact compared to a similar action in the BLM roadless area, where snow intercept cover may have greater importance. Based on these assumptions, there would likely be low risk of cumulative effects to moose as a result of the proposed action.

***Noxious weed concerns*:**

Alternative A No Action Alternative:

Under the No Action Alternative, direct, indirect and cumulative impacts are expected to remain the same. Noxious weeds, principally knapweed and houndstounge would continue to spread along existing roads and onto drier vegetation types, mainly south slopes. Noxious weed infestations are expected to increase on main haul routes, due to management activities on other ownerships. Existing weed infestations on State Land are expected to increase without disturbance. In Little Fish Creek, Fish Creek and Elk Creek where grazing occurs in the lower reaches, the spread of weeds is expected to increase.

Alternative B Action Alternative:

With the proposed timber harvest action, ground disturbing activities have the potential to introduce or spread noxious weeds in susceptible habitat types. The Action Alternative objective for weed management is to prevent new establishment of noxious weeds and control established populations along open roads. For this project an Integrated Weed Management (IWM) approach (see below) would be implemented that would include: prevention, revegetation and weed control measures for spot outbreaks, which are considered the most effective weed management treatments. Herbicide applications would be primarily used along disturbed roadside edges and spot treatments of small infestations. Studies have shown that herbicide applications, when properly done, can decrease knapweed and increase diversity within three years (Rice et. al., 1992). To protect water quality, herbicide would not be applied where runoff could enter surface waters or riparian features.

Integrated Weed Management Mitigations

To reduce current noxious weed infestations and limit the spread of weeds the following integrated weed management mitigation measures of prevention and control will be implemented.

- All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment would be subject to inspection by forest officer prior to moving on site.

- Revegetate all newly disturbed soils on road cuts and fills promptly with site adapted grasses (including native species) to reduce weed encroachment and stabilize roads from erosion. For grass seeding to be effective it is important to complete seeding concurrent with road construction.

- Weed treatment measures include herbicide and/or biological applications along portions of project roads and accessible sites with a priority on spot outbreaks of noxious weeds and as designated by the Forest officer. Any restricted use herbicide treatments will be implemented by a certified applicator according to herbicide label directions in accordance with applicable laws and rules of Missoula County Weed District.

- DNRC would monitor the project area for two years. If new infestations of noxious weeds are noted, a weed management plan would be developed, implemented and coordinated with the lessee's efforts.

Cumulative Effects:
Short-term effects would be to reduce existing noxious weed populations and increase native plants and seeded grasses. Where weeds are replaced with grasses, erosion would be reduced due to the improved plant cover. Without weed management, the loss of native grasses and forbs would be a major effect. Within a USFS research paper, *Plant Community Diversity After Herbicide Control of Spotted Knapweed*, it was stated that native grasses and forbs can be reduced by 60 to 90 percent, and that knapweed will cause reduced vigor of native plants (Rice et. al., 1992). Long-term goals are to hold noxious weeds at a determined level (determined at the time of discovery and planning). Weed management is a "long term battle", and currently may not be won. However, management by landowners within an area can make changes possible. This cooperation and the possible management that would occur is a benefit.

Effects to existing recreational opportunities:

Alternative A No Action Alternative:
A slight increase in recreational use of the project area would be expected to occur over time as human population increases. A low risk of direct, indirect and cumulative effects of the no action alternative degrading recreation opportunity and quality would be expected to occur.

Alternative B Action Alternative:
Recreation quality could be temporarily disrupted from a short-term increase in disturbance by project activity within the area during operational periods. Visibility within the affected stands would be increased. Roads would be constructed within the proposed project area and provide easily accessed areas for walking, jogging, and horseback riding.

Cumulative Effects:
Immediately following harvest or pre-commercial thinning, there would be a decrease in usage of an area. This is a reaction to the change in the general look of stands and the slash that is produced from the action that has taken place. Until the slash has degraded, there will be a minor impact. Off road use will also continue to be low until the slash has broken down to create opportunities for people on horseback. A low risk of direct, indirect and cumulative effects of the action alternative degrading recreation opportunity and quality would be expected to occur in the long term.

Aesthetics of the proposed sale area:

Desired Landscape Condition

To determine guidelines for this project, two visual landscape management systems were used, the Visual Resource Management System (USDA 1977a, USDA 1977b, USDA 1980a, USDA 1980b), and the Scenery Management System (USDA 1995).

Through these methods, a desired Visual Quality Objective (VQO) was derived.

Retention:
"Activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape and should not be evident to casual forest visitors".

Partial Retention:
"Activities may repeat form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but remain visually subordinate to the visual strength of the characteristic landscape".

Modification:
"Activities of vegetative and land form alteration must borrow from naturally established line, form, color, and texture so that their visual characteristics are those of natural occurrences within the surrounding area when viewed as middle ground or background. Activities may visually dominate the original characteristic landscape".

Alternative A No Action Alternative:

The risk of direct affects would be expected to be low. Over time, tree growth would be expected to fill in current, naturally occurring openings. Due to the long period of time involved, this affect would be expected to be low.

The risk of indirect affects would be expected to be insignificant. As timber stands become denser, stand health could decrease. This could increase the potential for high endemic insect infestations, resulting in contiguous portions of dead trees. Additionally, an increase of forest fuels would promote the potential for catastrophic wildfire events. Deforestation associated with insect damage and catastrophic wildfire would be expected to decrease aesthetics. Again, due to the long period of time involved and a wide range of variables, this risk would be low.

Past forest management activity on surrounding lands, would contribute to the cumulative visual effects to project area landscape. The risk of cumulative affects would be expected to be low as disturbances from past forest management activities have mostly revegetated. A minimal amount of cumulative effects would be expected from the continued increase in vegetative growth due to the long period of time involved.

Alternative B Action Alternative:

Disturbances caused by improvement work to roads and the harvest of trees may have an impact on the visual resource. This impact is caused by contrasts created between

the natural landscapes and managed landscapes. The extent to which the activities would affect the visual resource varies with how much they contrast in form, line, color, and texture. These differences are often subjective and are based on individual human perception. The Visual Quality Objective (VQO) determines the degree of acceptable change.

Methods described primarily as partial retention and modification would be used for timber management and road improvement work to achieve the desired VQO. Visual effects generated by timber management activities vary in duration and intensity according to the silvicultural treatment prescribed and the logging method used to achieve the silvicultural goals. Road improvement work can expose areas of light colored soils creating high color contrasts that can be seen for several miles. Over time, roads will revegetate and begin to blend with the natural landscapes. Slash also can contrast with the natural setting and can dominate viewing especially in the foreground. As slash cures, it changes to a reddish color that contrasts sharply to the natural greens, grays, and browns of a forest setting. This is generally a very short-term impact.

Due to the varying topography and small amount of area with low Visual Absorption Capacity (VAC) within the project area, much of the proposed action could remain "hidden" to the casual observer. Areas with the least amount of VAC would be most noticeable. These areas would generally consist of the steeper and higher elevation portions of proposed harvest units: section 10 that faces the highway and Sunset school, steeper areas within section 16 that faces Elk Creek Road (see *Viewsheds of the Proposed Haywire Wallace Timber sale* at the end of Chapter III). An experienced observer or someone who resides in the area would notice the changes to the other stands, mostly this will occur due to the decrease in stand density.

Where possible, much of the proposed cutting would be light to moderate in intensity. As many of the largest trees would be left, and a random, natural spacing would be used, it would be easier to decrease contrast in form, line, color, and texture between treated and untreated stands. Silvicultural treatments would borrow extensively from the natural grassy openings and only slightly affect the texture of the seen areas. Likewise, silvicultural treatments near areas of dense forest would borrow from the higher tree numbers and general stand characteristics (species, size, etc.). Along with silvicultural objectives, certain trees and clumps of trees would be selected to leave in these areas in an attempt to manage VAC.

The proposed harvest units will decrease the scenic integrity to *partial retention*, and the proposed road that will cross the hillside at the same elevation of the Cap Wallace road would meet *partial retention* to *modification*.

Due to topography and distance, the parts of the proposed harvest area would be clearly visible from Montana Highway 200. Sloping topography faces the highway from some locations and the nearest proposed harvest area would be approximately 2 miles away.

Cumulative Effects:
Any change to the scenery in the area from these alternatives would be in addition to past timber harvests, road building, vegetation management (grazing, pre-commercial thinning, etc.) and fire activity within the project area. This analysis includes all past and present effects. Due to slash and the initial color contrasts of the slash and limited road improvement work, there is an expected short-term impact.

Economics

Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. These figures are not intended for use as absolute estimates of return.

Alternative A No Action Alternative:

No harvesting would take place and no additional revenue above current grazing lease receipts would be generated from the project area. Tree planting and pre-commercial thinning also would not take place. Additionally, no improvements or transportation system would be constructed to improve the future timber revenue generating capacity of the affected area. Stands would not be managed, and many stands would run the risk of insect and disease infestation, decrease in growth and vigor, and increase their propensity for large and extensive wildfire. The timber stands would continue to grow at poor rates, but would increase slowly in size, volume, and value as time goes assuming conditions and markets were to stay static.

Alternative B Action Alternative:

To achieve a basic idea of the profitability of this proposed project, we will assume some basic timber industry factors will remain static. To understand this, we need to understand several factors that determine the overall economics of this timber sale.

When a timber sale is bid upon, there are several items that produce the "bid" that the DNRC receives. First, obviously, is the stumpage. This is what the purchaser will pay the DNRC for the volume removed. This figure will include costs that the purchaser incurs by purchasing this sale (logging costs, hauling costs, profit and risk, etc). For this proposed project it is assumed that volume would be between 6.0 MMBF (million board feet) and 9.0 MMBF. This would equate to approximately 40,500 tons – 60,750 tons. For this proposed project, we assumed a stumpage bid of $30.37 per ton. This would equate to a bid of $205.00 per mbf. (thousand board feet). This estimated bid was calculated by comparing similar sales that DNRC has recently (within the past 18 months) sold.

The next portion, as alluded to above, is the development cost. Involved within this is the cost of building road for this sale. This sale has a higher road building and development cost than other sales currently sold by the DNRC currently (approximately 12 miles of new construction), installation of gates or bridges, and all other details for the timber sale. Although this isn't "paid" to the DNRC, it is a number that will change the bid received.

The last portion is a "fixed" figure that is collected for Forest Improvement. Currently, we charge $2.48 per ton for the F.I. charge. Within this timber sale, much of the forest improvement money that would be "made" from this sale would pay for projects such as pre-commercial thinning and planting. This number would also be multiplied against the volume of the sale. Again, this number, although paid to the DNRC, will affect the bid that is received.

Given the estimated 2.74 multiplicative factor for revenue / cost ratio figures for the SWLO of the DNRC, one could calculate an estimated cost and profit. If we assumed an estimated revenue of $1,229,985.00 - $1,844,977.50, we could estimate a cost of $449,900.00 - $673,350.00. This would show an estimated "profit" of $780,085.00 - $1,171,627.00.

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APPENDIX A

MAPS

APPENDIX B

INITIAL PROPOSAL AND PUBLIC RESPONSES

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

JUDY MARTZ, GOVERNOR

CLEARWATER STATE FOREST

STATE OF MONTANA

PHONE: (406) 244-5857
FAX: (406) 244-5950

48455 SPERRY GRADE RD./BOX 388
GREENOUGH, MT 59836-0388

October 25, 2002

Initial Proposal
Haywire Wallace Timber Sale

The Montana Department of Natural Resources and Conservation, Clearwater Unit, is proposing a timber sale on State – owned portions of the following school trust lands.

Section 2, 4, 10, 14, and 16
All located within T.13 N., R.14 W., M.P.M.

The primary objective of this proposal is to produce funds for the school trust. This will be done in concurrence with the State Forest Land Management Plan. The State would also use this as an opportunity to remove dying, stagnant, and diseased trees. Many of the stands in the area are in a condition resulting from fire suppression and past logging practices. The resulting stands of small diameter saw log and regeneration are primarily Douglas-fir and other shade tolerant or short-lived trees such as lodgepole pine. Traditionally the area was primarily dominated by ponderosa pine and Western larch stands. Over the course of time, much of the winter forage areas have been over-taken by Douglas-fir. There may be the opportunity to perform some prescribed burning to restore parts of the area to winter range. Portions of these State lands have a past history of mining. This has increased the amount of land covered by noxious weeds. These areas would be considered carefully, and possible reclamation treatments would be considered.

The area is known to contain White-Tailed and Mule deer, Elk, Moose, Mountain Lion, and Black Bear. Recently, Grizzly Bears have been sighted in the Bata Mountain area, and protective measures to fulfill the Endangered Species Act may be used. This proposal is in the general vicinity of Little Fish Creek, Cap Wallace Creek, and Elk Creek, and all recent fisheries studies would be examined.

This proposed action may construct up to 7 miles of road and harvest up to six and one half million board feet of timber. The proposed action may be implemented in 2004 and may be finished by 2009.

In preparations for this timber sale, specialists such as wildlife biologists, hydrologists, soil scientists, and archeologists will be consulted. Neighboring landowners will also be asked for their input.

The Montana D.N.R.C. invites comments and suggestions concerning this proposal from all interested parties. Please respond by November 29, 2002.

Route all responses to:

Craig V. Nelson
Department of Natural Resources and Conservation
Clearwater Unit
48455 Sperry Grade Road
Greenough, MT.
59823

or: crnelson@state.mt.us
or: (406) 244-5857

PEOPLE SCOPED FOR THIS PROPOSED PROJECT
(December 2002)

Montana Wood Products Association (Ellen Engstedt), Helena, MT.
Tribal Historical Preservation Office (CSKT) Pablo, MT.
Stewart Lewin, Great Falls, MT.
Ecology Center, Missoula, MT.
Alliance for the Wild Rockies, Missoula, MT.
Jim Krantz (Plum Creek T.C.) Columbia Falls, MT.
F.H. Stoltze Land and Lumber, Columbia Falls, MT.
Friends of the Wild Swan, Swan Lake, MT.
Bureau of Land Management (Nancy Anderson), Missoula, MT.
Missoula County Weed District, Missoula , MT.
Paws-Up Angus Ranch, Greenough MT.
E bar L Ranch, Greenough, MT.
Lubrecht Experimental Forest (Hank Goetz), Greenough, MT.
Mark Baker, Missoula, MT.
Kevin Chappell (DNRC), Helena, MT.
Mike O'Herron (DNRC), Missoula, MT.
Dan Bushnell (DNRC), Helena, MT.
Bruce Rowland (DNRC), Missoula, MT.
Renee Myers (DNRC), Missoula, MT.
Mike McGrath (DNRC), Missoula, MT.
Pat Rennie (DNRC), Helena, MT.
Bob Storer, Missoula, MT.

Missoulian

Mark Baker October 31, 2002 and December 6, 2002

Synopsis of two phone calls with him

Voiced concerns about effects on big game.
Voiced concerns about "pre-commercial thinning" and its need.

The Ecology Center, Inc.

801 Sherwood Street, Suite B
Missoula, MT 59802
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ecocenter@wildrockies.org

RECEIVED
DEC 6 2002

December 4, 2002

Craig Nelson
Clearwater Unit-DNRC
48455 Sperry Grade Rd/
Greenough, MT 59823

Mr. Nelson:

The following are concerns and issues the Ecology Center believes should be addressed in the environmental analysis for the proposed Haywire project. Please send us the EA or EIS and Decision Document for the Haywire project.

We are concerned about proposals to log up to 6.5 million board feet and construct 7 miles of roads in an area that is habitat for grizzlies, elk, moose, and other species.

Why Log the State Lands in this Project Area At All?

When Montana was granted statehood, it was awarded land to be "held in trust for the support of education and for the attainment of other worthy objects helpful to the well-being of the people of this state." We point out that extractive development is not the only way to support education and that the state must also consider "the attainment of other worthy objects helpful to the well-being of the people of this state."

Too often State land managers log public lands under the guise of generating funding for schools. Conventional "wisdom" has been that extracting resources is the only way these lands can positively benefit our state and our school children. Recent events, however, have shown this notion to be false. Witness the recently opened Sprunger-Whitney Nature Trail in the Swan Valley, which is a model for state land management. The trail will provide valuable educational resources which cannot be duplicated in the classroom, and will also help pass down the importance of our state's natural heritage to our children for generations to come.

We would also point you to economist Thomas Power's 1996 study of the State's current forest management plan, "Montana's State Forests, Schools, and Quality of Life: An Economic Analysis," September, 1996. This study showed that revenue from timber sales directly contributed less than one percent of public school revenues and would only be expected to contribute a small fraction of this figure, even if cutting levels increased drastically. Public lands and other forested open spaces enhance amenity values that directly and indirectly create economic benefits for schools and other economic entities in Montana. Dr. Power's study further reinforces our contention that the DNRC's fundamental assumption that logging is the way to manage trust lands is seriously flawed.

The analysis must include an alternative which utilizes the lands in the Haywire project area in ways which will benefit local and state schools without logging or building any roads. This could include, for example, the creation of a nature trail similar to that of the Sprunger-Whitney Trail or possibly the creation of an outdoor, ecological "classroom" which could be used to teach ecology to differing levels of students in our public schools. In any case, for the analysis to be complete, DNRC must include an alternative which does not call for more logging or road building. The DNRC should also recognize that the protection of Montana's great forests, wildlife, waterways, and hunting, recreational and fishing resources should be considered as well. These are also worthy objects as well, and should be safeguarded.

Fire Suppression

The analysis should assess how past fire suppression in the areas has affected the incidence of tree diseases and insect infestation. This assessment should describe how past fire suppression has affected biological diversity in the areas, and what how natural forest succession has been altered by fire management. This assessment should address whether the DNRC's approach to fire succession needs to be changed in this location.

Wildlife

We are requesting comprehensive effects analyses for each of the proposed activities on all forest management indicator species, with special emphasis on elk. What are the species-specific habitat losses expected to occur as a result of implementing each alternative?

We request projections of effects on these species both site-specifically and in regards to habitat forest-wide as a result of the proposal. The analysis should show that the indicator species identified are in fact appropriate indicators of environmental changes in these areas for this type of project. If the biologists feel it is appropriate to document impacts using substitute species, they should accompany such a substitution with reasonable justification.

Finally, we ask that you adequately evaluate the impacts of the proposed timber sale on ungulate habitat, hunter opportunity, wildlife habitat fragmentation, biological diversity, and ESA listed species.

Threatened, Endangered, and Sensitive Species

We are particularly concerned about the potential impacts of this project (and other cumulative activities) on grizzly bears and other T&E species that may occur in the vicinity of the project area (SN).
We are seriously concerned about possible impacts on threatened, endangered, and sensitive species. The environmental analyses must assess how the timber sale proposals modify these habitats, specifically addressing the following questions:
(1) Would the projects contribute to the extinction of threatened or endangered species?
(2) What specific effects will the alternatives have on habitat for threatened, endangered, and sensitive species?
(3) What are the results of surveys in the areas for bald eagles, grizzly bears, grey wolves, peregrine falcons and any other threatened, endangered, or sensitive species which may use the habitat in the analysis areas?
(4) What are the habitat losses expected to occur as a result of implementing each alternative?
(5) The project analysis must disclose possible habitat losses to ESA listed species. For all listed species and particularly the grizzly bear, we expect to see formal consultation with the U.S. Fish & Wildlife Service initiated and documented.

Thorough surveys for threatened, endangered, and sensitive species and management indicator species must be conducted before any documents are finalized so that effects can be expressed in terms of populations and habitat acres, and the public has an opportunity to comment on the adequacy of proposed mitigation. Additionally, potential effects must be expressed both in terms of local populations and overall populations and distribution of the species in question. Research by Allendorf, Harris, & Metzgar* shows that a minimum viable population of grizzly bears in the Northern Rockies is between 1,670-2,000 bears, much higher than previously thought. The land area required to support this number of bears, based on even the most conservative approach (e.g. extrapolating the highest known densities across all habitat types) indicates that over 15 million acres of undisturbed habitat is required; more than in all the identified recovery zones for bears. A more realistic figure is somewhere around 25 million acres. This means that all currently suitable habitat must be protected, and corridors linking the subpopulation areas must also be protected.
**Allendorf, F.W., Harris, R.B., & Metzgar, L.H. Estimation of effective population size of grizzly bears by computer simulation. In proceedings, Fourth International Congress of Systematic and Evolutionary Biology.*

Biodiversity:

We specifically request that the analysis address the related issues of population viability and distribution throughout its geographic range in regards to all Threatened, Endangered, and otherwise rare species. We request that you examine the area for rare or unique biological communities and protect the resources associated with these communities. Please analyze the impacts of fragmentation on the biological communities of the area.

Please include in your analysis the possible effects of noxious weed introduction on rare and sensitive plant populations. Please include in the analysis the results of monitoring of noxious weed infestation from past management actions in the area. Please consider (1.) obliteration of existing roads, (2.) limiting road mileage and (3) limiting the acreage of habitat manipulation associated with this project as a means of reducing the spread of noxious weeds.

Please disclose whether any livestock grazing and other activities with cumulative affects are taking place in the project area and whether any streambanks, riparian areas, soil, vegetation, or other resources are being adversely affected by grazing. Please disclose what steps need to be taken to address impacts from grazing and other activities with cumulative effects on the resources of the area.

Water Quality and Fisheries:

Impacts of this project on Little Fish Creek, Cap Wallace Cr., Elk Cr. and other streams and tributaries should be carefully considered.

We request a careful analysis of the impacts to fisheries and water quality, including considerations of sedimentation, increases in peak flow, channel stability, risk of rain-on-snow events, and increases in stream water temperature. The cumulative effects analysis should address the condition of the streams in relation to all past management activities as well as considering the present proposal. Please disclose the impact of this project on hydrologic function. Please disclose the locations of seeps, springs, bogs and other sensitive wet areas, and the effects on these areas of the project activities. Please disclose what steps will

be taken to restore degraded watercourses. We further request that you refrain from harvesting in riparian areas and we recommend that no stream crossings be constructed in any of the drainages.

Please disclose in the project document the results of up-to-date monitoring of fish habitat and watershed conditions.

Please make sure that beneficial uses of the water bodies in the analysis area would not be degraded. What has been the effectiveness of proposed BMPs in preventing sediment from reaching water courses in or near the analysis area? What BMP failures have been noted for past projects with similar landtypes? We would like to see a thorough discussion of the BMPs and mitigation measures you would propose. This discussion must go beyond a mere listing, and include their relative effectiveness in achieving their intended goal(s), based upon experience in the Unit. Naturally, any mitigation costs should be disclosed in the economic analysis.

Please disclose the presence of areas of unstable soils which could result in mass movement. Please analyze the soil types in the area, disclose the erosion potential of the soil types, and map the results in the analysis document. Analyze how much soil compaction and surface erosion has occurred in the proposal area because of past actions and what the likely increases will be for the alternatives proposed.

We are seriously concerned about the effects of this sale on Bull Trout populations in the area. The State must explicitly outline what measures it will take to protect and enhance any and all resident inland native fish species, with special concern given to Bull Trout populations, westslope cutthroat trout populations and populations of other threatened, endangered, sensitive and listed species of special concern. Specifically, we request that Riparian Habitat Conservation Area buffer widths be defined. Those contained in the current Stream Management Zone (SMZ) laws are totally inadequate for the protection of Bull Trout. The Environmental Analysis must also include a discussion of current habitat conditions, including but not limited to Woody Debris Recruitment, Pool Frequency, water temperature, turbitity, dissolved oxygen levels, and other factors relating to Bull Trout habitat. Furthermore, the EA must disclose how the proposed project will effect Bull Trout and Westslope Cutthroat Trout meta-populations. In the case of Bull Trout this is especially important, given this species need to migrate out of spawning/rearing habitat. No action should occur which will negatively impact Bull Trout populations.

Timber Resource and Forest Health:

Please disclose the sizes and condition of manmade openings already existing in the area, and exactly where the proposed cutting units are in relation to the old harvest areas. Evaluate the likelihood of consequential blow-down of remaining trees in the cutting units or trees bordering the cutting units, based upon past harvesting in similar areas.

Please do studies that consider landtypes, habitat types, slopes, aspect, etc. for this project, so that there would be assurance of truly successful regeneration. Please disclose the regeneration success level from past even-aged harvesting in the immediate and surrounding compartments, explaining the dates of harvest, the problems encountered and times taken for certification of restocking.

Reforestation

The analysis must make verifiable assurances of regeneration success prospects, based on empirical evidence from similar land types. The assessment should include consideration of soils, slope, aspect, silvicultural methods, and climate regimes. The environmental analysis must identify a proven reforestation methodology, based on the above considerations, which will assure regeneration within five years. If the analysis proposes natural regeneration, then we would like to see a resource analysis and statistical evaluation which supports your decision. If a different form of regeneration is chosen, such as manual planting, you should provide an analysis which documents that the five year reforestation mandate will be achieved. Finally, the cost of an artificial regeneration program must be included in the economic analysis.

Best Management Practices (BMPs)

We would like to see a thorough discussion of the BMPs and mitigation measures you would propose to ameliorate project impacts. This discussion must go beyond a mere listing, and include the following:
(1) The relative effectiveness of each proposed BMP in achieving their intended goal(s);
(2) How dependent proposed BMPs are on outside sources of funding, and the likely environmental consequences should those funding sources not be realized. Any mitigation costs should be disclosed in the economic analysis;
(3) What BMP failure(s), if any, have led to any needed rehabilitation in the project area from past management activities?

Cultural Resources

We request that complete cultural resources surveys be completed which satisfy the terms of the National Historic Preservation Act and its implementing regulations. These surveys must be done for all areas that are proposed for ground disturbing activities, including road construction, helicopter landing pad construction, ground-based log skidding units, and all other areas where the surface will be disturbed.

Please include in your documentation, the survey methodology used, a copy of any Memoranda of Agreement with the State Historic Preservation Office, and the qualifications of the people doing the survey work.

Recreation

The environmental analysis should consider fully the impacts to the trail system in the analysis area, including the following questions:
(1) Will the quality of recreational experience be degraded by proposed development activities?
(2) What is the economic value of current recreational uses of the land, and what will the potential loss be in terms of dollars and cents?
(3) What are the nonquantifiable and aesthetic values of the land now vs. its condition after proposed development activities? How can these elements be considered in the analysis?

Road Density

The environmental analysis should assess the direct, indirect, and cumulative impacts of all road construction, reconstruction, and modifications of access management. Thorough analysis of the impacts of the existing and planned road system across the landscape should be incorporated into this analysis. All road construction proposals must be accompanied by a complete analysis specifying the number of miles, location, cost, and quality of road construction. The analysis must include the current and future open road density and total road density in the general project areas, including the analysis area. Road densities should be minimized so as to be consistent with threatened, endangered, sensitive, game and biodiversity needs. Analysis should also include a description (with accurate maps and tables) of all roads—temporary, system, nonsystem, other public and private, etc. This should document all roads in the project area. Locations of road closures should be revealed, the method of closure, and what if any traffic would be allowed on the "closed" roads. In addition, the State must examine the de facto effectiveness of its road closures, and explain how closure effectiveness will be ensured through proper monitoring.

Roads are the number one problem facing our public lands today. We are strongly opposed to any and all road construction, including temporary roads, spurs, and system roads. The project should be modified to avoid building any roads. The obliteration of any and all non-essential system and nonsystem roads in this watershed must be included in the project. Steven Johnson, Kootenai National Forest Hydrologist pointed out in his February 1995 paper "Factors Supporting Road Removal and/or Obliteration" that "Roads have been identified as the major impact on the forest environment." He also points out that roads, even those which have become significantly overgrown, increase sedimentation, re-direct and concentrate snowmelt runoff, and increase flow production levels.

We are fully opposed to the development of any and all roadless areas. The analysis must disclose if this area is a roadless area, or if no formal designation exists for the analysis area, we request that the analysis disclose whether or not the area borders any roadless, wilderness, "wilderness study" areas, or undeveloped sections of Park lands, including those managed by the State of Montana, U.S. Forest Service, U.S. Park Service, or BLM.

Old-Growth

The State has consistently neglected to properly protect Old Growth stands which it manages. The DNRC should not log any old growth. The DNRC should demonstrate that it is protecting at least 50% of the average proportion of old growth that would be expected to occur with natural processes. It is imperative that the State realize that Old Growth habitat is a critical to the survival of numerous species, including the Boreal Owl, Black-backed Woodpecker, and Flammulated Owl. No logging should occur in Old Growth areas in connection with this or any other project.

In the identification process for old-growth habitat, the analysis team should perform on-the-ground verification of areas chosen from photo-interpretation and database examination. This is especially important in identifying areas appropriate for old-growth designation. This verification should assess how much old-growth exists in the compartments surrounding the analysis area, and what amount of old-growth would be cut in each alternative. The environmental analysis should describe the precise criteria used to designate old-growth on the forest, including who made the decisions regarding old-growth designations, and that person's qualifications.

Given that natural succession in old-growth tends to eliminate current old-growth stands, how will harvest of mature, non-old-growth stands as well as old-growth stands effect the future percentage of old-growth within the overall landscape? We are totally opposed to any reduction of the amount of old-growth in the project areas, given the small percentage of remaining public land old-growth habitat and its importance to sensitive wildlife species. The analysis should accurately describe the sizes of old-growth stands in the areas (through use of maps and tables) and assess whether they are of sufficient size to provide secure habitat for old-growth dependent species, including interior old-growth dependent species such as the pine marten and goshawks.

Soils

No activity should be permitted in areas where soil stability or soil productivity will be adversely impacted by project activities. Consideration of soil stability and regeneration capacity should include:

(1) Are there any areas of unstable soils which could result in mass movement, and will any proposed activities occur in these areas or soil types? The soil types in the project area should be disclosed and management areas unsuited for timber harvest with sensitive soils eliminated from ground disturbing activities.
(2) How much soil compaction and surface erosion has occurred in the proposal area because of past actions, and what will the likely erosion increases be for the alternatives proposed?
(3) What has been the actual effectiveness of proposed BMPs in preventing sediment from reaching water courses?
(4) What BMP failures have been noted for past projects with similar landtypes?

Economics and Net Public Benefit:

We request that you prepare an economic analysis of any logging proposed and disclose what treatments are below-cost. We request that you document how your decisions and the selected alternatives maximize net public benefit. In other words, you should give consideration to, and adequately document, who benefits by these projects and who "pays" for them. We also are concerned that the cost of road building in this case would make the sale economically unfeasible. We ask that all costs and benefits be itemized in the analysis, so the pubic can see these figures.

Net public benefit is determined by numerous inputs and outputs, some of which are quantifiable and others which are more qualitative. Economic analysis can provide a useful basis for evaluation only if the economic evaluation is comprehensive and documents all costs and benefits related to the proposed action. We would like the analysis to:
(1) Insure that the economic analyses are meaningful, by including in the analyses both direct and induced costs;
(2) Adequately assess all current, in-place benefits;
(3) Include impacts to hunter opportunity and other forms of recreation (how will the proposed project impact the quality of backcountry hiking, for example?);
(4) Quantify all induced losses to outfitters and guides who may currently derive economic benefits from the areas;
(5) Consider all costs related to the projects, including the costs of preparing the analyses, all specialist support and consultation, costs associated with travel management and administration, road construction and engineering expenses, weed control, reforestation and planting, stand exams, timber stand improvement, and all other costs.

Cumulative Effects and Cross-boundary issues:

We request that cumulative effects be a major focus of your analysis. Please disclose the significance of the impacts from past activities, including those on nearby state, federal, and private land. Please include in the effects analysis any and all reasonably foreseeable management activities in the general area.

Please take a good look at the fragmentation of wildlife habitat that continues to accumulate in Western Montana and the northern Rocky Mountains. That is, take your cumulative effects analysis to the regional level. Please provide maps and other documentation on past harvest activities, including such information as year, regeneration success level, and cover level for each activity in the area.

The DNRC and other agencies on adjacent federal lands, should consider joint efforts for reducing the impacts of management activities, reducing road densities, reducing fire suppression, and taking other scientifically-sound, proactive steps to benefit and restore Threatened, Endangered and Sensitive species, roadless areas, and naturally-functioning ecosystems in the Northern Continental Divide ecosystem and Northern Rockies.

Maps and Appendices

We request that the pre-decisional document include detailed maps that disclose effects for all of the above mentioned issues. These maps should present information in a legible and logical format, and at a consistent scale such that different maps may be easily compared with one another.

We also request that a full copy of the Biological Evaluation and any Biological Assessment be included as an appendix to the draft EA/EIS. This information is vital to facilitate public understanding, and should be included in the document released for public review. If this information is not included in the document, we now request that we be mailed a copy individually when the draft document is mailed out for comments. We will want to review the BE/BA, and would like to avoid the time lag between release of the EA/EIS and when we might obtain the BE/BA.

Please keep both organizations on the mailing list for this proposal. If you or anyone on your analysis team for this proposal has any questions about any of the issues we've identified in this letter, please let us know.

Sincerely,

Sherman Bamford
The Ecology Center

APPENDIX C

LISTS

LIST OF PERSONS CONSULTED

Steve Flood	Hydrologist	BLM	Missoula, Mt.
Tom Daer	Forester	BLM	Missoula, Mt.
George Hirschenberger	Land Use Specialist	BLM	Missoula, Mt.
John Weinert	Forester	BLM	Missoula, Mt.
Shelagh Fox	Fuels Management Officer	BLM	Missoula, Mt.
Hank Goetz	Manager	LEF	Greenough, Mt.
Frank Maus	Forester	LEF	Greenough, Mt.
Channing Swan	Forester	LEF	Greenough, Mt.
Elizabeth Casselli	Landscape Architect	USFS	Missoula, Mt.
R.C. Carroll	Fuels Crew Chief	USFS	Missoula, Mt.
Ross Baty	Wildlife Biologist	DNRC	Missoula, Mt.
Robert Storer	Trust Lands Manager	DNRC	Missoula, Mt.
Colin Moon	Unit Fire Supervisor	DNRC	Greenough, Mt.
Howard Kent	Unit Fire Supervisor	DNRC	Greenough, Mt.
Will Wood	Forest Mgmt Specialist	DNRC	Missoula. Mt.
Sarah Pierce	Forest Program Specialist	DNRC	Missoula, Mt.
Mike O'Herron	Forest Program Specialist	DNRC	Missoula, Mt.
Jim Bower	Fisheries Biologist	DNRC	Missoula, Mt.

Plum Creek Timber Company (Bob Tardif, Neil Crawford)	Seeley Lake, Mt.
Smurfit-Stone Corporation (Ed Lamb)	Frenchtown, Mt.
Sun Mountain (Steve Flynn)	Phillipsburg, Mt.
The Nature Conservancy (Steve Kloetzel)	Ovando, Mt.
Mark Baker	Missoula, Mt.
Mark Killian (Paws-Up Angus Ranch)	Greenough, Mt.

LIST OF PREPARERS

Renee Myers	Mt DNRC	SWLO	Hydrologist / Soils
Jeff Collins	Mt DNRC	SWLO	Hydrologist / Soils
Mike McGrath	Mt DNRC	SWLO	Wildlife Biologist
Craig Nelson	Mt DNRC	CLW	Project Leader
Patrick Rennie	Mt DNRC	Lands	Archaeologist
Stephen Wallace	Mt DNRC	CLW	Decision Maker

SWLO – Southwestern Land Office	Missoula, MT.
Lands – Lands Administration Division	Helena, MT.
CLW – Clearwater Unit	Greenough, MT.

MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

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