Environmental Analysis for the

Timber Sale

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FINDING
GOLDEN ARCHES TIMBER SALE

An Environmental Analysis (EA) has been completed for the proposed Department of Natural Resources and Conservation (DNRC) Golden Arches Timber Sale. After a thorough review of the EA, project file, public correspondence, Department policies, standards and guidelines, and the State Forest Land Management Rules (SFLMR), I have made the following 3 decisions:

1. ALTERNATIVE SELECTED

Two alternatives are presented and were fully analyzed in the EA: the No-Action Alternative, which includes existing activities, but does not include a timber sale *(EA, 2.2.1)*; The proposed action, which proposes harvesting up to 5.6 million board feet of timber from 870 acres via ground skidding *(EA 2.2.2)*.

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 in 1.3 ***Project Objectives***. The proposed action generates more return to the school trust than the no action alternative. 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 or soil would occur under the proposed action. No losses in habitat, or unacceptable effects to Threatened, Endangered, or Sensitive species or diurnal raptors would occur under the proposed action. The action alternative would reduce the threat of catastrophic wildfire, promote tree regeneration, decrease the susceptibility of remaining trees to insect and disease infestations, increase tree vigor, and protect the power line right of way.

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. Forest Health

The action alternative is designed to bring stands back to an historic condition and the age classes (between the project area and the surrounding property) would not be outside the natural range of variability *(EA 4.3.1.1)*. Primarily, the silvicultural treatments used would remove less vigorous Douglas-fir, diseased lodgepole pine, and shade tolerant species such as subalpine fir and Engelmann Spruce. The changes made through the treatments should improve forest health and growth on 64% of the forested DNRC acres *(EA 4.3.1)*.

Vigor in almost all of the stands is currently poor or very poor due to disease, high stocking levels, and age *(EA 3.2.1.1.2)*. Blowdown after the harvest could be expected. Immediately, these trees could serve as "feeding sites" for bark beetles in the area. These trees would be salvaged if it was economically feasible as part of this project. Generally, harvest would be expected to reduce insect and disease outbreaks in the area *(EA 4.3.1.2)*.

b. **Fire Hazard**

During the summer of 2003it became obvious that much of the Landers Fork and Copper Creek drainages had become ready to burn in a stand replacement type of wildfire *(EA 3.1.1)*. That type of fire is different than the historic fire behavior *(EA 3.2.1.3)*. 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 4.3.1.3)*. It can be assumed that this harvest and the decrease in long-term fire behavior would be a benefit to the surrounding landscape and to DNRC cabin leases within the project area *(EA 4.3.1.3)*.

c. **Aesthetics**

Much of the project area can be seen from Highway 200 and Copper Creek Road *(EA 4.3.1.4)*. Immediately after harvest, slash would be evident after harvest *(EA 4.3.1.4)*. The overall proposed activities should blend with the current natural mosaic and past activities on the surrounding landscape *(EA 4.3.1.4)*. Effects are expected to be more pronounced in the short-term (following harvest) but should lessen as stands regenerate and grow *(EA 4.3.1.4)*.

d. **Sensitive Plants**

No sensitive plants have been identified *(EA 4.3.1.6)*.

e. **Noxious Weeds**

The project area has several small areas and pockets of noxious weeds *(EA 4.3.1.7)*. Increases of ground disturbance often cause increases the areas that weeds can inhabit. An Integrated Weed Management (IWM) would be used which includes: requiring cleaned equipment, treating existing weed patches with herbicide and insects, and grass seeding new roads *(EA 4.3.1.7)*, 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 4.3.1.7)*.

f. **Soils**

The primary risk to soils and their productivity are compaction and erosion *(EA 4.3.2)*. Many areas upstream of the project area are expected to erode after the large wildfire (Snow Tallon Fire) last summer *(EA 3.2.2)*. The project has been designed to leave tops, limbs, and unusable pieces of trees within the units to be recycled and return nutrients into the soils and provide coarse woody debris for microorganisms and small mammals *(EA 4.3.1.3)*. 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), or frozen ground or 18" of snow (loose) exist *(EA 4.3.1.3)*.

g. **Hydrology and Fisheries**

The Landers Fork of the Blackfoot was listed on the 2000303(d) list of impaired waterbodies *(EA 3.2.3.1.1)*. As this stream has shown channel instability and sediment deposition *(EA 3.2.3.1)* and very low numbers of native fish *(EA 3.2.3.2)* concern is obvious regarding the potential effects of this project. Copper Creek (a tributary of the Landers Fork) has higher numbers of native fish *(EA 3.2.3.2)* prior to the Snow Talon Fire when surveyed stretches showed a decrease (73% reduction) in redd counts *(EA 3.2.3.2)*. It is expected that the fire area will increase its sediment production *(EA 3.2.2 Table III-4)* with the primary risk to water quality (and fisheries) being sediment production *(EA 4.3.3.1.4)*. Primary water yield increases from the fire showed a very high increase in Copper Creek and the Landers Fork *(EA 4.3.3.1.2 Table IV-2)*, and estimated increases are expected to be "negligible" and that the effects would be "minimal" *(EA 4.3.3.1.2)*. Previous activities (the McDonald Gold Project) within section 6 established miles of road for reconnaissance of the mineral deposits *(EA 3.2.3.1.4)*. As stated earlier, sediment, whether produced by wildfire or roads, is still the primary risk to water quality and fisheries. Many road segments do not meet BMP's (Best Management Practices) and will be repaired with additional drainage structures, obliteration or abandonment of roads with steep grades (18%), and closure with gates *(EA 4.3.3.1.4)*. Roads used by this project will be seeded and mulched to help establishment

of grasses and decrease sediment production *(EA 4.3.3.1.4)*. Combining theses actions with the establishment of 80 foot buffers and deferring harvest within the streamside management zone *(EA 4.3.3.2)*, sediment production is decreased and potential habitat is promoted.

h. Wildlife: Threatened and Endangered Species

Grizzly Bears: This project area is within the Northern Continental Divide Ecosystem (NCDE) recovery area and has been used recently *(EA 3.2.4.1.1)*. Historically, this area has been a problem for grizzly bears as they have been re-located or removed *(EA 3.2.4.1.1)*. Reductions in open road mileage on DNRC sections *(EA 4.3.3.1.4 Table IV-4, and EA 4.3.4.1.1)* help reduce human and grizzly bear interactions. The timber sale has been designed to use existing topography and visual screening to block the view of grizzly bears *(EA 4.3.4.1.1)*. Within the past year, much of the habitat within this area (22%), has been changed by the Snow talon Fire *(EA 4.3.4.1.1)*. Some of the harvest will occur during normal denning season *(EA 4.3.1.3)*. Currently, harvest will change the vegetative cover, but it is assumed that the stands will regenerate. As these stands "fill in" the visual screening cover will increase. It is expected that these will all decrease the chance of any effect to the grizzly population to low levels *(EA 4.3.4.1.1)*.

Canada Lynx: Lynx are currently classified as threatened. The lynx population is highly correlated with snowshoe hares (the primary prey of lynx) *(EA 3.2.4.1.2)*. There are several areas where lynx denning and foraging sites can be found on the project area *(EA 3.2.4.1.2)*. Within section 6, the sale has been designed to defer harvest of lynx foraging habitat totaling 33 acres *(EA 4.3.4.1.2)*. This piece is actually part of a 144 acre block that includes ground on a neighbors land *(EA 4.3.4.1.2)*. The harvest of this sale should create 343 acres of early foraging habitat, and it will reduce the amount of open road. Minimal short-term impacts are expected *(EA 4.3.4.1.2)*.

i. Wildlife: Sensitive Species

Black-backed Woodpecker: The black-backed woodpecker is an irruptive species that feasts upon wood boring beetles within recently burned (1-5 years) locations *(EA 3.2.4.2.1)*. With the occurrence of the Snow Talon Fire, there is approximately 16,700 acres of habitat beginning within one mile northwest of the project area *(EA3.2.4.2.1)*. Within section 6, the amount of lodgepole pine present could produce small pockets of beetles, but it would not be enough food to support black-backed woodpeckers. Recreationists are common within sections 12 and 36 and would probably discourage black-backed woodpeckers using the site *(EA 4.3.4.2.1)*. These factors and the high amount of potential habitat so close by, make the possibility of this project disturbing black-backed woodpeckers low *(EA 4.3.4.2.1)*.

Pileated Woodpecker: The pileated woodpecker is one of the largest woodpeckers in North America *(EA 3.2.4.2.2)*. Pileated woodpeckers require nest snags of 29 inches DBH (but have nested in snags of 15 inches) *(EA 3.2.4.2.2)*. Many of the stands within the project area do not have trees in the 29 inch size *(EA 3.2.1.1.2)*. Much of the harvest would reserve the trees within this size class (generally ponderosa pine or healthy Douglas-fir) from cutting *(EA 4.3.1.1 and EA 4.3.4.2.2)*. The proposed project would provide low to moderate risk of direct and indirect effects, and would most likely re-distribute any pileated woodpeckers *(EA 4.3.4.2.2)*.

Fisher: Fishers are a medium-sized animal belonging to the weasel family that prefer dense lowland spruce-fir forests with high canopy closure *(EA 3.2.4.2.3)*. The proposed project would harvest approximately 279 acres of the 479 acres of fisher habitat *(EA 4.3.4.2.3)*. Given past management in the Landers Fork drainage fisher habitat may exist while the suitable habitat may not *(EA 3.2.4.2.3)*. Retention of this 279 acres would not sustain fisher during a breeding season *(EA 4.3.4.2.3)*. The project is expected to have low to moderate effects on fishers *(EA 4.3.4.2.3)*.

Flammulated Owl: The flammulated owl is a tiny forest owl that inhabits warm-dry ponderosa pine and cool-dry Douglas-fir forests and is a secondary nester *(EA 3.2.4.2.4)*. Many of the acres are currently unsuitable because they are too young and sparse, or too dense and closed canopied *(EA 3.2.4.2.4)*. Where ponderosa pine is present it would be the preferred leave tree species. The existing silvicultural prescription would reduce canopy closure and reduce the density of shade tolerant species *(EA 4.3.4.2.4)*. It is expected that harvest would increase the habitat for flammulated owl, and this project would have a low risk of effects *(EA 4.3.4.2.4)*.

Harlequin Duck: Harlequin ducks require white water streams with boulder and cobble substrates. They often dive up to 3 to 5 feet under the surface to search for food, so therefore, water quality is of concern *(EA 3.2.4.2.5)*. There are no existing records of harlequin ducks nesting within the project area or along the Landers Fork and Copper Creek *(EA 3.2.4.2.5)*. The most major impact to any potential harlequin ducks downstream will be sediment from the Snow Talon Fire, and this project would be minor in comparison *(EA 4.3.4.2.5)*. It is expected that this project would have minor impacts *(EA 4.3.4.2.5)*.

j. Wildlife: Big Game

White-tailed Deer: White-tailed deer are quite common in the project area. The densely stocked areas provide for thermal protection and hiding cover for the deer in the winter. There are approximately 984 acres of densely canopied forest within the project area *(EA 3.2.4.3.1)*. Given harvest plans with the project there would be a 75% reduction in snow-intercept cover and a reduction of 116 acres of winter range cover *(EA 4.3.4.3.1)*. This area is close to Lincoln, Montana, and receives "ample" hunting pressure *(EA 3.2.4.3.1)*. Given these two situations, and the location of USFS land south of Highway 200, the white-tailed deer population would see low to moderate effects *(EA 4.3.4.3.1)*.

Elk: Elk generally avoid roads, but will become more tolerant of closed roads over time. Given the normal calculations to calculate elk security cover, there is no elk security cover within the project area *(EA 3.2.4.3.2)*. There may be a creation of more nutritious and highly palatable forage after the harvest *(EA 4.3.4.3.2)*. The analysis area is a "gradient of security cover and winter range with a fire in between". Along the travel route between summer range and winter the elk will be under pressure *(EA 4.3.4.3.2)*. Risk is low to moderate *(EA 4.3.4.3.2)*.

Moose: The location of the project area (near Highway 200) and the recreationists common in sections 12 and 36, moose may only utilize this area as the transition from the Blackfoot River to more northerly destinations *(EA 3.2.4.3.3)*. For the occasional moose that may utilize the project area, the project would have low to moderate risk *(EA 4.3.4.3.3)*.

k. Archeology

Historic and prehistoric cultural resources have been located on the project area. *(EA 3.2.5)*. These locations have been or will be physically marked and efforts will be made to avoid them during harvest *(EA 4.3.5)*.

l. Economic Analysis

Currently there are cabin site leases and grazing leases on these sections. These do provide income, and will continue to do so, during and after the project *(EA 2.2.1, and EA 4.3.6.1 Table IV-5)*. Given projected timber receipts *(EA 4.3.6.1 Table IV-5)* used as revenue to the State of $840,000.00, no other action meets the needs. This project achieves the project goal and maximizes return on the current timber resource *(EA 4.3.6.2)*.

m. Human Environment

It is my decision to move forward with this project. Through everything that has been studied in this Environmental Assessment, there are not any concerns or known impacts that would have a significant impact on the human environment.

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.

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May 12, 2004

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ABBREVIATIONS

Ac	Acres
ALP	Alpine Fir
ARM	Administrative Rules for Montana
AUM	Animal Unit Month
BAER	Burned Area Emergency Rehabilitation
Bdft	Board Feet
BLM	Bureau of Land Management
BMP	Best Management Practices
BMU	Bear Management Unit
CO	Colorado
CWD	Coarse Woody Debris
DBH	Diameter at Breast Height
Dept	Department
DEQ	Department of Environmental Quality
DF	Douglas-fir
DFWP	Department of Fish, Wildlife, and Parks
DNRC	Department of Natural Resources and Conservation
E	East
EA	Environmental Analysis
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FI	Forest Improvement
FS	Forest Service
HRA	Hazard Reduction Agreement
HW	Hardwood
ICRB	Interior Columbia River Basin
IWM	Integrated Weed Management
LP	Lodgepole Pine
MBF	Thousand Board Feet
MC	Mixed Conifer
MCA	Montana Code Annotated
MMBF	Million Board Feet
MEPA	Montana Environmental Policy Act
MT	Montana
N	North
NCDE	Northern Continental Divide Ecosystem
NF	Nonforested
NW	Northwest
PP	Ponderosa Pine
R	Range
RMZ	Riparian Management Zone
S	South

SE	Southeast
SFLMR	State Forest Land Management Rules
SMZ	Streamside Management Zone
SWHC	Soil Water Holding Capacity
T	Township
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
W	West
WA	Washington
WL	Western Larch
WYI	Water Yield Increase

CHAPTER I - PROPOSED ACTION AND OBJECTIVES

1.1 Description of the Proposed Action

The Department of Natural Resources and Conservation (DNRC), Lincoln Field Office of the Clearwater Unit, proposes to harvest timber on state lands to generate revenue for the Montana School Trusts. The project area is located approximately 7 miles northeast of Lincoln, Montana in the Landers Fork drainage of the Blackfoot River, and involves portions of Section 6, Township 14 North, Range 7 West, Section 12, Township 14 North, Range 8 West and Section 36 Township 15 North, Range 8 West (these sections will be referred to as Section 6, 12, and 36 in the rest of this EA) for a total gross sale area of approximately 1749 acres (see Figure I-1. Vicinity Map). The proposed action would harvest approximately 5.6 MMBF of timber from 870 acres of forested land. This would include approximately 540 acres of improvement harvesting and 330 acres of light irregular seed tree harvesting all of which would be with ground skidding. Approximately 0.38 miles of road would be constructed or reconstructed and approximately 0.55 miles of road would be abandoned or obliterated. Harvest operations are expected to take place between July, 2004 and approximately December, 2009.

1.2 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, the stands on these parcels of land are generally in poor 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.

1.3 Project Objectives

In order to follow the Rules 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 parcel intensively for healthy and biologically diverse forests to provide long-term income for the Trust.
3. Improve timber stand growth and vigor.

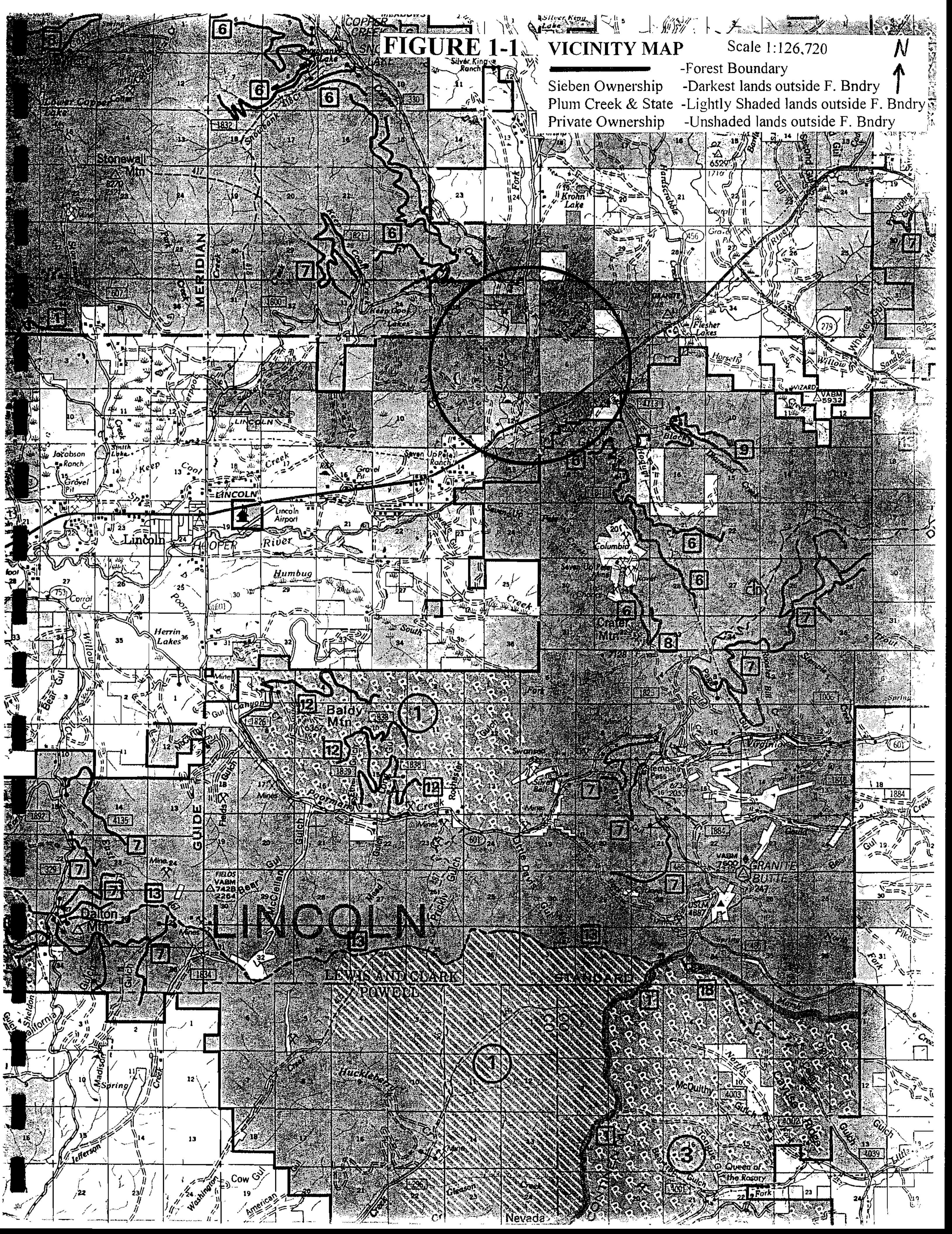


FIGURE 1-1 VICINITY MAP

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

1.4.1 Cooperating Agencies With Jurisdiction and Required Permits

- 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.

1.4.2 Other EISs, EAs, and Relevant Documents in the Area

McDonald Gold Project EIS. Seven-Up Pete Joint Venture 1994, construction of a gold mine and removal of gold and associated activities on Section 6.

Landers Fork Salvage EA Checklist, DNRC 1996, salvage of blowdown (40 MBF) on Section 12.

McDonald Meadows EA Checklist, DNRC 1996, salvage of blowdown (135 MBF) on Section 6.

West Butte Post and Pole and Smokey Mountain Post and Pole EA Checklists, DNRC 2001 and 2002 respectively, post and pole harvests (10 acres) on Section 6.

Park Creek EA checklist, DNRC 2002, salvage of beetle hit trees (400 MBF) in the Beaver Creek Drainage.

Landers Lodgepole Categorical Exclusion, DNRC 2003, harvest of timber (15 MBF) on two lease lots in Section 36.

Liverpark EA checklist, DNRC 2003, salvage of beetle hit trees (25 MBF) in Park Creek Drainage.

Copper Creek Road Improvements EIS, FS 2003, this project has been cancelled due to the Snow Talon Fire and associated rehabilitation work.

Snow Talon Burned Area Emergency Rehabilitation Plan, FS 2003, assesses post-fire conditions.

Helena National Forest Weed EIS. FS 2004, proposes weed control on FS ground in the Lincoln area.

Lincoln Post-Fire Mushroom Harvest Project Categorical Exclusion, FS 2004, proposal to manage both personal use and commercial harvest of morel mushrooms on national forest lands within the Snow Talon and Moose Wasson burned areas.

Lincoln Post-Fire Rehabilitation Project Categorical Exclusion, FS 2004, proposal to address non-emergency fire rehabilitation needs within the Snow Talon and Moose Wasson burned areas such as tree and shrub plantings, biological weed control, insect monitoring, pesticide, and pheromone treatments, and administrative site maintenance and repair.

Snow Talon Fire Salvage EIS, FS 2004, proposal to salvage approximately 20-25 MMBF on up to approximately 2700 burned acres and associated activities and reclamation of 105 acres of old jammer trails.

Blackfoot Travel Plan EIS, FS 2005, proposes changes to the FS current travel restrictions.

1.5 The Decision That Must Be Made

The Decision Maker will determine the following from this EA and will document their decision in the Finding found at the end of the document.

- Should the project be implemented or should an EIS be prepared?
- Do the alternatives presented in the EA meet the purpose of the project?
- Which alternative should be implemented?
- Are the proposed mitigations adequate and feasible?
- Does the selected alternative have a significant effect on the human environment?

1.6 Scope of the Environmental Analysis

1.6.1 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, comments from the public, and other interested parties.

The initial proposal, which was scoped in July of 2003, proposed the harvest of 5.6 MMBF from 885 acres of ground and included the relocation of 500 feet of road. The scoping notice was also printed in the Blackfoot Valley Dispatch in Lincoln. Additionally, resource professionals in state and federal agencies were contacted in person 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 Lincoln Field 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 Lincoln Field Office.

1.6.2 State Forest Land Management Rules Role in the Project

The SFLMR's were adopted in 2003 by the DNRC and provide specific rules that the DNRC must follow in the management of all forested state trust lands. A copy of these rules can be obtained at any DNRC office with forest management responsibilities. This EA and its associated proposed activities were developed through an interdisciplinary team approach that facilitated the incorporation of appropriate rules into the proposed action and the proposed management activities and mitigations that may be involved. All appropriate rules were used to help develop the proposed action and were most important in areas such as forest health, income generation, riparian management zones, and roads management.

1.6.3 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, but several issues have italicized comments that follow the item and may not receive further analysis in this EA. 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, timber stand health could continue to decline with increased severity and spread of mistletoe, increased risk of insect and disease outbreaks, and increased competition stress from overstocking.

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

< Slash from timber harvest activities could increase fire hazard and could make the site look displeasing.

< The residual stands could be susceptible to blowdown.

< The proposed project could change the aesthetics in the area especially along the Copper Creek Road.

< Proposed activities could spread noxious weeds.

< The interaction of McDonald Gold Project's ongoing reclamation and weed activities in relation to our proposed activities. *The presence of the McDonald Gold Project has no effect on the proposed project other than the roads that have been constructed that would*

be utilized to haul and skid on. The proposed project likewise would have no effect on the McDonald Gold Project other than the proposed changes to the road systems, stated in Chapter IV – Roads, and their possible future use of them. The DEQ and McDonald Gold Project would be kept informed of plans and ongoing activities to ensure that the risk of affecting each other's activities is kept low.

< The proposed project could interfere with the groomed snowmobile system during the winter. *The local snowmobile club that grooms the snowmobile trail system would be kept informed of ongoing activities and alternate routes found or safety hazards and inconveniences minimized.*

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

< The proposed project could affect Copper Creek which is an important bull trout and westslope cutthroat fishery and the Landers Fork is an important migratory corridor to the Blackfoot River.

< The proposed project could affect future CWD recruitment to the Landers Fork and there could be effects if channel migration occurred in the future.

< Both Copper Creek and the Landers Fork are identified as habitat impaired and are high priority restoration candidate streams for the Fish, Wildlife, and Parks.

< Management activities associated with this project could have adverse effects on water quality

< Proposed activities could have adverse effects on fisheries habitat.

< The proposed project could affect canopy cover and security cover for ungulates in Section 6.

< The proposed activities could affect archeological sites within the project area.

< The proposed activities could affect threatened and endangered species (i.e., bald eagles, gray wolves, grizzly bears, Canada lynx).

< The proposed activities could affect sensitive species.

1.6.4 Issues Eliminated From Further Study

1.6.4.1 Threatened and Endangered Species

1.6.4.1.1 Bald Eagle

There is concern that timber harvest activities would alter bald eagle habitat or provide unnecessary disturbance. The project area is 7.2 miles east of the nearest known bald eagle nest.

This nest is also located approximately 0.75 mile south of Hwy 200. Thus, due to the distance between the nest and project area, there would be low risk of direct, indirect, or cumulative effects to bald eagles as a result of the proposed action.

1.6.4.1.2 Gray Wolf

There is concern that the proposed timber harvest activities would adversely affect gray wolves. The project area is located approximately 19 miles and 22 miles north of the Halfway and Great Divide wolf packs, respectively. However, the Halfway pack was removed by the U.S. Fish and Wildlife Service in 2003 due to livestock depredations. Although wolves have home ranges on the order of 500 mi^2, due to the distance between the pack and the project area, there would be low risk of direct, indirect, or cumulative effects to wolves as a result of the proposed action.

1.6.4.2 Sensitive Species

1.6.4.2.1 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.

1.6.4.2.2 Common Loon

There is concern that timber harvest activities could affect or disturb common loons. This species is a diving bird, which requires relatively clear water to hunt aquatic prey, and minimal disturbance during nesting. While there are approximately 12 small lakes or ponds located to the west of the proposed project area, each body of water is not connected to the Landers Fork or Copper Creek (or are at least connected to upstream tributaries), and is at least 0.25 mile from the project area. Thus, common loons would not be affected by the proposed timber harvest operations or associated activities

1.6.4.2.3 Coeur d'Alene Salamander

There is concern that timber harvest activities could affect this species. This species requires waterfall spray zones or cascading streams. There are no known 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.

1.6.4.2.4 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 mine is located approximately 1 mile south of the project area in Section 13, T 14 N, R 08 W, on USFS ground. 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 1 mile from the mine entrance, there would be low risk of direct, indirect, or cumulative effects to this species.

1.6.4.2.5 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 (Deeble 1996). Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.6.4.2.6 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.

1.6.4.2.7 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.

CHAPTER II - ALTERNATIVES

2.1 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.

2.1.1 Initial Stages of Development

The DNRC has known for some time that forest health is declining on state land in the project area, however with the McDonald Gold Project and its associated exploration activities and potential for extraction of the gold, it would have been difficult to perform any forest management and not have been in each others way. With the current inactivity of the gold project, the DNRC felt this was a good opportunity to treat these sections of ground. It was decided that three sections (6, 12, and 36) would be included into this Golden Arches Environmental Analysis (see Table II-1 below). The intent of this project was to treat these three sections to achieve the objectives of maximizing revenue over the long-term from timber resources for the School Trust accounts and provide a sufficient amount of sawlog volume to contribute to the DNRC's sustained yield, manage intensively for healthy and biologically diverse forests, and improve timber stand growth and vigor. These three objectives come directly from the State Forest Land Management Rules that the DNRC is required to follow. The initial proposal, which was scoped in July of 2003, proposed the harvest of 5.6 MMBF from 885 acres of ground and included the relocation of 500 feet of road. Comments were received from various individuals, organizations, and agencies and grouped into the concerns listed in Chapter 1. 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 II-1
Description of Sections

Legal Description	State Owned Acres	Forested Acres	School Trusts
Sec. 6, T14N, R7W	629	555	E1/2SW1/4-State Industrial School (80 ac.) Remaining-School of Mines
Sec. 12, T14N, R8W	640	361	W1/2-Public Buildings E1/2-School for the Deaf & Blind
Sec. 36, T15N, R8W	480	439	Common Schools
Total	**1749**	**1355**	

2.1.2 Development of Alternatives

To perform analysis of existing conditions and effects of the proposed action in the project area by DNRC specialists, the project leader, and the decision maker, an interdisciplinary team was formed to develop alternatives and address the issues. Public comments were received, grouped into the concerns listed in Chapter I, and existing condition information was compiled. Using this information, the team met to develop alternatives. The largest issues the team built this project around were forest health, grizzly bears, roads, and fisheries issues (see Chapter IV for more detail). Several key areas were identified that would be deferred from management as part of this proposal, and those areas were an 80 foot no-harvest buffer where harvest units bordered the Landers Fork and Copper Creek and associated important overflow channels, additional deferred-harvest stands (approximately 97 acres in Section 36 and 48 acres in Section 12) adjacent to these fisheries, some winter harvesting would be required, and deferral of harvest on a 33 acre stand in the northeast corner of Section 6. Additional stands for deferral as well as larger buffers along fisheries were discussed but dropped from consideration because they would not meet all the project objectives. Some of the stands that were deferred from harvest are in poor to very poor health, however the team decided these stands were important enough from a biodiversity and resource standpoint that a balance should be found between the goals of maximizing revenue, improving forest health, and providing biological diversity. The team also decided with these deferrals and other applied mitigations that one action alternative would suffice to address issues and concerns while meeting project objectives. It was decided that 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.

DNRC's management of the road systems was also addressed as part of this proposal. With the amount of open roads in Section 6, it was decided that DNRC would as effectively as possible propose to close many of these roads with gates on state land and improve other existing closures. Options of additionally closing roads behind the gates with earth berms and some slash to minimize 4-wheeler and other illegal use if the gates where compromised were also discussed. This was dropped from consideration due to conflicts with future needs of these roads and the expense involved vs. the benefits gained. With many existing roads, very few additional roads were needed to perform the proposed activities, and minimization of new road construction was an internal goal. The majority of proposed new road construction would be associated with relocating steep existing roads and improving the overall road system. Some roads would also be decommissioned which would result in a decrease the total amount of roads on the project area despite the new road construction.

2.2 Description of Alternatives

2.2.1 Alternative A - No Action

Alternative A defers treatment of all sections at the present time. In this case, the DNRC would move on to a new project area on the Clearwater Unit and begin environmental analysis for a timber harvest and associated road building at that location. Current management activities such as fire suppression and grazing would continue. No improvements to the current road system

would occur, and it would be left in its current state. Forest health would continue to decline on the project area resulting in lost growth and revenue. Following the appropriate level of MEPA review, timber harvesting or road building could be proposed and undertaken in the future. This alternative can be used as a baseline for comparing the environmental consequences of the other action alternative.

Past, Present, and Reasonably Foreseeable Relevant Actions:
Past relevant management activities include the past salvage of blowdown, small amounts of timber harvesting, and harvest of post and pole material. Most of these areas were excluded from harvest under the current proposal since they have been managed in the recent past. Past activity of the McDonald Gold Project has affected the proposed action primarily in DNRC's proposed use of the existing road system (much of which was constructed by the project) and in how to manage this road system into the future. It is unknown at this time whether the project will continue with its plans to mine gold from the area due to pending court cases. Additionally, harvesting would be occurring on platted lease lots as part of this proposal that are not currently leased. While there are currently no firm plans to lease these lots, they could be leased at some time in the future. The proposed action would have no affect on the possibility of this occurring.

Other relevant actions outside the project area but possibly within some of the analysis areas are the ongoing and future fire rehabilitation efforts primarily by the Forest Service, including such actions as suppression related rehabilitation (fire line rehab etc) tree plantings, road improvements, stream restoration, weed control, and other erosion control projects. Some flooding and mass wasting is anticipated to occur within the burned area for several years following the fire and additional rehabilitation efforts are likely to occur in response to these events as they occur. Hazard tree removal has taken place by the Forest Service along open roads within the burned areas. Forest Service plans for salvage within the burned area include removal of approximately 20-25 MMBF of dead and dying trees, temporary road construction, and reclamation of 105 acres of old jammer trails. The Forest Service is also currently involved in revising their Forest Travel Plan, which could affect motorized use on Forest Service ownership within the general area. 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, road maintenance, and grazing.

Some salvage on private land within the burned area has been occurring and is likely to continue through the summer of 2004 and is likely to occur on approximately 700 acres. Additional harvesting outside the burned area has been occurring sporadically in the past and this activity is likely to continue in the future although the extent is unknown.

2.2.2 Alternative B – Action Alternative

Alternative B proposes to harvest approximately 5.6 MMBF of timber from 870 acres of forested land. This would include approximately 540 acres of improvement harvesting and 330 acres of light irregular seed tree harvesting (see Figure II-1 for unit locations and 4.3.1.1 for descriptions of prescriptions). It would also involve the girdling of primarily submerchantable mistletoe infected overstory lodgepole pine on 13 acres. Approximately 0.38 miles of road would be constructed and reconstructed while approximately 0.55 miles of road would be obliterated or abandoned. Additionally, 14.16 miles of road would be closed to motorized use as a result of this alternative. All of the roads used would receive road maintenance and weed control and would be brought up to BMP's. See Figures II-1, II-2, and II-3 and the following Table II-2 for treatments specific to each section.

TABLE II-2
Summary of Proposed Treatments by Sections
(Action Alternative)

	Section 6	Section 12	Section 36	Total
Acres	629	640	480	1749
Forested Acres	555	361	439	1355
Improvement Harvest Acres	320	110	110	540
Light Irregular Seed tree Acres	130	80	120	330
Girdle Treatment Acres	13			13
MMBF Harvested	2.5	1.25	1.85	5.6
Current Open Road Miles	15.15	8.14	4.45	27.74
Current Closed Road Miles	0.66	0.17	1.26	2.09
Proposed Open Road Miles	1.28	7.93	4.3	13.51
Proposed Closed Road Miles	14.61	0.38	1.26	16.25
Proposed Road Obliteration	0.13	0	0.15	0.28
Proposed Road Abandonment	0.06	0.21	0	0.27
Proposed Road Construction	0.29	0	0	0.29
Proposed Road Reconstruction	0.09	0	0	0.09
Winter harvest required (12/1-3/30)	none	West of the Landers Fork (78 ac)	Improvement harvests west of Landers Fork (87 ac)	165 acres

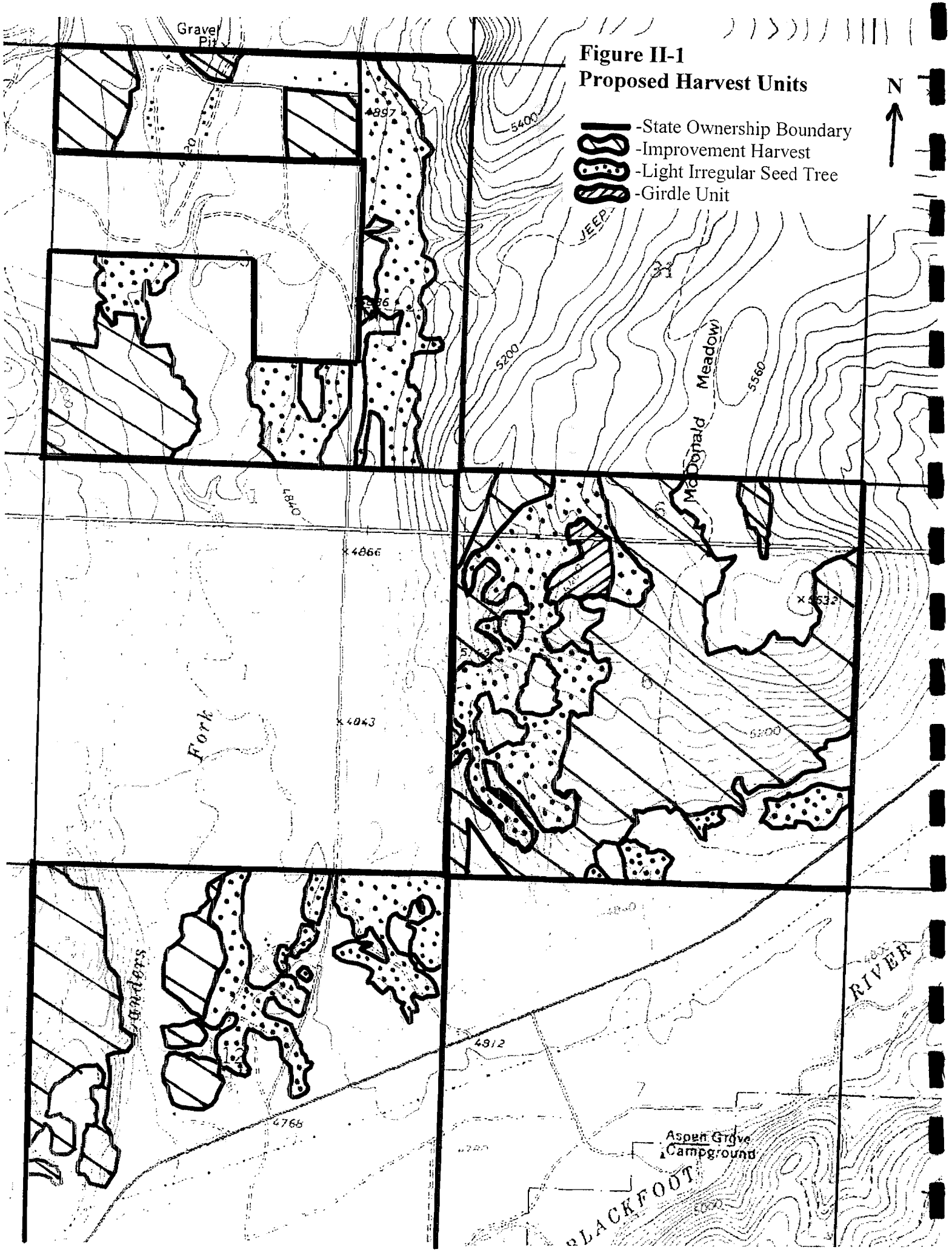


Figure II-1
Proposed Harvest Units
N
-State Ownership Boundary
-Improvement Harvest
-Light Irregular Seed Tree
-Girdle Unit
Gravel Pit
4897
5400
JEEP
5200
5560
McDonald Meadow
4840
4866
4843
Fork
Landers
4812
4765
RIVER
Aspen Grove Campground
BLACKFOOT

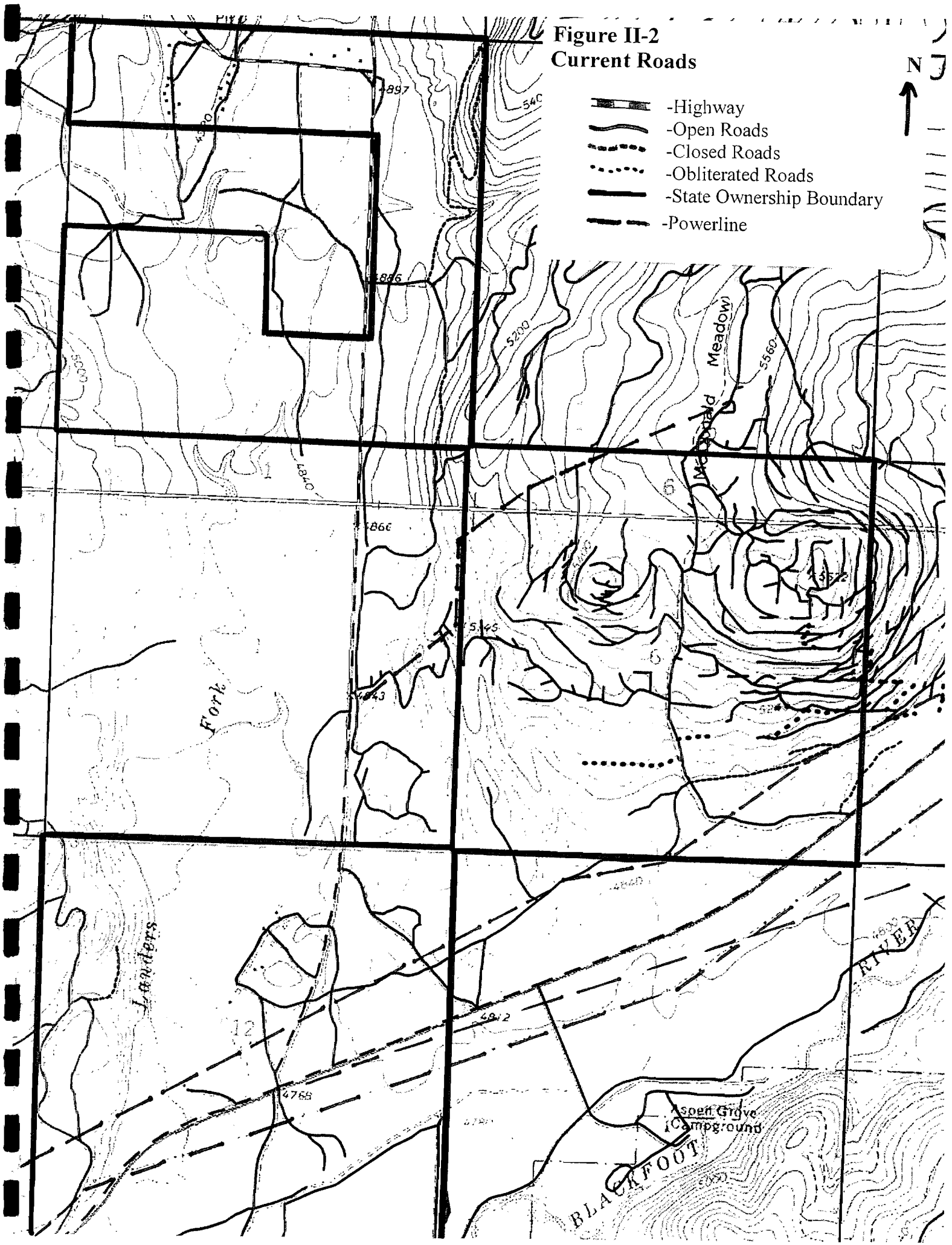


Figure II-2
Current Roads
N
-Highway
-Open Roads
-Closed Roads
-Obliterated Roads
-State Ownership Boundary
-Powerline
McDonald Meadow
Fork
Landers
Aspen Grove Campground
BLACKFOOT
RIVER

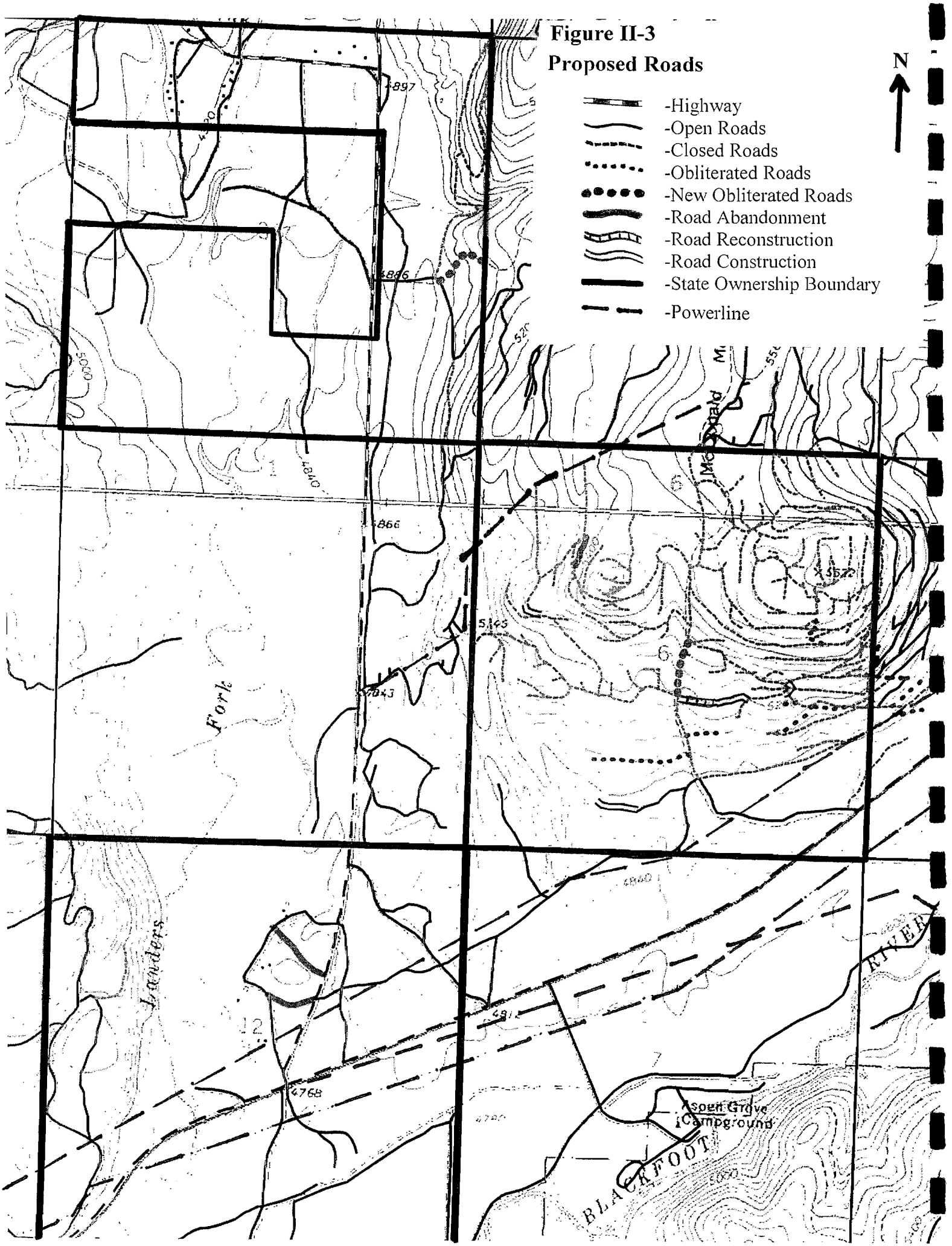


Figure II-3
Proposed Roads
N
-Highway
-Open Roads
-Closed Roads
-Obliterated Roads
-New Obliterated Roads
-Road Abandonment
-Road Reconstruction
-Road Construction
-State Ownership Boundary
-Powerline
Landers
Fork
Aspen Grove
Campground
BLACKFOOT
RIVER

Mitigations For Action Alternative

< A majority of slash in areas immediately adjacent to and easily seen from the heavy use areas would be removed and/or piled.

< Remove less basal area in spruce stands east of the Landers Fork in Section 12 to minimize the risk of blowdown.

< 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. An attempt would be made to eradicate small known infestations of dalmation toadflax, leafy spurge, and St. John's Wort.

< 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 temporary or abandoned roads that would not require periodic maintenance.

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

< Minimize new road construction due to existing high road densities. Relocate several steep road segments to more favorable locations.

< Abandon and obliterate 0.55 miles of road resulting in a net decrease in road densities.

< 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.

< Comply with all stipulations set forth in the 124 permits if any.

< Defer harvest within 80 feet of the Landers Fork and Copper Creek and associated important overflow channels.

< Defer harvest in some timber stands adjacent to the Landers Fork and Copper Creek which would provide additional buffering and unentered wildlife habitat.

< Remove failing culvert on tributary stream to the Landers Fork.

< 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. Some moister conditions would be accepted on harvest units where tractors remain on designated trails and timber would be winched to trails.

< 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 except along open roads.

< 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.

< Close 14.44 miles of road for wildlife security and to minimize maintenance needs.

< Defer treatment on 33 acres in the northeast corner of Section 6 to provide lynx habitat and a travel corridor, hiding cover, and thermal cover for wildlife.

< Require winter harvesting in most units west of the Landers Fork to minimize possible disturbance to grizzlies and to minimize ground disturbance near riparian areas.

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

< Mark with fluorescent ribbon and lathe all archeological sites near proposed activities and efforts would be made to avoid disturbance of those resources.

2.2.3 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 by improving current growth rates.
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.

2.3 Comparison of Alternatives

2.3.1 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 lodgepole pine stands as stand vigor declines and an increased chance of a stand replacing fire as fuel loadings build up. No road closures would occur to reduce open road densities. Conversely, wildlife security cover would not be changed from its current state, no new roads would be built, and hydrologic conditions in the watersheds and fisheries would not be affected by any of the activities proposed by the action alternative.

2.3.2 Alternative B – Action Alternative

Under this alternative, timber harvesting, road building, and other associated management activities would occur. Table II-3 summarizes the environmental effects of each of the alternatives. A more detailed explanation of environmental effects can be found in Chapter IV.

TABLE II-3
Comparison of Environmental Effects by Proposed Alternative

	Alternative A (No Action)	Alternative B (Action)
Volume Harvested (MMBF)	0	5.6
Acres Harvested	0	870
% Timbered Ownership Receiving Treatment	0	64%
New Road Construction (miles)	0	0.29
Road Reconstruction (miles)	0	0.09
Road Obliteration (miles)	0	0.28

Open Roads (miles)	27.74	13.51
Closed Roads (miles)	2.09	16.25
Approximate Average Basal Areas in Improvement Harvest Units	90-120	40-60
Approximate Average Basal Areas in Seed Tree Harvest Units	60-80	5-15
% Increase in Young Stands and Decrease in Post and Mature Stands	0	39
% Decrease in Older Stands	0	0
Risk of Insect Attack	high	low
Occurrence of Mistletoe	moderate	very low
Risk of Stand Replacing Fire	high	low
Forest Health and Growth Rates	poor	good
Risk of blowdown	low	moderate
Risk of Noxious Weed Spread	slow	Increased/moderate
Occurrence of Noxious Weeds	low	moderate
Weed Spraying	very little	roads and key infestations
Changes in Aesthetics	none	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 to moderate risk
Effects to Archeological Resources	none	low to none
Estimated Gross Revenue to the State	$23,100	$1,131,900
Estimated Net Revenue to the School Trust	$23,100	$863,100
Maximization of Revenue	No	Yes

CHAPTER III – AFFECTED ENVIRONMENT

3.1 Introduction

This chapter identifies and describes those resources that are affected by the proposed action, and is organized by general resource categories and their associated issues. It does not describe any effects of the alternatives, as these will be covered in Chapter IV. The descriptions of the existing environment found in this chapter can be used as a baseline for comparison in Chapter IV.

3.1.1 General Description of the Area

The proposed Golden Arches Timber Sale is located in the western foothills of the Continental Divide, northeast of Lincoln, MT. Elevations in the harvest area vary between 4700 and 5500 feet. These parcels drain to tributaries of the Blackfoot River. The trust lands involved in the proposed project are forested and non-forested with grazing leases on portions of all three sections.

There are currently cabin site leases (approximately 1 acre in size each) on Sections 12 and 36 and commercial lease lots on Section 12. The 8 commercial lease lots in Section 12 are primarily unused except for one year-round home near Highway 200. They all lie west of the Copper Creek Road and east of the Landers Fork. The 8 cabin site leases in Section 12 are also unused at this time. They lie east of the Copper Creek Road and north of Highway 200. There are 18 active cabin site leases in Section 36 all in the north ½ of the north ½ and all of which are seasonally used. They lie east of Copper Creek. Additionally, 10 lease lots have been platted but are currently unleased in Section 36 in the northwest ¼ of the northwest ¼ and 6 more are in the northwest ¼ of the southwest ¼. No management activities are planned on any of the leased cabin sites in Section 36 as a result of this proposal.

The Seven-Up Pete Joint Venture began leasing the three sections of state land within the project area for mineral exploration in 1989 as part of the McDonald Gold Project. The project also involved some private land adjacent to state ownership. As part of this project the lessees began exploration for gold that involved road construction, test drilling, construction of a powerline and other associated activities. The amounts of gold found were large enough for the lessee to prepare an EIS for the extraction of gold from the area. Plans involved the excavation of much of Section 6 where most of the gold was found to be located. Since that time the use of cyanide to extract the gold has been banned and the leases of the mineral estate have expired and have been canceled by the DNRC. The Seven-Up Pete Joint Venture has sued the DNRC for canceling their lease. A decision on this lawsuit is not expected to work its way through the court system for several more years. The Montana Department of Environmental Quality currently does have regulatory authority over the McDonald Gold Project in regards to their road building and other past activities on the ground. If the McDonald Gold Project were not to go forward with its plans due to unfavorable rulings, many of the roads would be required by DEQ to be obliterated and reclaimed.

During the fire season of 2003 approximately 37,700 acres burned as part of the Snow Talon Fire in the upper reaches of Copper Creek and the Landers Fork and surrounding drainages with primarily high intensity stand replacing fires. This fire lies northwest of the project area and burned to within approximately one mile of state ownership in Section 36.

The forested areas on state ownership are comprised of three separate types. Approximately half the forested area is composed primarily of Douglas-fir with interspersed ponderosa pine and lodgepole pine. The other predominant cover type is lodgepole pine with very few Douglas-fir and ponderosa pine scattered in. The third forest type is found primarily along the Landers Fork and is dominated by spruce with interspersed lodgepole pine, Douglas-fir, and Cottonwoods. The forested habitat types present are primarily PSME/CARU, PSME/SYAL, and several ABLA/MEFE (Pfister et.al., 1977). The Douglas-fir and spruce stands are generally multi-storied and the lodgepole stands are primarily one-storied (approximately 110 years old). Regeneration and sapling size trees are common within the Douglas-fir and spruce dominated stands and are also prevalent where the timber meets the grassland. This is most likely due to the lack of fires, which historically burned encroachment trees on the edge of the grasslands.

Historical fire frequencies for the moist Douglas-fir fire group have a mean fire interval of approximately 42 years (Fischer and Bradley, 1987). Most of the stands in the proposed project area have higher stocking rates and greater canopy closure than occurred historically. Many of the younger age class Douglas-fir would likely have been thinned out or a small patch completely killed by a normally occurring fire event. Naturally occurring fire events would have created opportunities for continued regeneration of the seral species such as ponderosa and lodgepole pine and would have generally kept the stand structure more open than it is currently (Remington, 1993).

In many locations typical understory vegetation historically consisted of aspen, willow, various smaller shrubs (e.g., ninebark, grouse whortleberry, juniper, etc.) and a variety of herbaceous species (e.g., pinegrass, arnica, aster, etc.) (Pfister et.al., 1977; Fischer and Clayton, 1983). Fire suppression has allowed the stands to develop a more closed canopy condition which has caused a decline in these understory species. Annual and bunchgrass types in the project area are experiencing encroachment by Douglas-fir and lodgepole pine. This is likely due to the lack of frequent fires, which historically kept the south and west aspects clear of all but some scattered individual trees (Gruell, 1983). Grasslands are found interspersed within forested areas (regardless of aspect) where deep, rich soil conditions and frequent fires combined to retard tree establishment (Remington, 1993).

The trust lands involved in the proposed sale area total approximately 1749 acres with approximately 1355 acres of forested ground. General stand vigor ranges from very poor to good with the majority of the area being in the poor category. Little insect activity is currently present in any of the stands, but there is increasing susceptibility to Douglas-fir bark beetle, brown cubical root rot, and spruce budworm infestations in the Douglas-fir and mountain pine beetle in the lodgepole pine. Many of the lodgepole pine stands are severely infected with mistletoe.

3.1.2 Cumulative Impacts of Past Forest Management Activities

Past harvesting in Section 6 includes selective harvesting in most of the south half over 30 years ago, salvage of dead and dying trees (approximately 135 MBF) around McDonald Meadows in portions of the NE corner from 1986-1990, and post and pole sales (approximately 10 acres) in the lodgepole stand in the center of the west half from 1999-2003 (none of these past harvested areas are proposed for harvest as part of the proposed action). The selective harvesting appears to have removed primarily larger, healthier trees however many large trees were left as well. This has created more room for the younger age classes, and the older trees remaining have a poorer overall vigor. Few skid trails are evident and the stands are still heavily stocked with fairly closed canopy. The salvage removed blown-down and dying trees from root rot, which has resulted in a shelterwood type harvest in which the root rot is still affecting the health of the remaining trees. The post and pole material was removed by means of skidders and pickups in the harvest area and has left varying leave tree densities from a commercial thin to seed tree type harvest. Some of the leave trees are still infected with mistletoe and are old (110 years old) with relatively small crowns that they are not likely to improve their growth rates substantially. Skidding was dispersed in the salvage and post and pole harvest areas leaving much of the ground area undisturbed, but little regeneration has become established at this time.

Very little past harvesting is evident in Section 12 however a regeneration harvest did occur over 30 years ago along the northwest edge of the section and several small (less than 2 acre) salvages of blowdown have taken place in the spruce and lodgepole stands. The regeneration harvest was very successful in regenerating the stand to Douglas-fir, ponderosa pine, and lodgepole pine however primarily poorer and mistletoe infected trees were left in the overstory. Some forested area has been cleared in the past for commercial lease sites such as an old abandoned sawmill site and has been heavily compacted and disturbed where reestablishment of trees will likely be slow and sporadic.

Some 30-50 year old selective logging is evident in Section 36 in the northwest and southeast corners, which removed some of the larger trees and created growing space for the younger trees. The very southeast corner of the section was seed tree harvested approximately 30 years ago and the stand has regenerated quite well. Approximately 20 acres in the southwest corner was clearcut around 1985 and is now regenerated with a good spacing of lodgepole pine. Most recently two lease lots (approximately 3 acres) in the northeast portion of the section where harvested to remove mistletoe infected lodgepole pine and reduce fire hazard. Some small roads and skid trails are still evident throughout the section.

All of the sections have received moderate to high levels of firewooding as is evidenced by the scattered stumps of dead trees that were removed. Some less accessible areas still have high amounts of dead standing and down trees while the more accessible areas have primarily been picked clean.

Timber harvesting has taken place on a majority of the surrounding private lands. Most of this harvesting has been by means of clearcuts and group selections. A majority of the harvesting is over 20 years old and is now fully regenerated with good stocking levels. Harvesting on these

surrounding private lands is expected to continue over time, however to a lesser extent than in the past since a majority of the ground has already been heavily harvested.

There is good public access to all three sections from paved roads. Major past and present uses of the proposed project area are grazing, timber production, and mineral exploration.

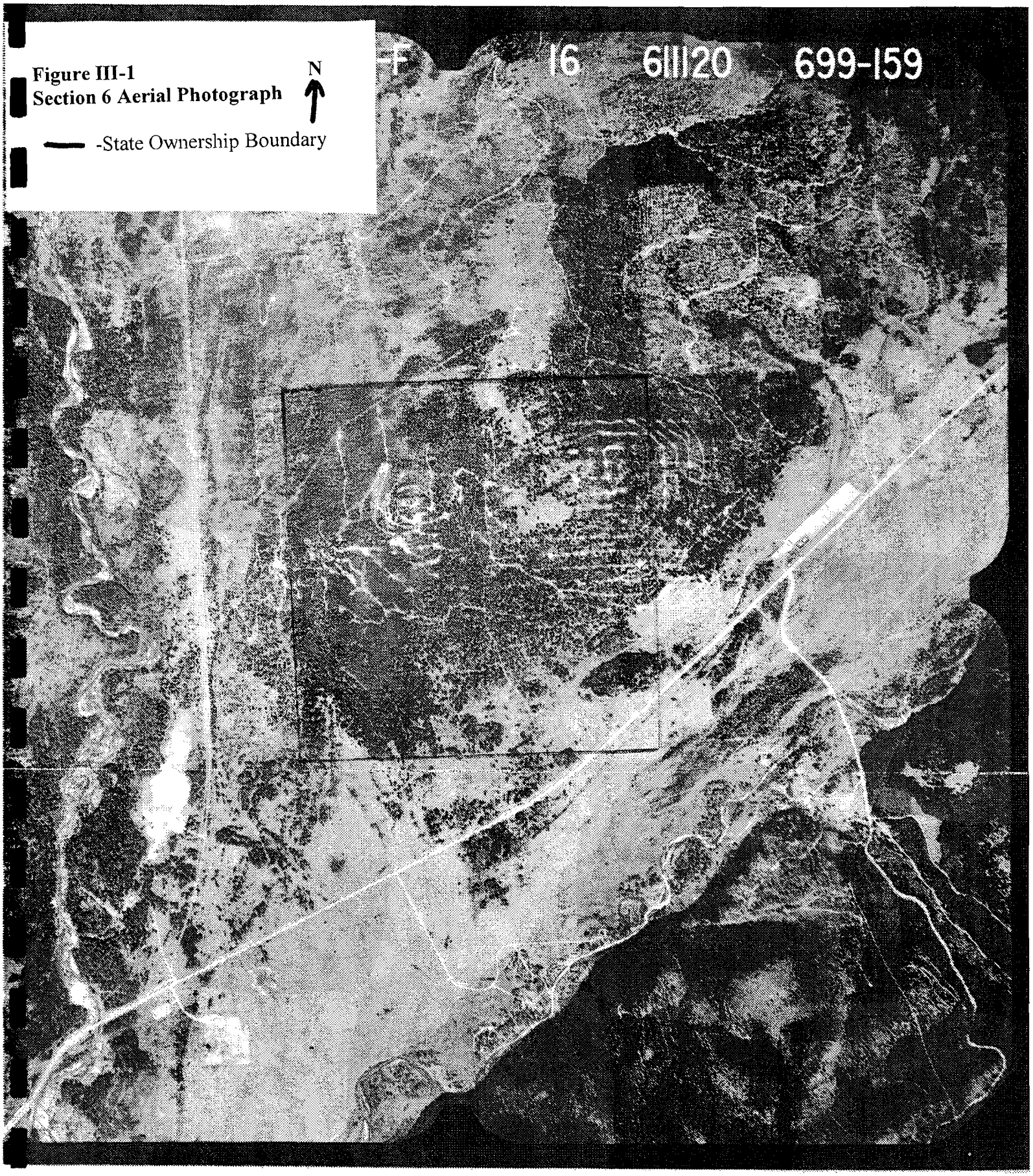


Figure III-1
Section 6 Aerial Photograph

Figure III-2
Section 12 Aerial Photograph

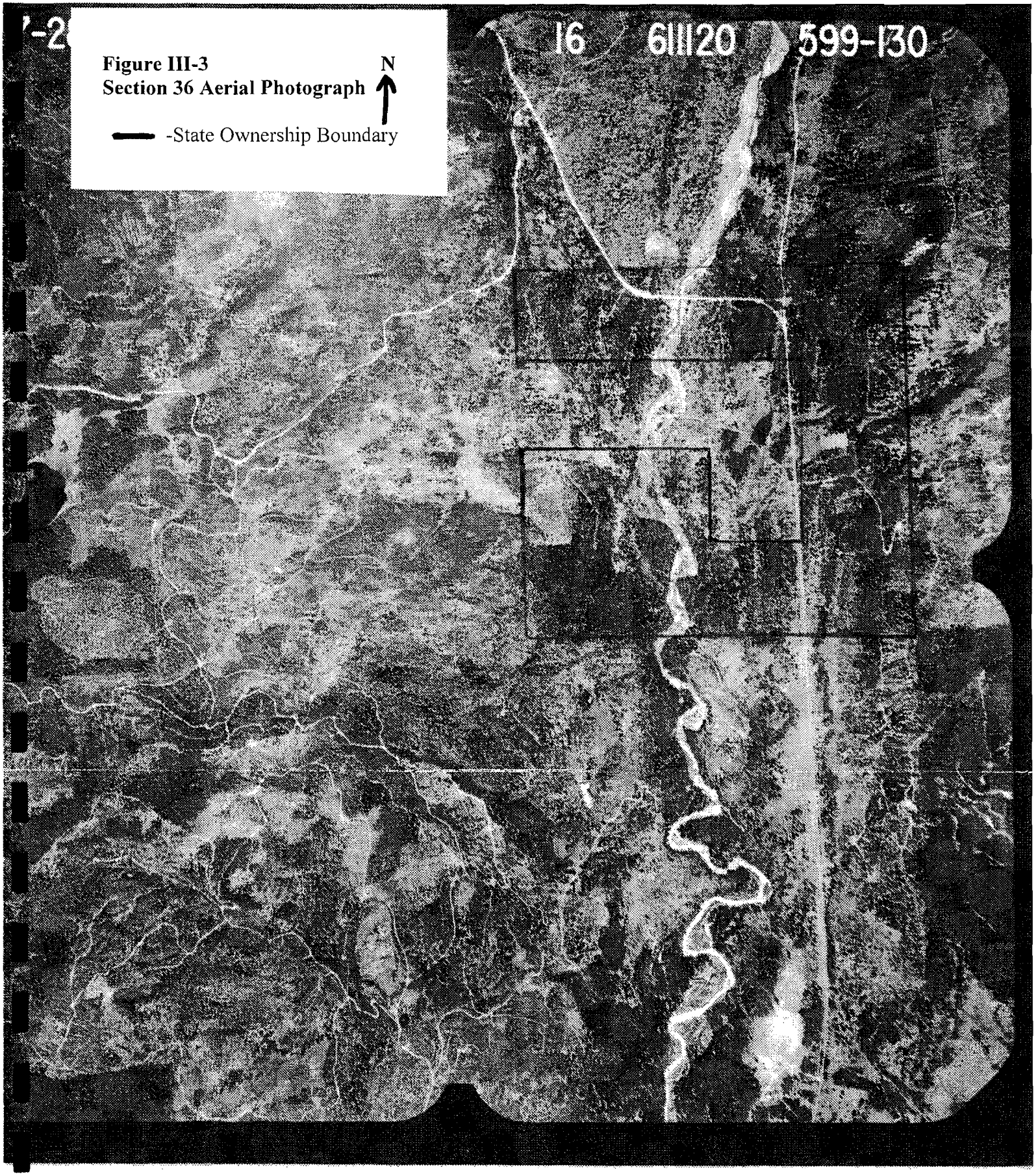


Figure III-3
Section 36 Aerial Photograph

3.2 Affected Resources

3.2.1 Vegetation

For the vegetative related resources the cumulative effects analysis area includes all three state parcels and all those lands within one mile of these two sections. This involves and includes both private and federal ownership in addition to state ownership (see Figure I-1. Vicinity map). In general, the area surrounding the state ownership has been more heavily harvested in the past 40 years than state ownership.

3.2.1.1 Forest Structure and Cover Types

3.2.1.1.1 Regional and Unit-wide Assessments

At the broad scale, assessments prepared for the 1997 Interior Columbia River Basin (ICRB) Draft EIS are useful in examining how DNRC's ownership fits into the larger ecosystem. The information in the ICRB Draft EIS shows the general trend across the analysis area is a decrease of ponderosa pine, western larch, and western white pine across their ranges. The primary trend is from shade intolerant to more shade tolerant species (true firs, spruces, and western red cedar) with the shade intolerant species (ponderosa pine, lodgepole pine, and western larch) out competed and replaced by shade tolerant species. Fire regimes have changed from predominantly mixed and non-lethal severity to a large predominance of lethal severity fires. Acres of old forests of both multistory and single story structure have decreased.

The ICRB EIS grouped forests into three broad categories:

Dry - includes ponderosa pine, dry Douglas-fir, and dry grand fir forests.

Moist – includes cedar/hemlock, moist Douglas-fir, grand fir, and wet spruce/fir forests.

Cold – includes the higher elevation forests not falling into 1 of the other 2 categories.

All three forest groups have experienced large increases in dominance by shade-tolerant species due to timber harvesting, fire suppression, insects, and diseases. All 3 groups are more likely to experience stand replacing fires than they did historically due to a large buildup of fuels and changes in stand structure and composition. *The majority of the stands in the proposed project area would fall in the Dry forest category.*

An overall decrease in old growth stands has occurred in the dry forest group with a large increase in multistoried stand conditions and a large decrease in single storied forests. Within the multistoried forests, shade tolerant tree species are 3 times as abundant. Ponderosa pine has been replaced by grand fir or Douglas-fir on nearly 40 % of its range. Shade tolerant species dominate 30% more stands than historically. *Many of the trends summarized above are taking place in the proposed project area.*

Estimating historical conditions is important in defining what the forest looked like before the widespread settlement and influence of the western Europeans (pre-industrial age). The working assumption is that average historical conditions represent a healthy, sustainable, diverse forest with

all the pieces intact as committed to in the SFLMR. Historical conditions provide an indication of a desirable future condition for the forest tempered by current circumstances. Appropriate conditions are based on ecological characteristics (land type, habitat type, disturbance regime, unique characteristics) and can be characterized by the proportion and distribution of forest types and structures historically present on the landscape.

Past management activities and fire suppression appear to have had some effect on shifting cover types on Clearwater Unit. A majority of the current cover types are generally the same as what would be considered historical (appropriate) cover types under natural processes (Table III-1). 5816 acres of current cover type is different from the appropriate type, which is 12.6% of the total acres Unit-wide. The majority of the stands that are not in the appropriate cover type fall within the WL/DF type primarily because these stands are more dependent on fire or proper management and are more susceptible to encroachment by other species.

Table III-1
Area by Current Cover Type and Appropriate Cover Type for Clearwater Unit

Current Cover Type [1]	Appropriate Type							
	ALP/NC Acres	DF Acres	HW Acres	LP Acres	MC Acres	PP Acres	WL/DF Acres	**Total Acres**
ALP	353	167		285			1909	**2714**
DF		5844					291	**6135**
HW			176					**176**
LP				4122		16	895	**5033**
MC		284		165	458		1337	**2244**
PP						16,455	36	**16,491**
WL/DF		293				138	12,900	**13,331**
Total	**353**	**6588**	**176**	**4572**	**458**	**16,609**	**17,368**	**46,124**

[1]ALP = Alpine Fir, HW = Hardwood (Cottonwood, Aspen) PP = Ponderosa Pine, DF = Douglas-fir, WL-DF = Western Larch-Douglas-fir, LP = Lodgepole Pine, MC = Mixed Conifer.

Clearwater Unit is currently dominated by PP and WL-DF cover types (36% and 29% respectively), which are also the dominant appropriate types. This indicates that Clearwater Unit has a variety of lower elevation dry types as well as more moist higher elevation types with a distribution of cover types in between.

Table III-2 lists Unit-wide age class distribution by cover type. Stand age has been influenced by fire suppression as well. This lack of moderate severity and stand replacement fires has been a primary cause in the shift in age classes from the younger seedling/sapling stages to the more mature age classes. Historically in this region, an average of cover types within the respective age classes would be 23% in seed-sapling, 29% in poles, 21% in mature, and 21% in older age classes (Losensky, 1997).

Table III-2
Current Age Structure by Current Forest Cover Types for Clearwater Unit

Cover Type	Seed-Sapling 1-39 yrs	Poles 40-99 yrs	Mature 100-149 yrs	Older 150+ yrs	**Total Acres**
PP	954	4725	7072	3740	**16,491**
DF	307	1187	2776	1865	**6135**
WL-DF	219	2774	5328	5010	**13,331**
LP	591	2773	1331	338	**5033**
MC	81	789	1075	299	**2244**
ALP	106	606	918	1084	**2714**
HW	0	163	13	0	**176**
Total ac	**2258 (5%)**	**13,017 (28%)**	**18,513(40%)**	**12,336 (27%)**	**46,124**

3.2.1.1.2 Project Level Analysis

Within the proposed sale area all of the stands have the same current cover type as the appropriate cover type. This is well below the unit average of 12.6% that do not have the same cover types.

On state ownership in the analysis area the predominant stand type is lodgepole pine followed closely by Douglas-fir (Table III-3), which is very different from the unit averages found above. The age trends are somewhat similar to the unit-wide (Table III-2) averages especially in the seed-sap age class. There is however a 14% difference in the mature age classes and the pole and older age class percentages are slightly higher and have the largest portion of the acreage. Most of the trends affecting the ICRB are also similar to those of the analysis area.

Table III-3
Current Age Distribution by Cover Type in the Project Area

Cover Type	Seed-Sap 1-39 Acres	Poles 40-99 Acres	Mature 100-149 Acres	Older 150+ Acres	Non-Forested Acres	**Total Acres**
PP	41.8	31	33.2	124.5		**230.5**
DF		60.5	78.4	323.7		**462.6**
WL-DF						
LP	16.8	262.7	241.6	32.9		**554**
MC		107.5				**107.5**
ALP						
NF*					394.6	**394.6**
Total	**58.6 (4%)**	**461.7(34%)**	**353.2(26%)**	**481.1 (36%)**	**394.6**	**1749.2**

*NF = nonforested

The vast majority of the lodgepole pine stands are in the pole and mature age classes. The amount of acres in the pole size class is somewhat deceiving because most of the overstory trees in these stands and the mature stands are the same age, around 100-110 years old. However, the

stand ages found in the table above are average stand ages and many of the pole stands, particularly those found in Section 36, are a bit more open and have younger lodgepole pine growing in the openings in and around these 100-110 year old trees which tends to bring the overall stand age down. Most of the stand ages in the pole age class are in the higher end of this age class, around 80 and 90 years old and most of the ages in the mature age class are in the lower end of the age class, around 100 and 110. So most of the stands in these two different age classes are actually more similar than they might appear from the table. Many of the lodgepole stands in Section 12 have young lodgepole encroaching on the nonforested grasslands scattered in and around the timbered stands. Most of the lodgepole stands can be found in the western side of Section 6 (231 acres), the northeast corner of Section 12 (115 acres), and scattered throughout Section 36 (208 acres). Most portions of the lodgepole stands are well stocked with lodgepole pine with little to no other species present, and they average 12-14 inches in diameter with one exception which lies in the western center of Section 6 where the lodgepole are more heavily stocked and average 6-8 inches in diameter. Basal areas are highly variable with a majority of the stands averaging around 60-80. Approximately 10 acres of recently harvested post and pole units found in middle of the western half of Section 6 (no harvesting is proposed in these stands, see map in Chapter II for general locations) are no longer heavily stocked like most of the rest of the lodgepole cover types and have basal areas around 20-40 instead. One older lodgepole stand (33 acres) lies in the northeast corner of Section 6 and with its age has a substantial amount of rot, mistletoe, and decadence. Vigor in almost all these stands is poor to very poor due to disease, high stocking levels, and age. Approximately 30 acres of lodgepole cover type on the edges of several stands in Section 6 were misclassified and should be reclassified as Douglas-fir cover type.

The largest age class for the Douglas-fir cover type is the older age group with none being classified in the seed-sapling group. All of the older stands are found in Section 6 (324 acres) and all of the stands in Section 6 are in this older age class. They lie primarily in the center and southeast corners of the section with additional smaller stands in the northwest corner. All of these older stands have been aged right at the breakpoint between the older age class and the mature age class at 150 years old. A good portion of these stands do have trees older than 150 years old, but many of them also have a multi-storied canopy with several age classes of younger thrifty Douglas-fir. They also have a mix primarily of lodgepole pine and ponderosa pine. Diameters of the older trees range around 16-20 inches with basal areas of the stands averaging 90-120. An exception is the blowdown salvaged Douglas-fir stand (no harvest is proposed in this stand, see map in Chapter II for general location) in the northeast portion of the section that has lower basal areas and resembles an even aged shelterwood harvest with an open understory. Many of the older trees in these stands are becoming poor in health due to age and competition. The remaining Douglas-fir stands are found in Section 12 (114 acres) and Section 36 (25 acres). The stands in Section 12 are found on the west edge of the section and lie west of the Landers Fork. One stand is a mature stand on steep slopes overlooking the Landers Fork and the other is a pole stand along the section line that is heavily stocked with these younger relatively healthy Douglas-fir, lodgepole and ponderosa pine. The one stand in Section 36 is found in the southeast corner of the section and is primarily heavily stocked but healthy pole sized trees but is classified as a mature stand.

A third cover type of ponderosa pine exists with the majority of the stands in the older age class. All but one of these stands are found in Section 36 (188 acres) scattered throughout the section. Many of these stands have a very low representation of only 20-30 percent ponderosa pine but are still classified as ponderosa pine with these percentages. The other species present are dominated by Douglas-fir and lodgepole pine in the uplands and along the Landers Fork in the low lands by spruce, lodgepole pine, and cottonwoods. Only one stand is composed almost strictly of ponderosa pine and is found in the sandy soils on the northeast side of the Landers Fork. Most of the ponderosa pine stands are multi-storied unevenaged stands. All of the stands that fall in the older age class lie along the Landers Fork. Although highly variable, diameters average 14-20 inches with basal areas around 40-90. Most of these stands are in poor to fair health with competition being the primary cause of poorer health. Many of the older ponderosa pine are in poorer health due to both age and competition. The remaining ponderosa stand is found in Section 12 (42 acres) and is a seed/sapling stand that is primarily encroachment on the grasslands and also has a mixture of Douglas-fir and lodgepole pine.

The remaining cover type is the mixed conifer type, and consists of 3 stands found along the east side of the Landers Fork in Sections 12 (90 acres) and 36 (18 acres). All of these stands are in the pole age class and are composed primarily of spruce with additional lodgepole pine, aspen, and cottonwoods with a few scattered Douglas-fir and ponderosa pine. The stands are in fair health and are moderately to heavily stocked. Diameters average 14-18 inches with basal areas ranging from 60-160.

Approximately 394 acres of grasslands and roads are found scattered throughout all three sections. These are composed of native grasses, sagebrush, and encroaching trees.

Cumulative Effects

Cumulatively, the stands found on state ownership are in older age classes than might have been expected historically. However, within the analysis area this is not the case since much of the private land has been harvested within the last 30-40 years and does have a higher representation of these younger age classes resulting in an age class structure within the analysis area that may more closely resemble what would have been expected historically. Almost all the stands surrounding state ownership are moderately to well stocked and cover types appear to be appropriate.

3.2.1.2 Forest Health

Generally, the overall stand health across State ownership is fair to very poor and is primarily dependent on stocking levels and age. Most of the stands are overstocked, older aged, and/or have problems with disease. Generally, the stands that are heavily stocked have poorer rates of growth since growing space, nutrients, water, and sunlight are more limited. Health varies from stand to stand, but the stands with the poorest health are the heavily stocked older stands in which the trees are overmature and individual tree vigor is declining and in dense lodgepole stands where growing space is limited. The best growth rates on these parcels can be found in the younger, thriftier stands of Douglas-fir and spruce and in some of the multi-storied stands. There is currently little insect activity on these parcels, but conditions do exist for outbreaks to occur.

Most of the lodgepole pine stands are heavily stocked and have reached maturity. Both of these conditions have led to substantially slowed growth rates in these trees. Many of the individual trees have small, thin crowns that are becoming or are already flat topped. Additionally, mistletoe can be found in most of the lodgepole stands with a range of severities from light to heavily infected. Dwarf mistletoes are widespread throughout the Northern Region and have a great impact on the forests. These parasites are native components of the forest ecosystems in the western United States, but human influences such as partial cutting and fire exclusion have served to increase the intensification, spread, and severity of dwarf mistletoes to unnatural and unmanageable levels in many forest stands (USDA Forest Service R-1, 1991). Some of the trees are so heavily infected that mortality is occurring while others are deformed and rotting from the infections. Trees with lighter infections are suffering growth losses and beginning to show signs of physical deformities as a result of the mistletoe infections. Understory trees are also quickly becoming infected. When infected at a young age, most of these trees will never become large and provide the canopy cover or seed source that their parents did. Because of the growth inhibiting effects of mistletoe these young trees would likely remain small, bushy, and misformed. In the most heavily infected areas, total stand growth rates are near zero. The worst infected areas are in the northeast corner and northwest portions of Section 6. Many of the lodgepole pine stands are currently reaching a highly susceptible stage for mountain pine beetle attacks. The most susceptible lodgepole stands are at relatively low elevations, greater than 8 inches in diameter, and older than 80 years of age (USDA Forest Service et. al., 1991). The risk is compounded by the stands being in poor health with low vigor.

Generally the Douglas-fir and ponderosa pine stands are in fair to poor health and are in better health where the younger age classes exist. Overstocking and old age are the primary growth inhibitors in these stands. Many of the older trees have thinning crowns, dead tops, and poor growth rates while the younger trees are relatively healthy and suffer primarily from overstocking and competition. There are moderate to high amounts of armellaria root rot within the Douglas-fir stands in Section 6. These stands are suffering mortality primarily in the Douglas-fir trees and other infected trees have poorer growth and thinning crowns and are being weakened by the disease. Ponderosa and lodgepole pine are less susceptible to root rot and do not appear to be suffering these same losses. Brown Cubical Butt Rot (Phaeolus schweinitzii) is also infecting some of the Douglas-fir and is causing rotting and decay of the stem and/or roots of infected trees and are spread by spores of fruiting bodies. This is usually found in the older more decadent stands of Douglas-fir. Additionally, several small pockets of Douglas-fir bark beetles also exist, but do not appear to be rapidly increasing at this time. The densely stocked and multi-storied stands of Douglas-fir could be susceptible to spruce budworm attacks should budworm populations increase in the area. There is currently an outbreak of spruce budworm occurring in the Flesher Pass area 6-8 miles east of the project area. Budworms do not typically kill many of the trees they attack but can cause severe declines in stand health and growth

The mixed conifer stands are generally in fair health with trees mostly less than 100 years old, although the lodgepole pine in the stands have reached maturity and are slowing in growth. In several portions of these stands there is slow spruce mortality from unknown causes and past mortality is evident from the large amounts of coarse woody debris and down trees.

Within the analysis area on surrounding ownership stand health tends to be better since most of the stands have been managed in the last 40 years and are now in the younger age classes. Some of the stands are to the point where they are becoming densely stocked and competition is beginning to slow growth rates however.

Cumulative Effects
The near exclusion of fire in the 20th century has likely affected many of the currently overstocked stands in the analysis area. The ponderosa pine stands would have been expected to receive frequent low intensity fires that would burn many of the understory Douglas-fir and pine and maintain these stands at lower stocking levels than exist today which would have resulted in more healthy and vigorous stands. The Douglas-fir stands would have been expected to receive less frequent but moderate intensity fires that also would have had beneficial thinning effects that would improve forest health. These fires would have also been expected to keep the mistletoe at much lower levels since mistletoe is very susceptible to fire and tends to cleanse the stands of this disease.

3.2.1.3 Fire Hazard

The most predominant historic fire frequency in the project area is in the moist Douglas-fir habitat types, which had a mean fire interval of around 42 years in presettlement stands. Fire was an important agent in controlling density and species composition. 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 lodgepole pine dominated stands the fire frequency is expected to be longer between fires and was typically a stand replacement event if fuels and mistletoe had built up.

Currently, the risk of a stand replacing fire or a fire that would burn more intensely than expected under natural conditions historically on these three sections is moderate to high. 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.

Cumulative Effects
The near exclusion of fire in the 20th century has likely affected many of the currently overstocked stands in the analysis area. Stand dynamics, succession, and fuel loadings have all changed over the past 100 years to create a situation that puts these forest stands at a much higher risk of high intensity and sometimes stand replacing fires. Past harvesting of trees has helped decrease fuel loadings and stand densities, but in many cases has removed the larger trees

that are in most cases more fire resistant. Within the analysis area, fire hazard has generally increased over time in the ways described above with the exception of the more recently harvested areas. In these locations, the risk of high intensity fires is still low to moderate due to decreased stocking levels, amounts of mistletoe, and ladder fuels.

3.2.1.4 Aesthetics

The primary high use/high travel areas that the project area can be seen from are Highway 200 which runs through the south half of Section 12 and southeast corner of Section 6 and the Copper Creek Road which runs through the northeast corner of Section 12 and the east half of Section 36. The majority of the area immediately adjacent to these two roads in Sections 6 and 12 are nonforested with small patches of lodgepole pine and lodgepole pine encroachment with broken topography and rolling hills. The state ownership adjacent to the Copper Creek road in Section 36 is primarily forested with moderate to well stocked lodgepole pine stands. With the exception of the nonforested areas, the forested stands appear primarily well stocked with heavy canopy cover from these use areas. Much of the hillside in Section 6 can be seen from Highway 200 and except for several small rock scree slopes also appears heavily forested. The existing road system in Section 6 cannot be seen.

From the stand level (within the stand), most of the sections are timbered with very few high standard roads, which can be aesthetically pleasing to many. However, sight distances in most locations are less than 100-200 feet, which does not allow for visual pleasure of the landscape but does provide a feeling of seclusion. There are many low standard roads within the sections, which provides easy foot and in some locations vehicle access to the stands, but the ground has been disturbed and can be visually displeasing to some. Some of the stands are very thick, have heavy downfall, and/or have heavy mistletoe infestations and brooms causing physical deformities in the infected trees resulting in an unhealthy and dysfunctional appearance in the stands. Other areas have park-like conditions with relatively little downfall or disease and resulting in a pleasing appearance to most.

Cumulative Effects

The analysis area likely appears more timbered than what would have been expected historically due to the exclusion of fire and resulting increase in stand densities and lack of moderate intensity fires. There has been little to no effect aesthetically from road construction in the analysis area as they are very hard to discern from the high use areas in the valley bottom. At the stand level, sight distances are expected to be shorter due to increased stocking levels and there has been an increase in physical deformity in many of the lodgepole pine stands from mistletoe, both from the exclusion of fire over time.

3.2.1.5 Old Growth

There is one stand on state ownership that lies in Section 6 that is classified as old growth and meets the Green et al. definition of old growth that has been adopted by the DNRC. This stand is 33 acres in size in the northeast corner of the section and is comprised of 150-170 year old primarily lodgepole pine trees. The stand is decadent and heavily infected with diseases. The

larger trees that actually qualify this lodgepole old growth stand as old growth are primarily scattered 14-18 inch Douglas-fir.

While other stands in the project area do contain scattered old trees, none are sufficient enough in numbers to qualify the stands as old growth.

Cumulative Effects
Within the analysis area the near exclusion of fire would have likely increased the amount and distribution of old growth, however heavy past harvest activity on adjacent private lands has likely resulted in a net decrease in the amount of old growth that might have been expected on the landscape historically. Some old growth stands may exist within the analysis area on Forest Service ground as well as on private ownership adjacent to and east of the old growth stand on state land.

3.2.1.6 Sensitive Plants

A search of the Montana Natural Heritage Program was conducted and no sensitive plants were identified in the analysis area. No sensitive plants have been identified in field reconnaissance by DNRC personnel.

3.2.1.7 Noxious Weeds

Noxious weeds occurring in this area are mostly knapweed (Centaurea maculosa) and spot infestations of thistle (Cirsium arvense), yellow toadflax (Linaria vulgaris), leafy spurge (Euphorbia esula), dalmation toadflax (Linaria dalmatica) and St. Johnswort (Hypericum perforatum). Knapweed occurs along roadsides and in some portions of forested areas. Biological control has been used to reduce infestations of knapweed as well as herbicide treatments for knapweed, leafy spurge, yellow toadflax, dalmation toadflax and St. Johnswort. Only one relatively small spot infestation was found of leafy spurge (Section 12), dalmation toadflax (Section 12) and St. Johnswort (Section 36).

Increased traffic activity as a result of fire suppression activities, reductions in canopy cover, and increases in exposed mineral soil, is expected to increase existing species of noxious weeds and potential new invaders in the fire area and immediate vicinity. All fire suppression equipment except for those involved in initial attack activities, was sprayed before entering the area, which should reduce the risk of additional noxious weeds species introductions.

3.2.2 Soils

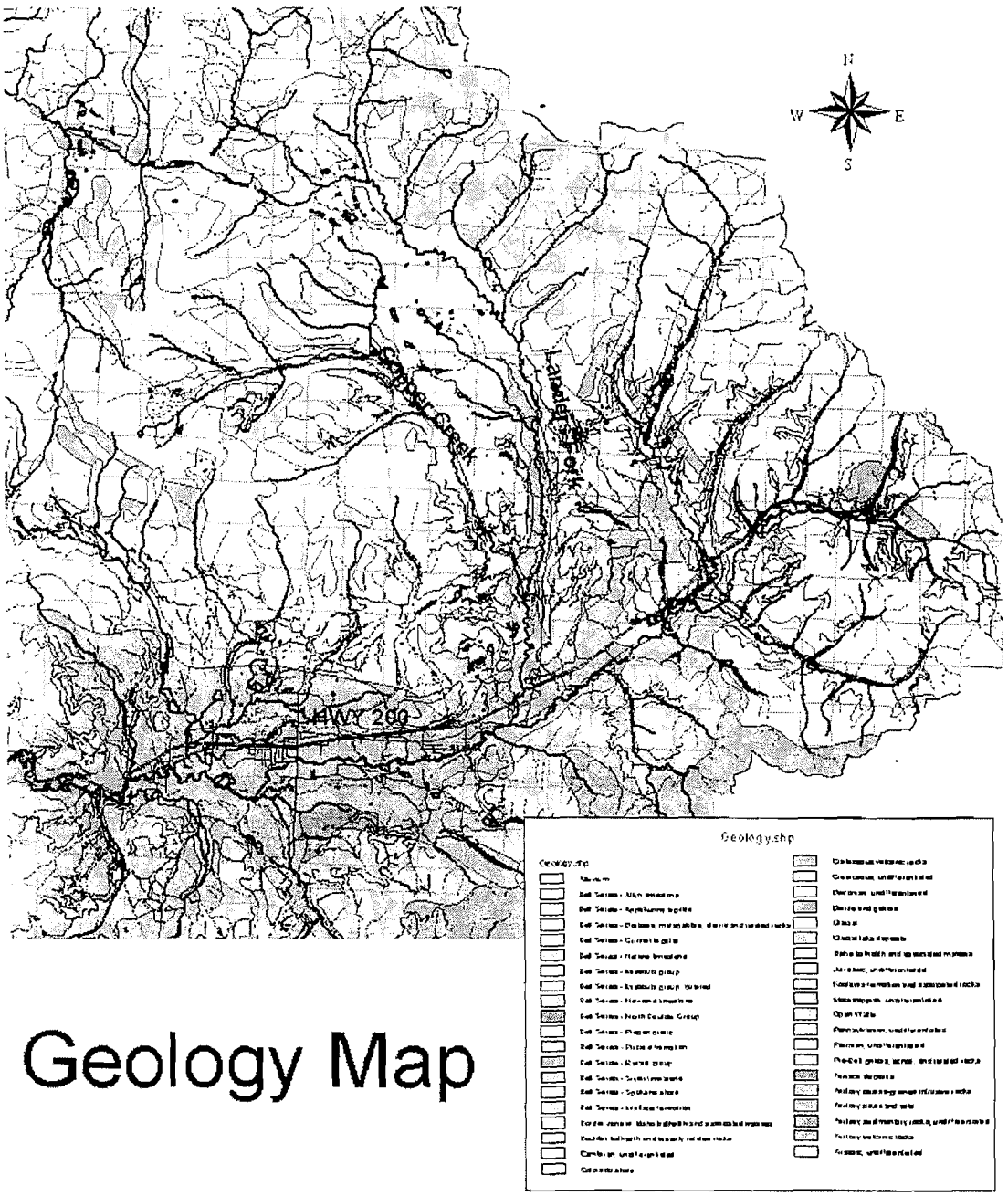
Geology
Geology in Copper Creek is a combination of **Qg** Glacial sedimentary formations, **pCs** Spokane Shale Belt Series and **pCn** Helena Limestone Belt Series.

Geology in the Landers Fork is a combination of **Qg** Glacial sedimentary formations, **pCs** Spokane Shale Belt Series, **pCh** Helena Limestone Belt Series, **Kdg** Diorite and gabbro, **pCm**

Missoula Group Belt Series, **Cu** undifferentiated sedimentary rock and **pCpi** Piegan Group Belt Series.

The project area is a combination of **Qg** Glacial sedimentary formations, **Qal** Alluvium and **pCn** Helena Limestone Belt Series.

Figure III-4. Geology Map



Soils

As mentioned above, high severity fire did burn through a large portion of the Copper Creek watershed as well as sections of the Landers Fork watershed. High severity burn areas are expected to impact soils. Modification of standing vegetation and consumption of organic matter are the most significant indirect effects of fire on soils (DeBano et al. 1998, Neary et al. 1999). Fire effects on soils are dependent on fire severity and duration of intensity. Soil temperatures can increase after a fire from the loss of forest vegetation, which provides shade and organic material, which acts as an insulator. This change in temperature regime causes the activation of many new processes within the soil. Studies have shown, the more dramatic the change in temperature regime, the more likely that a new suite of plants and animals will inhabit the recently burned forest (Barnes et al. 1998).

Surface erosion hazard was evaluated by the Forest Service for each Landtype in the Landers Fork and Copper Creek non-wilderness areas, within the fire perimeter. A total of 26,189 acres was evaluated.

Table III-4
2003 Snow Talon BAER Report Surface Erosion Hazard

Erosion Hazard	Acres	% Area
Slight	4,976	19%
Moderate	19,033	73%
High	861	3%

Soils in the project area are a combination of the soils listed below in the chart. Some soils in the project area have a high water holding capacity and remain wet later in the spring. These soil types including; 15E Worock Mikeshell Stony Loams 8-35%, 299D Leavitt Libeg Stony Loams 4-30% 499D Farnuf Hilger Stony Loams Cool 4-25%, 609A Slategoat Silt Loam 0-2%, have a higher susceptibility to compaction and displacement.

Table III-5
Soils

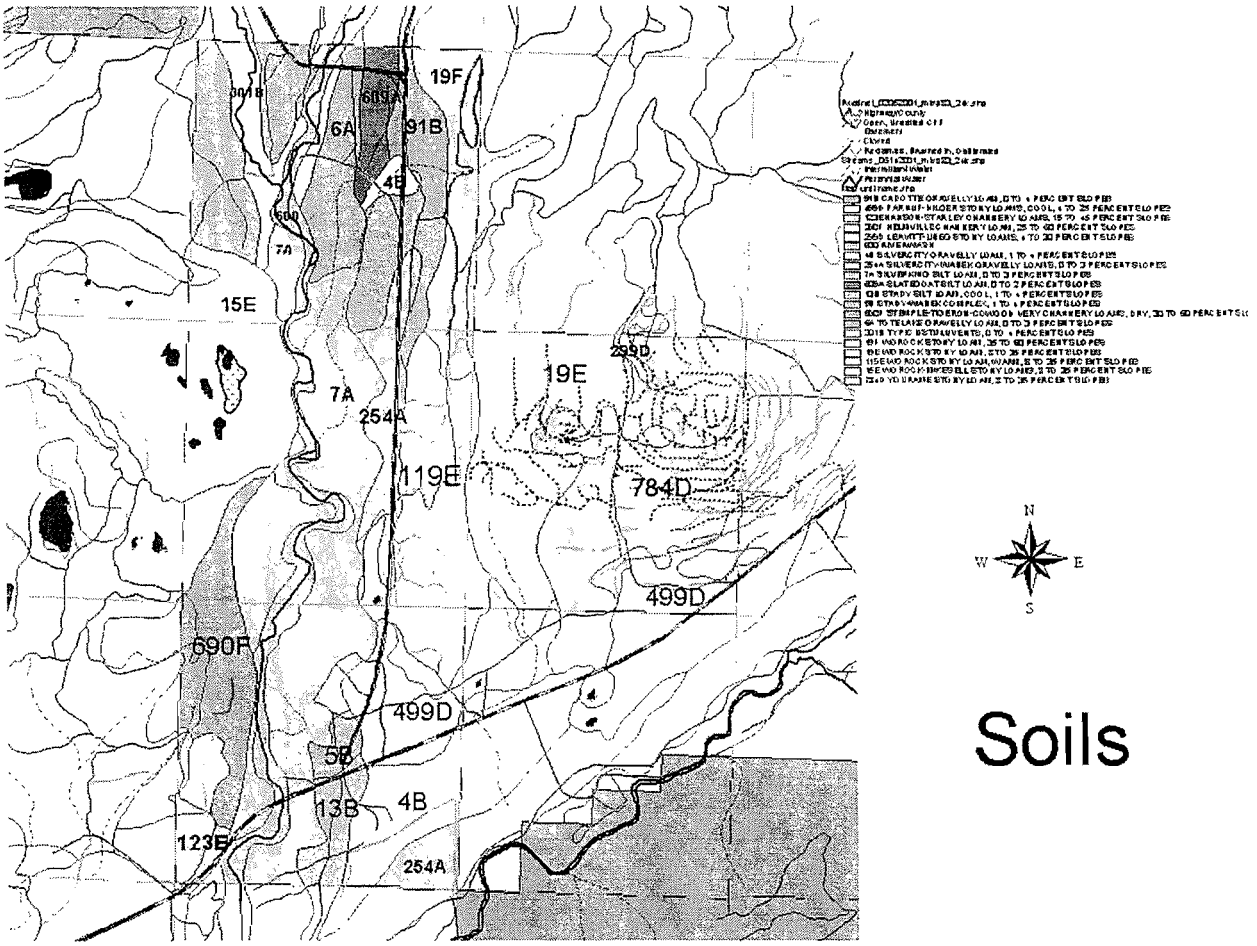
Map Unit	Annual Precipitation	Parent Material	Drainage Class	Surface Layer	Subsoil Layer	SWHC	Erosion Hazard	Displacement Hazard	Compaction Hazard	Notes
4B Silvercity Gravel Loam 1-4% Slopes			Well Drained	0-6	> 40 in	2.9-4.2	Low	Low	Low	
5B Stady Wabek Complex 1-4% Slopes			Well Drained	0-6 0-10	> 40 in	Stady 3.7-5.0 Wabek 1.9-2.6	Low Low	Mod Low	Mod Low	
6A Totleake Gravelly Loams 0-3% Slopes			Well Drained	0-4	> 40 in	2.0-2.7	Low	Mod	Low	
7A Silverking Silt Loam 0-3% Slopes			Well Drained	0-4	> 40 in	4.3-5.6	Low	Mod	Mod	
13B Stady Silt Loam Cool 1-4% Slopes			Well Drained	0-6	> 40 in	3.7-5.0	Low	Low	Mod	
15E Worock			Well Drained	0-5	> 40 in	Worock	Mod	Mod	High	

Mikeshell Stony Loams 8-35% Slopes				0-9		7.7-9.5 Mikeshell 4.6-5.3	Mod	Mod	Mod	
19E Worock Stony Loams 8-35% Slopes			Well Drained	0-5	> 40 in	4.6-5.3	Mod	Low	Mod	
19F Worock Stony Loams 35-60% Slopes			Well Drained	0-5	> 40 in	4.6-5.3	Mod/High	Low	Mod	
91B Cadotte Gravelly Loam 0-4% Slopes			Well Drained	0-8	> 40 in	2.9-3.9	Low	Low	Low	
119E Worock Stony Loam, Warm, 8-35% Slopes			Well Drained	0-5	> 40 in	4.6-5.3	Mod	Low	Mod	
123E Hanson Strarley Channery Loams 15-45% Slopes			Well Drained	0-9 0-6	10-20 in	Starley 1.7-2.0 Hanson 6.1-7.2	Mod Mod	Low Low	Low Mod	
254A Silvercity Wabek Gravelly Loams 0-3% Slopes			Well Drained	0-6 0-6	>40 in	Silvercity 2.9-4.2 Wabek 1.8-2.5	Low Low	Low Low	Low Low	
299D Leavitt-Libeg Stony Loams 4-30% Slopes			Well Drained	0-7 0-15	>40 in	Leavitt 6.1-7.7 Libeg 4.6-5.3	Mod Mod	Low Low	Mod Mod	
301B Typic Ustifluvents 0-4% Slopes			Well Drained		>40 in	NA				
390 F Helmville Channery Loam 25-60% Slopes			Well Drained	0-10	>40 in	4.9-6.3	High	Low	Mod	
499D Farnuf Hilger Stony Loams Cool 4-25% Slopes			Well Drained	0-5 0-6	>40 in	Farnuf 8.0-10 Hilger 3.5-4.2	Mod Mod	Low Low	Mod Low	
600 Riverwash					>40 in	NA				
609A Slategoat Silt Loam 0-2% Slopes			Moderately Drained	0-7	>40 in	9.1-11.5	Low	Low	Mod	
690F Stemple Tigeron Cowood Very Channery Loams Dry 30-60% Slopes			Well Drained	0-15 0-11 0-4	40 in >40 in 10-20 in	Stemple 3.2-4.1 Tigeron 3.9-4.6 Cowood 0.8-1.	High High High	Low Low Low	Low Low Low	
784D Yourname Stony Loam 8-35% Slopes				0-6	>40 in	4.9-5.7	Mod	Low	Mod	

Soils in the project area, including 390F Helmville Channery Loams 25-60% slopes and 690F Stemple Tigeron Cowood Very Channery Loams Dry 30-60% slopes have a higher risk of erosion on slopes greater than 35%.

Existing landslide features can re-activate following wildfire, due to decomposition of dead tree roots and saturated soils caused by the build-up of soil water without tree transpiration. According the 2003 Snow Talon BAER Report, two landslide features were mapped in Falls Creek following wildfires. These landslides do have the potential to re-activate over the next 4-5 years resulting in mass failure and extensive sediment deposition.

Figure III-5. Soils Map



3.2.3 Hydrology and Fisheries

3.2.3.1 Hydrology

Analysis Area: Refer to hydrology map for watershed boundaries and locations.
The Analysis area contains three sections, including sections 12 T14N, R8W, Section 36 T15N, R8W and Section 6 T14N, R7W. Section 36 is located on low to moderate slopes and is a mixture of ownership between State Trust Lands and the Sieben Ranch. There are two Class 1

stream channels located in Section 36, the Landers Fork and Copper Creek. Copper Creek is a tributary to the Landers Fork and the Landers Fork is a tributary to the Blackfoot River.

The Landers Fork has a drainage area of approximately 46,746 acres (excluding Copper Creek)and is drained by a combination of class 1, class 2 and class 3 stream channels as well as ephemeral draws and several draws with no discernable stream channel. It is also drained by headwater lakes, which flow into Meadows Creek, a tributary to the Landers Fork. Ownership in the watershed is a combination of State Trust Lands, Plum Creek, Private and Forest Service. A majority of the river miles along the mainstem flow through private ownership, with limited sections of State Trust Lands and Forest Service ownership.

The Landers Fork shows historic signs of channel instability with higher rates of channel migration (as observed in aerial photos) and sediment deposition.
Field reconnaissance investigations performed for the Upper Blackfoot TMDL draft found that historical photos from the mid 1960's showed a large event that occurred, resulting in "significant alterations in geomorphology and floodplain vegetation" (Blackfoot Headwaters Planning Area Water Quality and Habitat Restoration Plan and TMDL for Sediment; Stakeholder Review 2004). Prior to 1937, the Landers Fork showed characteristics of a "narrow active channel with bars well vegetated with trees". "The significance of these findings was that these alterations in areas where human activities were negligible suggesting that the conditions that persist to this day were the result of natural disturbance in the basin." (Blackfoot Headwaters Planning Area Water Quality and Habitat Restoration Plan and TMDL for Sediment; Stakeholder Review)

There are portions of the lower Landers Fork however, that have been impacted as a result of undersized road bridges and channelization.

Terrain on the east side of the Landers Fork in the project area in Section 12, is located on low to moderate slopes. The west side of the Landers Fork in the project area in Section 12, is comprised of steep slopes, directly adjacent to the channel. There are State cabin leases located in this section. The Landers Fork in this section is mostly drained by ephemeral draws and draws with no discernable stream channel. There is one intermittent channel located in the SE ¼ of the NE ¼ of Section 36.

Copper Creek is a tributary to the Landers Fork. Copper Creek has a drainage area of approximately 26,068 acres and is drained by several headwater lakes, a combination of class 1, class2 and class 3 stream channels as well as ephemeral draws and draws with no discernable stream channel. Most of the Copper Creek drainage downstream of the fire area is well vegetated and contains sufficient canopy cover and well vegetated stable banks.

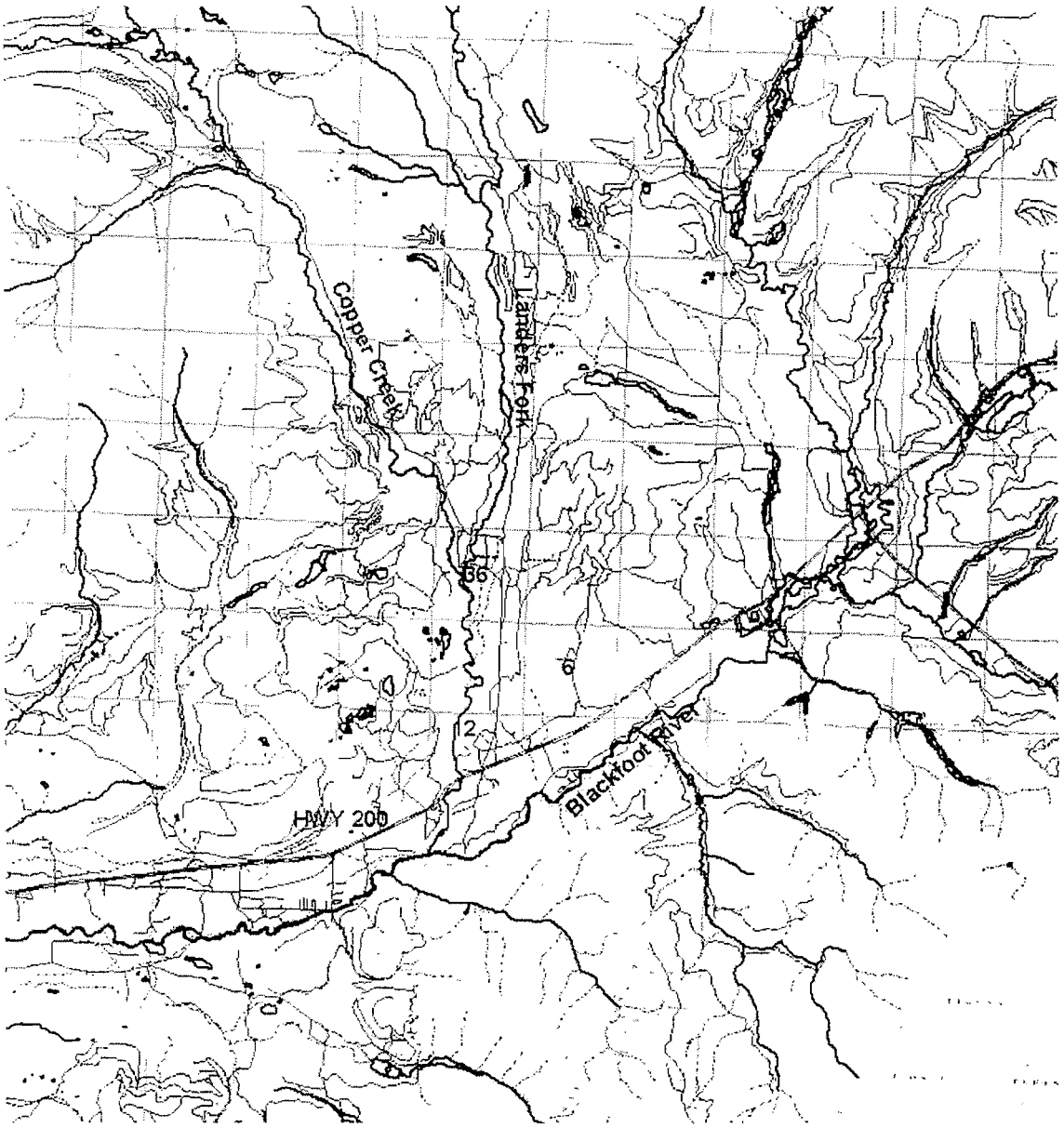
The Copper Creek drainage is a mixture of ownership between State Trust Lands, private and Forest Service. A majority of the watershed is Forest Service ownership with a small portion in the lower drainage that flows through private and State land. There are State cabin leases located in this section.

The project area in Section 6 is located on low to moderate slopes, ranging between 0-40% slopes and is owned by the State. There is a lease held by the Seven Up Pete Venture since 1989 (please refer to mine information in Chapter II). There is one spring located in this section in the NW ¼ of the NW ¼. The rest of the section is drained by ephemeral draws and dry draws with no discernable stream channel.

This section has been greatly impacted by the Seven Up Pete Venture during early exploration and testing. Large tests pits were excavated removing large amounts of earth. Most of these test pits were left un-rehabilitated and currently remain as disturbed areas. Test wells were dug throughout the section, but a majority of the vegetation around these wells has re-vegetated. In order to access the test areas, a large amount of road was constructed (see water quality existing conditions for detail).

Currently all three sections in the project area have grazing leases. Section 6, T14N, R7W has 558.5 acres allotted for grazing and an 81 AUM carrying capacity. Section 12, T14N, R8W has 280 acres allotted for grazing and a 185 AUM carrying capacity. Section 36, 15N, R8W has 457.8 acres allotted for grazing and a 76 AUM carrying capacity. Currently, all AUM's are filled by sheep. However, impacts as a result of sheep grazing were observed to be minimal.

Figure III-6. Watershed Map



Watershed Map

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.

The existing cumulative effects of past timber harvest activity 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, habitat type and road miles.

For a portion of this project, the ECA model was used to predict post fire water yield increases. The delay time was increased to 1 year to account for a period of minimal ground cover until vegetation has established. Water yield calculations for existing conditions were estimated by the watershed specialist for the Helena National Forest. Proposed water yield increases for the project area were calculated by a DNRC hydrologist using the same ECA methodology.

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

Some information for this project was also obtained through the Blackfoot Headwaters Planning Area Water Quality and Habitat Restoration Plan and TMDL for Sediment; Stakeholder Review Draft. Other information was obtained from the Snow Talon Fire Watershed Specialists Report for the Helena National Forest.

Methods used for determining Riparian Management Zones (RMZ's) followed Forest Management Rule36.11.425 Watershed Management, Streamside Management Rules and Riparian Management Rules.

Because of the project size, amount of DNRC ownership in the watershed and minimal amount of road adjacent to the stream channel in the project area, road sediment modeling was not completed.

3.2.3.1.1 Water Quality and Beneficial Uses

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. Increased levels of sediment are expected as a result of the wildfire that occurred during August 2003 within the Landers Fork and Copper creek drainages. The Snow Talon fire burned approximately 37,700 aces, which are mostly located on Forest Service ownership. A large majority of the burn area was stand replacement fire with extensive crown fires. Approximately 26,500 acres or 60% was mapped as high severity burn.
Many undersized culverts were found by the BAER Team during field reconossaince. Under the Burned Area Emergency Response (BAER) plan, temporary removal and proper sizing of culverts are some methods that will be utilized to reduce erosion and sedimentation during increased flows including rain events and spring runoff. Installing additional drainage features where necessary will also reduce erosion of road surface material. Over 20 culverts and 2 bridges were determined to be at risk from potential storm flow increases, requiring overflow channels to be installed to reduce the risk of structure loss (BAER Report 2003 Snow Talon Fire). Over 26

miles of trail were affected by the fire. Many of the drainage features on these trails were destroyed by the fire. Drainage structures were required on these trails as fire mitigation measures, to decrease the potential for accelerated erosion and sediment delivery to stream channels.

Burn severity for Copper Creek, the Landers Fork and their tributaries is listed in the chart below, referenced from the 2003 Snow Talon Fire BAER Report.

Table III-6
Burn Intensity

Drainage	Drainage Area	Low Burn Severity (acres)	Low Burn Severity (percent area)	Moderate Burn Severity (acres)	Moderate Burn Severity (percent area	High Burn Severity (acres)	High Burn Severity (percent area)
Copper Cr.	26,068	1,759.9	6.7%	1,608.0	6.2%	16,205.0	62.2%
Copper Cr. Above Snowbank bridge	16,983	1,371.0	8.1%	1,608.0	9.5%	8,346.0	49.1%
Indian Meadows	3,577	1,781.0	49.8%	0.0	0.0%	1,796.0	50.2%
Landers Fork	46,746	641.0	1.4%	80.0	0.2%	8,496.0	18.2%
Snowbank Cr.	4,785	279.8	5.8%	0.0	0.0%	4,318.8	90.3%
Cotter Cr.	789	49.2	6.2%	58.8	7.5%	684	86.7%
Total* for entire Snow Talon Fire Area	32,371.0	4,176.0	12.9%	1,688.0	5.2%	26,507.0	81.9%

*Note: Total Fire Area is not obtained by adding above drainage areas, because some of the drainages are contained within larger watersheds, and acres would thus be double counted. For example, Coter Creek drainage is contained within the larger Copper Creek drainage.

(Burned Area Emergency Response BAER Report 2003 Snow Talon Fire)

Some hillslopes in the Copper Creek drainage show signs of erosional features from historic fire events. Large slump areas were also observed on aerial photos, which are currently at a higher risk of failure. Both these areas are more susceptible to erosion and gully formation after extensive vegetation removal during the Snow Talon Fire of 2003. Snow conditions and rain events will have an affect on the occurrence probability of these events.

There has been timber harvest in both Copper Creek and the Landers Fork. Signs of past harvest activity were observed in the project area. However, old skid trails are stable and well vegetated. Approximately 3081 acres have been harvested in the watershed by the Forest Service. Harvest on private ownership has occurred but levels and prescription types are unknown.

Copper Creek, the Landers Fork, and their tributaries are B-1 Classified Streams in 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.

The Landers Fork was listed on the 2000 303 (d) list for impaired waterbodies, but was not listed on the 2002 list.

3.2.3.1.2 Water Yield

Existing cumulative impacts to water quality are those impacts caused by cumulative effects from past and present activities within the watershed. Water yield in both the Landers Fork and Copper Creek are expected to increase as a result of the Snow Talon Fire. As a result of moderate to high intensity wildfires, vegetation and canopy cover are removed, reducing canopy and forest floor interception capacity, in return changing the evapo-transpiration process. Dead standing trees have little or no canopy cover are therefore incapable of providing substantial levels of snow or rainfall interception.

As a result of anticipated water yield increases, peak flows are also expected to increase. Peak flows may change in magnitude and duration, but are dependent on intensity and duration of rainstorms as well as snowpack conditions, making it difficult to predict and calculate increases. We do know that increases in peak flows can result in increased risk of debris flows and erosion. Stream channel reactions to these flows vary depending on geomorphology and stream channel stability.

Stream flooding is likely to occur this spring in Copper Creek and lower sections of the Landers Fork, because of the amount of high severity burn. Stream flooding could damage values at risk, including campgrounds, roads culverts and private property.

The Landers Fork has higher sediment loads as a result of naturally erosive soils and is more susceptible to erosion with increased flows. Copper Creek is naturally a more stable channel with less erosive soils and greater bank stability. However, water yield is expected to increase by 700% in Copper Creek, greatly increasing the risk of channel instability from peak flows.

Annual water yield increases for existing conditions were calculated by the watershed specialist for the Helena National Forest. The summary of annual water yield increases was taken from the Helena National Forest Watershed Specialists Report for the Snow Talon Fire.

Table III-7
Post Fire Predicted Water Yield Increases

Analysis Area	**Water Yield Increases**	
	Before 2003 Fires	Existing
Copper Creek	1.3	10.3
Landers Fork	0.3	2.6

3.2.3.1.3 Sediment Yield

Existing cumulative impacts to water quality in the affected watershed are associated with increased levels of sediment delivery to the stream channel. Unknown levels of sediment

delivery have occurred as a result of historic timber harvest in the upper portion of the Copper Creek watershed, existing road systems and stream crossings. The Landers Fork has had limited sediment delivery from timber harvest due to low historic harvest levels in this drainage. However, road systems in both the Landers Fork and Copper Creek drainages range from poor to good condition and roads are contributing sediment in some locations. Most of the direct sediment delivery in Copper Creek and the Landers Fork, is isolated to stream crossings that do not meet BMP standards and those areas where the stream channel is directly adjacent to the road.

Sediment yields are expected to increase as a result of increases in water yield associated with wildfire activity. During spring runoff and rain events sediment flows will increase on hillsides and roads, increasing the risk of sediment delivery to the stream channel in Copper Creek and the Landers Fork. The risk of debris flows is expected to increase in heavily burned watersheds. Debris flows can cause channel downcutting and produce large movements of sediment. These large movements of sediment downstream have the potential to result in large alluvial fans. Landslide activity and mud flows would contribute to post fire sediment yield increases if they occur.

3.2.3.1.4 Roads

There are approximately 30 miles of roads on state ownership within the project area (see Figure II-2. Current Roads Map). This includes portions of Highway 200 in Sections 6 and 12 and a paved stretch of the Copper Creek Road #330 in Sections 12 and 36. Most of the 15.8 miles of roads in Section 6 were constructed as part of the McDonald Gold Project in the 1990's. Some of these roads are steep and narrow with gradients exceeding 18%, while others are flatter and wider with gradients less than 8%. Portions of the main road which are steep and lack sufficient drainage have significant rutting and rilling occurring. Many of the side roads are no longer drivable due to down trees, rocks, vegetation, and other debris covering them. However almost all of them are accessible with a 4-wheeler.

Approximately 0.45 miles of road have already been obliterated on this section by the McDonald Gold Project. The term obliteration for this project refers to the removal of the road prism and reshaping the slope to its natural contour. Abandonment refers to closing a road because it is not intended for use for future forest management activities or motorized vehicles and is left in a condition that provides adequate stability and surface drainage without periodic maintenance.

Several stretches of road do not meet BMPs due to steepness and lack of drainage structures. Most of these roads receive little use due to inactivity of the McDonald Gold Project and gates that restrict some access. Most of the roads in Sections 12 (8.31 miles) and 36 (5.71 miles) are on flatter ground and well vegetated, but several segments do not currently meet BMPs. Many of these roads provide access to the Landers Fork, Copper Creek and Sieben Ranch Company ground, which are used heavily primarily during the summer by recreationists. All of the roads on state land are classified as open by the DNRC except for those that are overgrown with vegetation.

There is an existing ford located on private land in the SE ¼ of the NW ¼ of Section 36. The stream bottom in this section of channel is well armored with cobble bed material. However, it is assumed that some direct sediment delivery is occurring during use. There is also an existing 18" pipe in the SE ¼ of the NE ¼ of section 36, that is undersized and causing sediment deposition at the inlet of the culvert. Additionally, in the NE ¼ of the SE ¼ of section 36 an undersized 8" relief pipe has resulted in chronic erosion, which has led to rilling down the center of the road.

3.2.3.2 Fisheries

In 2003 the Snow Talon Fire burned 37,700 acres in Copper Creek and the Landers Fork. Both drainages support bull trout, which is listed as "threatened" under the Endangered Species Act (ESA) and included as critical habitat in the Proposed Designation of Critical Habitat for the Klamath River and Columbia River Distinct Population Segments of Bull Trout (BAER Report 2003). Under the Inland Native Species Strategy, amended to the Helena National Forest Plan in 1995, the Copper Creek drainage is considered a priority drainage. Westslope cutthroat trout (listed as a sensitive species) was also found in all drainages surveyed by the Forest Service in the fire perimeter.

Landers Fork

The Landers Fork is the largest tributary to the upper Blackfoot River. At base flow, the Landers Fork approximately doubles the flow of the Blackfoot River. Some reaches upstream of Highway 200 have been channelized and affected by undersized bridges, resulting in areas of instability and alterations. Stream channel alterations resulting in increased instability have caused a reduction in habitat complexity. (Blackfoot River Fisheries Inventory, Monitoring and Restoration Report 2000)

Non-native species in this drainage include brown trout and rainbow trout. The Landers Fork supports low numbers of juveniles and very low numbers of non-native species (Blackfoot River Fisheries Inventory, Monitoring and Restoration Report 2000). The lower reaches of the Landers Fork provide wintering areas, rearing habitat and a migration corridor for Adult Blackfoot River fluvial bull trout, which reproduce in Copper Creek (Chapman and Hillman 1996, Swamberg and Burns 1997).

Copper Creek

Copper Creek, a major tributary to the Lower Landers Fork is an important tributary for the spawning and rearing of westslope cutthroat and fluvial bull trout. It supports the only major spawning migration of fluvial bulltrout in the upper Blackfoot Basin. Most reaches of Copper Creek in the project area are stable and well vegetated with adequate canopy cover and large woody debris for thermal protection and habitat complexity. Large woody debris is not a limiting factor in Copper Creek. A large winter kill in 1989 supplied a large amount of debris that has been moving down the channel (Laura Burns 2004). According to stream temperature data collected by the Montana Department of Fish Wildlife and Parks. Copper Creek had the coldest summer stream temperatures of any of the sampled streams in the Blackfoot watershed in 1999.

Copper Creek fish populations are comprised only of native fish species over the entire length of stream (Peters1990, Chapman and Hillman 1996). Sample locations at established survey points recorded bull trout and westslope cutthroat trout at all survey locations. Surveys conducted post fire in 2003 found a 73% reduction in redd counts from those found in 2002. This is most likely attributed to high intensity burn throughout portions of the stream channel resulting in fish kills and increased sediment loads and loss of habitat. There was also a fire retardant drop in an important spawning reach of Copper Creek that is assumed to have resulted in a fish kill.

Stream temperatures in both Copper Creek and the Landers Fork are expected to increase as a result of vegetation loss during the Snow Talon fire. Some reaches of stream channel experienced high intensity burns, which consumed most or all of the riparian vegetation and cover that would normally provide thermal protection.

Following post fire electrofishing surveys conducted in Copper Creek, the Forest Service found that fish populations may have been totally eliminated in those drainages that had been heavily burned. Visual observation concluded that fish mortality throughout Copper Creek ranged from 50-100% depending on location and burn intensity. (Snow Talon Fire BAER Report, 2003)

The highest concern for fisheries under existing cumulative effects would be sedimentation. Anticipated increases in sediment are expected to affect fisheries habitat and populations. Because weather events cannot be predicted, the short and long-term effects to fish populations is hard to predict. Areas of instability are present in both Copper Creek and the Landers Fork. If landslides or mud and debris flows occur, large amounts of sediment and debris could be transported downstream. High increases in sediment and debris movement could have adverse effects on important fish habitat.

3.2.4 Wildlife

3.2.4.1 Threatened and Endangered Species

3.2.4.1.1 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 located within the Northern Continental Divide Ecosystem (NCDE) grizzly bear recovery area, and has been used by grizzly bears recently (M. McGrath, MT DNRC, personal observation, December 2003). Due to the location of the project area within the NCDE and recent use, the cumulative effects analysis area will be the combined areas covered by the Alice Creek and Red Mountain sub-units of the Monture-Landers Fork Bear Management Unit (BMU; a subdivision of the NCDE), totaling 229 mi^2 (146,808 ac). The ownership of the

analysis area is a mixture of landowners, and contains a portion of the Scapegoat Wilderness (Table III-4).

Table III-4
Ownership Patterns within the Grizzly Bear Analysis Area

Landowner	Acres (%)
DNRC	4,710 (3.2)
Plum Creek	7,816 (5.3)
Bureau of Land Management	31 (.002)
U. S. Forest Service	109,865 (74.8)
Scapegoat Wilderness (subset of USFS)	50,669 (34.5)
Private Lands	23,648 (16.1)
Water	738 (.005)
Total	**146,808**

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 1.52 miles of open road per square mile (simple linear calculation; 347 miles of open road [does not include seasonally restricted roads]), and 2.04 total miles of road per square mile (466 miles of road), within the 229 square mile grizzly bear analysis area. Within the 2.73 mi^2 project area, there are approximately 10.15 miles of open road per square mile (27.74 miles of road, including Highway 200; most open road in Section 6), and approximately 10.93 miles of total road per square mile (29.83 miles of road; simple linear calculation). The highest density of roads in both the project and analysis areas, are located within Section 6 of the project area, and were constructed in association with the McDonald Gold Project.

Other activity associated with the project area includes 429 AUM of sheep, seasonal cabin sites, and an undeveloped gold mine (see 3.1.1 for further detail regarding cabin sites and the mine). Historically, both recent and past, grizzly bears have been re-located or removed from the population within the analysis area because they were found preying upon sheep in late spring (J. Jonkel, MT FWP, personal communication). Thus, the analysis area has historically been problematic for grizzly bears.

3.2.4.1.2 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 (Koehler 1990, Squires and Laurion 2000, Mowat et al. 2000). These den sites may be located in regenerating stands that are >20 years post-disturbance, or in mature conifer stands (Koehler 1990, Ruediger et al. 2000).

Elevations in the project area range from 4,760 to 5,632 feet, and suitable habitat types (Pfister et al. 1977) for potential denning and foraging occur in the area. Snowshoe hares are important

lynx prey and are associated with dense young lodgepole pine stands, as well as mature stands with subalpine fir understories. Approximately 33 ac of mature foraging habitat is located in the NE portion of Section 6. Lynx tracks have been seen in the vicinity of Section 6 (M. McGrath, DNRC, personal observation, December 2003).

3.2.4.2 Sensitive Species

3.2.4.2.1 Black-backed Woodpecker

The black-backed woodpecker is an irruptive species that forages opportunistically on outbreaks of wood boring beetles primarily in recently burned habitats, and to a lesser degree in unburned habitats. It is also considered to be a sensitive species in Montana. Although the black-backed woodpecker's nesting and foraging requirements are thought to be tightly linked with burned areas, it does nest and forage in unburned forest in response to insect outbreaks (Bull et al. 1986, Hutto 1995). Burned forests tend to be used immediately after burns occur (approximately 1 - 5 years). Large, densely stocked non-salvaged stands with an abundance of trees greater than or equal to 12 inches dbh appear to provide the greatest benefit to black-backed woodpeckers for foraging and nesting. Black-backed woodpeckers are also found in green forests with high levels of insect activity.

The extensive and intensive wildfires of western Montana in 2003 created large amounts of potentially suitable habitat that will be available for black-backed woodpeckers at the landscape scale. Because of the close relationship of black-backed woodpeckers and wildfire, the analysis area was defined as an area inclusive of two major fires near the project area: the Snow-Talon and Moose-Wasson fires, located 1.5 miles to the north, and 13.5 miles to the south of the project area, respectively. Within the 1,800 ac Moose-Wasson fire perimeter, a total of 590 ac burned: approximately 294 ac of low severity burn, 296 ac of moderate severity, and zero acres of high severity burn. Because the Moose-Wasson fire burned as a mosaic, there were many acres within the perimeter of the fire that did not burn. Thus, few acres of black-backed woodpecker habitat were created during the Moose-Wasson fire. Within the 37,700-acre Snow-Talon fire is located approximately 1 mile NW of the project area, 32,370 ac burned within the fire perimeter, including approximately 4,504 acres within the Scapegoat Wilderness Area. This fire also experienced 26,500 ac of high, 1,690 ac of moderate, and 4,180 ac of low burn severity, creating approximately 16,697 acres of potential black-backed woodpecker habitat (i.e., high burn severity in stands > 80 years old; Scott Schrenk, Helena National Forest biologist, personal communication, March 2004). The USFS may salvage up to 2,700 ac of moderate and high severity burn within the Snow-Talon fire, but outside of designated roadless and wilderness areas, and 80% to 95% of the available high-quality black-backed woodpecker habitat would remain untreated (Scott Schrenk, USFS, personal communication, March 2004). Thus, potential salvage operations by the USFS on the Snow-Talon Fire would still leave several thousand acres of potential black-backed woodpecker habitat post-harvest.

3.2.4.2.2 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, McClelland 1979, Bull et

al. 1992). 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 stands within project area are dominated by lodgepole pine, Douglas-fir, or Engelmann spruce, with the second-most predominate species being ponderosa pine, of varying ages, lodgepole pine, or subalpine fir. Average stand dbh is 12 inches, with a range of 4 to 24 inches (Stand Level Inventory database). There are currently 10 stands of potential pileated woodpecker habitat, totaling 473 ac, distributed throughout the project area that contain multi-storied structure with average stand diameters ≥ 15 inches (range 16 - 24 inches dbh).

3.2.4.2.3 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 (Coulter 1966, Coulter 1966, Powell 1977, Kelly 1977, Powell 1977, Kelly 1977, Clem 1977, Powell 1978, Powell 1978). For resting and denning, fishers typically use hollow trees, logs and stumps, brush piles, and holes in the ground (Coulter 1966, Powell 1977). Because fishers prefer stands with dense canopy cover, areas that have experienced high intensity fires would not be suitable fisher habitat for several decades. However, newly created snags would provide needed coarse woody debris over time.

Within the project area, there are approximately 454 acres of habitat types (i.e., Pfister et al. 1977) that fisher prefer to use, with 347 of those acres (76%) located in Section 36. Because these habitat types are present does not necessarily indicate that these acres are currently suitable for use by fisher (i.e., stand structure, canopy closure, etc.). For example, the 347 acres of preferred fisher habitat types in section 36 are heavily influenced by the main Landers Fork road and recreational camping, which would reduce the suitability of those acres for fisher. Adjoining lands within a 1-mile radius, north of Highway 200, are privately owned by the Sieben Ranch, and their timber has been intensively managed over the past 20 years. Thus, while preferred fisher habitat types may currently exist within the project and analysis areas, suitable habitat may not.

3.2.4.2.4 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. Home ranges are typically > 20 acres in area (McCallum 1994). 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 under burns 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 1,135 acres of flammulated owl preferred habitat types (SLI data), with those acres being relatively evenly distributed throughout the project area. Many of these acres are currently unsuitable for flammulated owls because they are either too young and sparse, as a result of past harvest activities, or too dense and closed canopied as a result of nearly a century of fire suppression. Due to the size of both the project area and flammulated owl home range, the project area will also be the cumulative effects analysis area.

3.2.4.2.5 Harlequin Duck

Harlequin ducks require white-water streams with boulder and cobble substrates for nesting and breeding. Harlequins usually nest under bushes along rocky shores that are adjacent to the rapids of mountain streams. They typically dive 3 to 5 feet in the swift currents in search of food along the streambed. Typical food items are primarily animal food, consisting of: crustaceans, mollusks, insects, echinoderms and fish (Bellrose 1980). Thus, water quality is an issue for harlequin ducks so that they can continue to find food during the breeding season.

The Landers Fork and Copper Creek, which are tributaries to the Blackfoot River, each flow through portions of the project area and could thus be affected by the proposed action. While there are no existing records of harlequin ducks nesting within the project area, or along the Landers Fork and Copper Creek (Montana Natural Heritage Database), there are concerns that water quality downstream could be affected by the proposed project as well as runoff from the Snow-Talon fire.

3.2.4.3 Big Game

3.2.4.3.1 White-tailed 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 984 acres of densely canopied forest which provide snow-intercept, and possibly thermal cover for white-tailed deer. Within the larger cumulative effects analysis area, the area inclusive of the project area and a one mile radius surrounding it, there are approximately 3,322 acres of snow intercept/thermal cover (determined using orthophotographs dated 20 August 1995). Due to the project area's proximity to the town

of Lincoln, MT, this area likely receives ample hunting pressure. Additionally, the Sieben Ranch has the grazing license on the project area, including 429 AUMs for sheep grazing.

3.2.4.3.2 Elk

Elk generally avoid open roads, however, they 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 for deer and 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 elk herds.

Following the concept of elk security cover (Hillis et al. 1991), there is no elk security habitat within the project area due to the abundance of open roads. The grizzly bear cumulative effects analysis area will also be used for the analysis of elk habitat because many of the elk that utilize the project area migrate from the Scapegoat Wilderness Area. Thus, there are approximately 58,921 acres of elk security habitat within the analysis area. Because of the 2003 Snow Talon fire, the amount of security habitat was recently reduced to its current levels.

3.2.4.3.3 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). The 146,851 acre cumulative effects analysis area (same area used to analyze for grizzly bears and elk) is a mixed area with dense coniferous forest towards the NW, with a 37,706 acre area burned in 2003 (Snow Talon Fire), and recently harvested private timber lands in the SE portion, near the valley floor. Additionally, moose would forage along the riparian areas associated with Copper Creek, the Landers Fork, and Alice and Bartlett Creeks. Due to the project area's proximity to Hwy. 200, and the high recreational use of Sections 12 and 36 in both summer and winter, moose may only utilize the project area as they transition from the Blackfoot River to more northerly destinations. There are approximately 33,945 acres of moose winter range within the analysis area, and all of the project area is considered to be winter range habitat.

3.2.5 Archeology

Historic and prehistoric cultural resources have been identified in the project area of potential effect. Those resources consist of cairns, road routes, trail routes, lithic scatters, a tool stone quarry, homestead locales/remnants, irrigation ditches, and features associated with lumber production. The entire area of potential effect was inventoried to BLM Class III standards and the results of that inventory are utilized here.

CHAPTER IV – ENVIRONMENTAL EFFECTS

4.1 Introduction

This chapter describes the environmental effects of each alternative on the resources described in Chapter III and contains the scientific and analytic basis for the alternatives comparison summarized in Chapter II. It is organized in the same manner as Chapter III by general resource categories and their associated issues.

4.2 Predicted Attainment of the Project Objectives

See Chapter I for a complete list of the project objectives. The no action alternative does not meet any of the project objectives. Revenue would be lost and forest health would continue to decline under this alternative. The DNRC would be required to find volume elsewhere to meet its sustained yield.

The action alternative does meet the all of the objectives. This alternative would improve forest health and growth on 64% of the forested acres. The majority of the remaining untreated ground is already in fair to good health and does not require treatment at this time. While some compromises were made to retain some stands unharvested that were in need of treatment to improve forest health and maximize income, a balance was found between managing intensively for healthy forests and leaving several key stands for biological diversity. In this alternative the occurrence and risk of spread of disease would be minimized and vigor and growth rates within the stands would be increased substantially.

4.3 Affected Resources

4.3.1 Vegetation

For the vegetative related resources the cumulative effects analysis area includes all three state parcels and all those lands within one mile of these three sections. This involves and includes both private and federal ownership in addition to state ownership (see Figure I-1. Vicinity Map). Most of the conclusions that are arrived at in the following section are as a result of professional judgment and experience.

4.3.1.1 Forest Structure and Cover Types

Alternative A

The stands would not be harvested and should remain essentially the same, although successional processes would slowly change the attributes over time. This gradual succession would be the case with all the stands under the no-action alternative. The stands would continue to age and trees would grow larger. An increase in stem rot, mistletoe, and other infectious agents would be expected as would increased amounts of down woody debris. The already overstocked stand conditions would continue and worsen. Although, a slow progression with small openings being created as individual trees or groups of trees die, and the initiation of new growth might be

expected. There would be an increased risk of large-scale loss of stands due to insect and disease outbreaks or fire over time.

Alternative B

Under the action alternative, age class distribution, average tree size, and tree spacing would all be affected. In general, age class distribution within the proposed harvest units would be changed toward a younger distribution (see Table IV-1) as growing space is created and regeneration is initiated. Change in age class distribution would be expected to only shift slightly in the improvement harvests with the removal of relatively more of the older less healthy trees than the younger ones while age class distribution in the seed tree harvests would change dramatically from primarily the pole and mature classes to seed/sapling stands with the removal of much of the overstories and initiation of young regeneration. These younger trees would also contribute to a smaller average tree size, although in the seed tree harvests the residual trees would generally be larger in diameter than the smaller intermediate and suppressed trees that would be removed. In all cases, the stands would be more openly spaced as trees are harvested. Within the improvement harvests, where there are currently multi-storied stands, this would remain post-harvest, and where there are single-storied stands the removal of some trees and resulting initiation of regeneration would over time create a two-storied or multi-storied stand. In the seed tree harvests few trees would remain in the overstory with many new trees becoming established in the understory, and therefore the stands would in most cases more closely resemble a one-storied stand.

When Table IV-1 is compared with Table III-3 the change from 4% of the stands in the project area in the seed/sapling age class to 43% is quite evident. Most of this increase in younger age class stands would result from seed tree harvesting and the removal of many of the pole and mature lodgepole stands. The older age class would remain the same as most of these stands are in the Douglas-fir and ponderosa pine cover types where improvement harvesting would be taking place. The numbers found below are estimates based on professional judgment of age class distribution post-harvest and can be used as relative guides to depict expected changes.

Table IV-1
Proposed Age Distribution by Cover Type in the Project Area

Cover Type	Seed-Sap 1-39 Acres	Poles 40-99 Acres	Mature 100-149 Acres	Older 150+ Acres	Non-Forested Acres	**Total Acres**
PP	41.8	31	33.2	124.5		**230.5**
DF	66.1	60.5	25.3	323.7		**475.6**
WL-DF						
LP	470.2	45.1	27.8	32.9		**576**
MC		72.5				**72.5**
ALP						
NF					394.6	**394.6**
Total	**578.1(43%)**	**209.1(15%)**	**86.3(6%)**	**481.1 (36%)**	**394.6**	**1749.2**

Most cover types are not expected to change as a result of the silvicultural prescriptions proposed for these timber stands, however some portions of stands may be reclassified with new cover types due to harvest in a portion of a stand and no harvest in the other, from misclassification, etc. An example would be where a 100 acre stand of spruce with pockets of lodgepole pine was lumped into a mixed conifer stand preharvest, it might receive 40 acres of harvest where lodgepole pine was predominant and those 40 acres would be classified as lodgepole pine post-harvest with the remaining 60 acres remaining as mixed conifer.

One cover type that would be changed as a result of the silvicultural prescription is the approximately 13 acre girdling unit. The canopy in this stand is already quite open (approximately 10 – 20% coverage) and it has advanced regeneration that is approximately 80% Douglas-fir. Left untreated this overstory would continue to die and the stand would eventually be reclassified as a Douglas-fir cover type, however the proposed action of girdling the overstory lodgepole trees would cause this to occur sooner. There is no need to maintain this stand as a lodgepole cover type since either lodgepole or Douglas-fir would be good appropriate cover types for this site.

Both Sections 6 and 12 have experienced isolated blowdown of trees and small stands of trees during large wind events, however it does not appear to be a chronic problem on the project area at the current time. On other state parcels in the Lincoln area blowdown of residual trees post-harvest has been a problem. Trees most susceptible to blowdown are typically those that are larger with bigger crowns and those that are shallow rooted such as spruce and lodgepole pine, however blowdown of Douglas-fir in the area is also quite common. A moderate amount of blowdown could be expected in the residual stand post-harvest on the project area although a low amount of blowdown is more likely. Blowdown is most likely to occur in the seed tree areas where the largest changes in stand structure would occur and on edges of these units where the wind could pick up speed in the more open seed tree harvest and then hit the more dense edges of improvement harvests with greater force than the trees are currently being exposed to. Another area that might be more susceptible would be the improvement harvest areas in Section 12 lying east of the Landers Fork where spruce is one of the more predominant species. This area is somewhat protected from the prevailing west winds by the ridgeline and unharvested area to the west, however proposed harvesting in these stands would be of a lighter nature and remove on the lower end of the basal area targets of the improvement harvest prescription. This would tend to minimize the risk of blowdown and maintain the stands in a somewhat more dense sheltered condition, therefore little blowdown is expected. 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. Should blowdown occur, the residual stands could be somewhat more open than proposed in the action alternative, and this blowdown would be harvested as part of the proposed action.

The following is a summary of the silvicultural prescriptions and treatments that would influence the structures of the stands in the harvested portions of the project area. See the maps in Chapter II to aid in understanding harvest unit size, shape, and location.

Improvement Harvest:
This treatment would improve the health and growth of the residual stand by removing poorer trees of all sizes and create growing space and associated increases in sunlight, water, and nutrients for the residual trees. Harvesting would promote and maintain the uneven aged nature of the stands. Almost all lodgepole pine and all trees with mistletoe would be removed and ponderosa pine would be favored over Douglas-fir where present. In areas where lodgepole pine is more abundant, this removal of lodgepole could result in openings of approximately ½ acre in size with little to no leave trees. Additionally, most of the competitive trees around ponderosa pine would be cut, and the small openings created around the ponderosa pine would also encourage some regeneration of the species. While initiation of regeneration is not a primary goal of this treatment, where openings in the canopy are created, regeneration may become established and would be encouraged. Approximately 60% of the basal area would be removed by cutting those trees that are in poorer health, with poor crowns or form, and those that are overcrowded. Some areas may have less than 60% of the basal area removed due to relatively good existing health of the stand and in other areas more than 60% of the basal area may be removed due to relative poor health of the existing stand and in those areas with greater amounts of lodgepole pine and ponderosa pine, but overall the prescription stand basal area reductions should average around 60%. Some blowdown within and adjacent to the units is could be expected and may be salvaged as part of this project. Advanced regeneration and healthy submerchantable trees would be protected to the extent practicable. Poor suppressed trees with little to no potential for future growth would not be protected and may be slashed if needed post-harvest. Additional thinning of heavily stocked pockets of advanced regeneration would also take place to improve growth if time and funding were available. Harvesting should promote the rejuvenation of some quaking aspen within the stand where it is currently present and is being suppressed from coniferous competition. Most large standing dead trees would be left as snags where safe to do so and most of the trees with greater than 60% rot would be left as snag recruits. Approximately 5-15 tons of coarse woody debris would be left within the units except along some open roads, near current and possible future cabin sites, and near heavily used recreational areas.

Light Irregular Seed Tree with Reserves:
This treatment is designed to remove the less vigorous lodgepole pine from the stands while maintaining good ponderosa pine and Douglas-fir to continue to grow and regenerate within the stands. Almost all lodgepole pine within the units would be cut unless they are young trees or larger culls that might make a good snag in which case the tree would be girdled if infected with mistletoe. Cutting all trees with mistletoe would serve to reduce the current amounts of mistletoe and minimize its spread into the residual and adjacent stands. Most large standing dead trees would be left as snags where safe to do so. The current occurrence and distribution of healthy ponderosa pine and Douglas-fir within the stands is uneven and sporadic which would tend to leave an irregular spacing of these residual trees as is the advanced regeneration that would be protected to the extent practicable. Large openings with no leave trees approximately 5 acres in size are expected. Average basal areas within the stands should be around 5-15 immediately post-harvest and would be very unevenly spaced. Some blowdown within and adjacent to the units is likely and may be salvaged as part of this project. Advanced regeneration and healthy submerchantable trees would be protected to the extent practicable. Poor suppressed trees with little to no potential for future growth would not be protected and may be slashed if needed post-

harvest. Harvesting should promote the rejuvenation of some quaking aspen within the stand where it is currently present and is being suppressed from coniferous competition. Ample regeneration of lodgepole pine would be expected regardless of season of harvest, scarification, and slash loading within the stands. However, more regeneration would be expected in areas that are harvested in the summer and where more tops and limbs are left. Planting of ponderosa pine and western larch (in appropriate locations) may also take place to encourage the amount and distribution of these species. Approximately 10-15 tons of coarse woody debris would be left within the units except along some open roads, near current and possible future cabin sites, and near heavily used recreational areas.

Overstory Girdle:
This treatment would seek to kill heavily disease infected overstory lodgepole pine trees (that are not economically feasible to harvest) by means of girdling them. There is already a heavy fuel loading of downed disease infected trees that have died over time, and the overstory has been opened enough that an approximately 10-15 year old understory of Douglas-fir and lodgepole pine has become established. The overstory trees that would be girdled are approximately 6-8 inches in diameter and around 100 years old. These overstory trees are competing with the advanced regeneration and are at high risk of infecting the understory lodgepole pine. These trees could be felled instead of girdled, but this would only increase the currently high downed fuel loadings. If healthy Douglas-fir or ponderosa pine are present in the overstory, they would be left alive to grow and regenerate. Girdling should reduce the spread of mistletoe within the stands and reduce competition with understory trees. The girdled trees would eventually fall over after some time at which point some of the current downed fuel loading would likely have been reduced from rotting. This treatment would only be performed if funding and time were available.

Cumulative Effects
The risk of negative cumulative effects occurring is very low since many of the proposed treatments are designed to emulate historic processes and bring the stands back toward more historic stand conditions. While many of the stands would be seed tree harvested bringing them into the younger age classes similar to much of the surrounding private ownership, this higher representation of younger age class acres is not outside the natural range of fluctuation that might be expected historically with the occurrence of large stand replacing events in the lodgepole cover types. Future possible harvesting on private lands within the analysis area would also tend to make age classes younger, but would not be expected to cause large negative effects to forest structure and cover types since they would be expected to be relatively small in extent. Some blowdown could occur on private ownership bordering cutting units due to proposed harvesting. While the likelihood of this happening would be moderate, it would be small in extent due to the fact that most of these bordering lands have already been harvested in the past several decades.

4.3.1.2 Forest Health

Alternative A
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 stem rot and mistletoe would become worse, and the lodgepole pine stands would become more

susceptible to a mountain pine beetle outbreak as time goes on and stand vigor continues to decrease.

Alternative B
The silvicultural prescriptions found in section 4.3.1.1 describe the proposed treatments in detail.

Generally, the improvement harvests on 540 acres would thin and sanitize the stands and greatly increase growth rates and tree vigor. Stocking levels and competition would be reduced by removing the poorer growing trees including trees with poor form, with thin or small crowns, trees infected by disease, or trees that are otherwise contributing to overstocking. This would tend to improve stand vigor and initiate new growth and regeneration. Overall stand health would be improved which would make the stands much less susceptible to future insect and disease outbreaks. 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 and promote less susceptible species such as ponderosa pine. Mortality that occurs due to the possible increase in root rot may be salvaged as part of this project.

The seed tree harvests proposed for 330 acres would remove almost all of the mistletoe from the stands and most of the lodgepole pine, which currently have poor growth rates due to age, disease, and overstocking. These treatments are designed to regenerate the stands with seral species that are young and vigorous which would improve growth rates substantially within these treated stands. The proposed harvesting would greatly reduce the occurrence and spread of mistletoe as well as the risk of a mountain pine beetle outbreak or stand replacing fire.

With both proposed treatments blowdown of some residual trees could be expected. This could have a negative effect to forest health by providing a food source for bark beetles. However, these trees may be salvaged as a part of this proposal, which would virtually eliminate this risk.

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 stand health and vigor. Cumulatively this would serve to reduce the risk of insect and disease outbreaks in the area and minimize the risk of populations building on state ownership that could affect adjacent landowners in the near future.

4.3.1.3 Fire Hazard

Alternative A
Fire hazard and the risk of stand replacing fires on the project area would not be affected as a result of this alternative. The stands would remain at high fuel loadings and ladder fuels would continue to increase at levels well above those expected without the exclusion of fire. Existing conditions described in Chapter III would persist and worsen. Stand densities and down fuel loadings would be expected to increase over time as would the amount and severity of disease such as mistletoe all of which would tend to increase the risk of stand replacing fires over time.

This condition would be expected to increase over time until the fuels are modified by an ecological disturbance or by management activities.

Alternative B

The reduction in stand densities and removal of forest products and forest fuels proposed in this alternative on 870 acres would greatly reduce the risk of stand replacing fires. If fires were to burn through the area, they would be more likely to be light to moderate severity as a result of this reduction in fuels except possibly in extreme fire conditions. With the reduction in fuels and thinning of the tree canopies, fire would be more likely to be ground fires that would burn in the understories and be more controllable than stand replacing crown fires. Treatments would also reduce ladder fuels by removing and thinning smaller trees, which would reduce the chance of fire reaching and carrying in the crowns of the stands. On the approximately 330 acres of seed tree harvesting high intensity crown fires would not be possible as most of the canopy cover would be removed and only ground fires with individual tree torching would be possible. Eventually over time as the stand regenerates and becomes older with larger trees, more fuels, and tighter canopies the risk of higher intensity fires would again begin to increase. On the approximately 540 acres of improvement harvesting the reduction in stand densities and thinning of the canopies would reduce the risk of stand replacing fires, however over time as the trees grow and fill in the holes created in the canopies, the risk would tend to increase again over time.

Some of the tops, limbs, and unusable pieces of the trees would be left out in the forest to recycle nutrients to the soils and to provide coarse woody debris for microorganisms and small mammals as well as their benefits to the residual stand. This slash would increase fire hazard in the ground fuels on the site for up to approximately 3 years as it cures and decomposes. All of this slash left in the woods would meet the State Hazard Reduction Laws. There would also be slash piles at the landings, which would be burned or otherwise disposed of within approximately 2 years of their creation. The effects of this increase in ground fuels would be somewhat offset by the reduction in elevated fuels. A net reduction in the short-term (2-3 years) fire hazard in the seed tree areas would still be expected and in the improvement harvest areas no change in fire hazard might be expected until the logging slash especially in the fine fuels (needles and small branches) has decomposed and ameliorated in 2-3 years.

The proposed harvesting would also decrease the risk of uncontrollable fires to the cabin sites and associated structures found on state land within the project area. The thinning and removal of forest fuels especially in the canopies would be expected to decrease fire intensities which would allow fire personnel to control these fires more easily before they reach these structures were a fire to burn through the area.

Cumulative Effects:

For the first three years fire hazard would not likely be reduced considerably due to the offsetting effects of decreased stand densities but increased slash loadings. In the long-term however, the decreased risk of high intensity and stand replacing fires on 870 acres would provide a net benefit within the analysis area. Should a fire start in the overstocked or heavily diseased stands and build to high intensities, it puts most of the nearby stands at increased risk regardless of their fuel loads or stocking levels due to the fire intensity that was allowed to build. By removing 870 acres from this heavily stocked and diseased state, the surrounding landscape would benefit

through reduced risk of higher intensity fires and through areas where fire might be more controllable because of the proposed treatments.

4.3.1.4 Aesthetics

As described in Chapter III, the high use areas that the project area can be seen from are Highway 200 and Copper Creek Road.

Alternative A
The aesthetics would remain much the same as they are now under this alternative. Over time these stands might begin to appear somewhat more dense with increases in down and standing dead debris. There would also be an increased risk of insect or disease attack or high intensity fire in these stands as stand densities and mistletoe increase, which would open the stands considerably and change the aesthetics from their current state should one of these disturbances occur.

Alternative B
The most noticeable areas of change as a result of the proposed project would be in the seed tree harvest areas. In several locations (approximately 1 mile in length when added together and approximately 50 acres) seed tree harvesting would occur immediately adjacent to and on both sides of the Copper Creek Road (see Figure II-1. Proposed Harvest Units Map). In these areas, site distances would be increased until topography or tree cover limits it. Areas that used to be heavily forested would now appear quite open with only scattered seed trees and possibly some advanced regeneration remaining. Grass coverage would increase and tree stumps would be visible in the non-winter months. Some slash would be left on the ground although most of the slash in areas immediately adjacent to and easily seen from the heavy use areas would be removed and piled. This should result in a somewhat more pleasing look along the heavily used areas than the remainder of the harvest units where slash and coarse woody debris are left in larger amounts. Slash piles would be seen as well in some locations for several years until they were burned. Blackened soil and some charred pieces would be evident for some time after these piles were burned. Removal of trees would allow for increased viewing of the landscape and associated wildlife, but would reduce the heavily forested look of the area. Eventually over time the stands would regenerate and within approximately 20 years these younger trees should provide cover and screening of the area. As the stands mature, they would more closely resemble the conditions that currently exist. There is very little improvement harvest immediately adjacent to high use areas. Effects here would be similar to those described within stand changes found several paragraphs following this one.

Section 6 can be seen at a distance from Highway 200. Here some seed tree harvesting in the southwest corner would be evident although due to relatively flat slopes, topography, aspect, and leave areas they would be at such an angle that only a small portion of it (approximately 40 acres in size) would actually be apparent. This area would appear open with scattered seed trees. It would resemble a natural opening in the forest canopy where the ground would be seen, but would appear different from the existing heavy lodgepole pine canopy coverage. Much of the south facing aspects in Section 6 where improvement harvesting would take place would also be readily seen from the highway and the southeast corner can be seen from several homes in the

Hogum Creek area. These areas would appear very similar to their current appearance. The canopy coverage would look somewhat less dense with an expected reduction of approximately 50-60% and more small openings would be visible where the ground could be seen. This thinner appearance would be evident on approximately 150 acres from the highway. Over time, trees and tree canopies would grow in and the stands would appear more dense with less openings in the canopies. Existing roads would still not be likely to be seen with the reduction in tree cover although from certain locations short segments might be evident. At certain angles skid trails might be evident for the first several years following harvesting especially where soil was disturbed were summer harvesting to occur. Over time these trails would revegetate and tree crowns would fill in the openings.

At the stand level (on the site), relatively very little road construction and other road disturbing activities are planned. Therefore no measurable effect aesthetically is anticipated from this activity. Within all of the harvested areas, site distances and views of the topography and surrounding landscape would be increased. Stands that are harvested with seed tree harvesting would be considerably changed as site distances would greatly increase. More than 90% of the trees would be removed. Harvest areas would resemble openings where grass cover would increase and stumps and slash on the ground would be seen. Scattered seed trees and some advanced regeneration would remain but would provide little screening. The areas infected with mistletoe would be sanitized of the majority of those trees with the physical deformities and brooms caused from mistletoe leaving the residual stands with a more healthy and thrifty appearance. Over time these stands would regenerate and grow providing more visual screening within the stands and in turn providing more forested characteristics.

Within the improvement harvest areas the stands would appear more open as approximately 60% of the basal area would be removed and site distances would be increased. Stands would appear more park-like or thinned and more sunlight would reach the ground. The residual stand would look more healthy and thrifty with the removal of the less healthy and diseased trees. The existing trees and regeneration would grow in over time resulting in shorter site distances and a more densely forested look.

Across most of the harvested area some skid trails would be evident and would grow in and become less evident over time. Skid trails would be more evident in the short-term in summer harvested areas and much less evident in winter harvested areas since ground disturbance would be less at this time of year. Only a relatively small portion of the harvest area would be required to be winter logged (some areas west of the Landers Fork), so the amount and extent of harvesting in the summer versus the winter is unpredictable and is up to the timber sale purchasers. Slash would be evident especially for the first 2-3 years across most of the harvest units and would cause an unsightly appearance to most. This effect would ameliorate over time as the slash decomposes and the red needles fall off.

Cumulative Effects:

Most of the surrounding lands within the analysis area are forested with varying size and age classes of trees, however a portion of the area does have openings and most of it has evidence of past timber harvesting. The proposed activities are expected to blend with the current mosaic on the landscape as well as past management activities in the area. The proposed project would be

expected to have a low risk of negatively affecting the aesthetic quality or forested characteristics of the area. Effects are expected to be more pronounced in the short-term with the immediately noticeable change from heavily forested stands along the roads to open areas with stumps, but would lessen over time as the stands regenerated and regrew.

4.3.1.5 Old Growth

Alternative A
The amount of old growth on the project area would remain the same as would the amount of old trees within the other stands in the project area. Stands would continue to age and over time some might meet the definition of old growth should some disturbance not change their age, size, or stocking characteristics.

Alternative B
The amount of old growth on the project area would remain the same since the only old growth stand is not proposed to be harvested (33 acre lodgepole stand in the northeast corner of Section 12). This stand was found to have key benefits to some wildlife species and therefore was deferred from treatment at this time despite its poor health and growth rates.

Old trees as well as mature trees that are not yet old within the proposed harvest areas would be cut. This could result in fewer stands being eligible to be recruited into the old growth classification in the near-term, which would be a negative effect to old growth of the proposed project. Seed tree harvesting would preclude treated stands from becoming eligible to become old growth by current standards for at least 140 years on 330 acres. Improvement harvesting would not preclude these stands from becoming old growth in the nearer-term since all size and age classes would be still represented post-harvest, however stand characteristics would be changed that might delay their recruitment into old growth classification. Harvesting however, would allow the residual trees to grow larger, faster which would be a benefit to meeting old growth status and old growth characteristics in the future. So as a result of the proposed project, fewer stands would be available to be recruited into old growth status, which would be a negative effect to possible future old growth stands.

Cumulative Effects:
The proposed project would not decrease the amount of old growth currently in the analysis area, however it would reduce the number of stands (330 acres) and could delay the amount of old growth stands available for recruitment into old growth status in the near-term, which would result in a negative effect to old growth amounts and abundance in the area.

4.3.1.6 Sensitive Plants

No sensitive plants have been identified therefore no effects are expected to occur under either alternative.

4.3.1.7 Noxious Weeds

Alternative A

It is expected that noxious weed infestations may increase in the burned areas. Existing knapweed infestations in the area are present along roadsides and forested areas. High intensity burn areas will be at higher risk of infestation due to reduced native species competition with knapweed. As part of the restoration effort, disturbed areas were seeded with a mixture of species to hopefully out-compete knapweed. It is expected however, that fire suppression activities resulted in an increase in noxious weeds and the potential for the introduction of new species.

Alternative B
Under the proposed activities, an increase in ground disturbance could increase or introduce noxious weeds throughout roads and forested areas. With weed species such as thistle and to a lesser extent knapweed, weed seeds may already be scattered throughout the forested areas and the reduction of canopy cover or disturbance from the timber harvest activities could provide the catalyst for spread.

For this project an Integrated Weed Management (IWM) approach would be implemented that would include: prevention, revegetation and weed control measures for spot outbreaks, which are considered the most effective weed management treatments. Short-term goals 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. Localized herbicide applications would be used, primarily along disturbed roadside edges and spot treatments of small infestations. An herbicide treatment of most of the noxious weeds along the roadsides would take place once prior to proposed activities and once following completion of activities. In addition, some heavy infestations of knapweed further from roadsides would also be treated. All known infestations of yellow toadflax, dalmation toadflax, leafy spurge, and St. Johnswort would be spot treated for several years in an attempt to reduce infestation size of yellow toadflax and likely eradicate the other three species from the project area.

To protect water quality, herbicide would not be applied where runoff could enter surface waters or riparian features. Re-entry could increase the risk of cumulative impacts, if necessary mitigation measures to control noxious weeds are not implemented for each individual re-entry. Existing biological control efforts for knapweed would be monitored and supplemented if necessary.

4.3.2 Soils

Alternative A
Increases in erosion are expected to be moderate to high in high severity burn areas Rehabilitated dozer line, safety zones and drop points may result in increased erosion until they are vegetated. Water bars, slash placement and seeding on these areas, is expected to help reduce erosion rates.

Alternative B
The primary risks to long-term soil productivity are compaction and erosion of surface soils. During timber harvest, equipment operation on wet sites and sensitive soils can result in soil compaction, rutting, displacement and erosion. Potential effects are a reduction in long-term soil

productivity, and regeneration potential as well as impacts to course woody debris distribution and nutrient cycling.

Cumulative effects could occur from repeated entries into a harvest area. Under the action alternative, risk of direct, indirect and cumulative impacts are expected to be minimal. Some harvest units adjacent to the Landers Fork and Copper Creek would be restricted to winter harvest conditions to minimize the effects of erosion, displacement and compaction. Winter conditions require frozen ground or a minimum snow depth of 18".

Units not restricted to winter conditions would require a skid trail plan and design approved by the forest officer to ensure soil impacts would not exceed more than 15% of the total unit area. Some soils with higher available water holding capacity including 15E Worock Mikeshell Stony Loams 8-35% slopes, 299D Leavit Libeg Stony Loams 4-30% slopes, 499D Farnuff Hilger Stony Loams Cool 4-25% slopes and 609A Slategoat Silt Loams 0-2% slopes are more sensitive to season of use. These soils would require a moisture content check by the forest officer before the start of mechanized operations.

4.3.3 Hydrology and Fisheries

4.3.3.1 Hydrology

4.3.3.1.1 Water Quality

Alternative A
Under the no action alternative the direct and indirect effects evaluated are those effects associated with 2003 wildfire activities. Mitigations implemented under the 2003 Baer Report are expected to reduce erosion and potential effects on water quality resulting from wildfires. Impacts to water quality as a result of the wildfire are expected to occur in both Copper Creek and the Landers Fork.

Alternative B
A watershed effects analysis was completed for the proposed sale area to determine the potential direct, indirect and cumulative impacts to water quality. Because the Landers Fork was listed on the 2000 303 (d) listed of impaired waterbodies, all recommended mitigation would be implemented to protect water quality. Pursuant to Montana Annotated Code section 75-5-70310C, pending completion of a TMDL on a water body listed pursuant to 75-5-702: new or expanded non-point source activities affecting a listed water body may commence and continue provided those activities are conducted in accordance with the reasonable land, soil and water conservation practices. A draft TMDL for sediment has been completed and is currently under review by the Department of Environmental Quality (DEQ).

Under the action alternative minimal direct, indirect and cumulative effects are expected as a result of the proposed action. Mitigation measures implemented during the proposed activities are expected to minimize the potential impacts to water quality. Riparian Management Zones (RMZ's) would be implemented on the Landers Fork and Copper Creek. Harvest units adjacent to Copper creek and the Landers Fork would have 80 foot no cut buffers extending from recently

active overflow channels outward. These buffers would be flexible depending on channel conditions following spring runoff. If channel migration occurs, buffers would be adjusted appropriately. Some ground based operation units located adjacent to the Landers Fork and Copper Creek in Section 36 would be restricted to winter harvest operations to minimize erosion, displacement and compaction. Equipment restriction zones would be required around all springs and wet areas. All Streamside Management Zone Law and Rules would be implemented.

4.3.3.1.2 Water Yield

Existing water yield has increased resulting from wildfire activities in 2003 (addressed in Chapter III). Existing water yield in both watersheds were low prior to the wildfires that occurred in 2003. Post fire water yields are projected to increase dramatically during 2004. Water yield increases calculated for the proposed harvest activities were negligible. Water yield increases for Copper Creek were 0.1%, increasing from 10.3% to10.4%. Water yield for the Landers Fork did not increase under the proposed activities.

Table IV-2
Proposed Harvest Predicted Water Yield Increases

Analysis Area	Water Yield Increases		Water Yield Increases Proposed Harvest
	Before 2003 Fires	Existing	Proposed Activities
Copper Creek	1.3%	10.3%	10.4%
Landers Fork	0.3%	2.6%	2.6%

Because water yield increases were calculated to be negligible, the risk of direct, indirect and cumulative effects from the proposed activities is expected to be minimal.

4.3.3.1.3 Sediment Yield

Sediment yield is expected to increase as a result of the 2003 wildfires. Sediment yield increases as a result of the proposed action are expected to be minimal. Most of the ground in the project area is located on low to moderate slopes (0-45%). Those units located adjacent to the Landers Fork and Copper Creek are located on slopes between 0-4% slopes with sufficient buffers to adequately filter sediment before reaching the stream channel. Roads that do not meet BMP's would be improved to minimize the amount of sediment produced by roads.

4.3.3.1.4 Roads

Alternative A
Under the no action alternative, no changes to the current road system would occur. High open road densities would remain and BMP problems would still exist. All roads that are currently classified as open would remain open.

Alternative B

The primary risk to water quality is sediment delivery from roads. All existing roads planned for use and occurring on Trust Lands were evaluated. There are roads in the project area that do not comply with BMP standards. Some roads require additional drainage features or replacement of undersized features. There are roads in the project area that exceed preferred road gradient standards. Two sections of steep road that exceed 18% gradient would be obliterated or abandoned to eliminate high levels of erosion that are currently occurring on these portions of road. Additional mitigation measures for surface drainage would be implemented under the proposed activities.

Under the proposed action 16.25 miles of road would be closed to access through gates, 0.28 miles would be obliterated and 0.27 miles would be abandoned. In combination, these mitigations are expected to deter recreational traffic and reduce use during wet periods. There would also be approximately .29 miles of new road construction and .09 miles of reconstruction. Because there is no water located near the new road construction, impacts to water quality are expected to be minimal.

An undersized culvert on an intermittent channel located in the SE ¼ of the NE ¼ of Section 36 would be removed. Following removing, the banks would be reshaped to their natural contours. The banks would also be seeded and mulched to help re-establish vegetation. During construction, a temporary increase of sediment to the stream channel is expected, but removal would result in overall long-term decreases in sediment. Upsizing the 8" pipe in Section 36 would also decrease erosion and reduce sediment

Table IV-3
Proposed Road Miles

	Section 6	Section 12	Section 36	Total
Current Open Road Miles	15.15	8.14	4.45	27.74
Current Closed Road Miles	0.66	0.17	1.26	2.09
Proposed Open Road Miles	1.28	7.93	4.3	13.51
Proposed Closed Road Miles	14.61	0.38	1.26	16.25
Proposed Road Obliteration	0.13	0	0.15	0.28
Proposed Road Abandonment	0.06	0.21	0	0.27
Proposed Road Construction	0.29	0	0	0.29
Proposed Road Reconstruction	0.09	0	0	0.09

Cumulative Effects
Within the analysis area erosion would be reduced as a result of the project with the improvement of roads to meet BMPs and from the road relocations, abandonments, and obliterations. Total and open road densities would also be reduced within the analysis area.

4.3.3.2 Fisheries

Alternative A
Under the No Action Alternative impacts would still occur as a result of high intensity wildfires in both Copper Creek and the Landers Fork. Anticipated increases in sediment are expected to affect fisheries habitat and populations. Because weather events cannot be predicted, the short and long-term effects to fish populations is hard to predict. The potential for mudflows and debris flows is high and could alter channel features and stability. Stream temperatures in Copper Creek are expected to increase as a result of high intensity wildfire throughout a large portion of the riparian area.

Alternative B
A sufficient vegetative buffer area would remain between the Landers Fork, Copper Creek and harvest units within the proposed project area. Best Management Practices and Streamside Management Zone Laws and Rules would be implemented.

Under the proposed action habitat alteration would not occur as a result of silvicultural practices. The DNRC would implement bull trout immediate actions, restricting any harvest or equipment operations within the streamside management zone (Montana Department of Fish, Wildlife and Parks. 1994. Immediate Actions (for bull trout restoration). Lang Peterman, Administrator, Fisheries Division).

There would not be riparian harvest and buffers would be established to sufficiently protect the integrity of the stream channel. An 80 foot no cut buffer would be left between relatively recent overflow channels and harvest unit boundaries on Copper Creek and the Landers Fork. These buffers are subject to change, depending on post runoff channel conditions. Deferring harvest in the SMZ's would retain existing levels of stream shade and potential large woody debris recruitment. Therefore, causing no detrimental effects to stream temperature and channel form and function. Direct, indirect and cumulative effects of the proposed actions are expected to be minimal if proposed mitigation measures are implemented.

4.3.4 Wildlife

4.3.4.1 Threatened and Endangered Species

4.3.4.1.1 Grizzly Bear (Federally Threatened)

Alternative A
Under the no action alternative, vegetation changes would be limited to gradual successional changes, possibly small timber permits, or a future timber harvest that would be subject to

environmental review. Additionally, should the courts rule in favor of the McDonald Gold Project, the landscape surrounding Section 6 could change radically, and remove grizzly bear habitat within that parcel. The mine was covered under a previous EIS. With the exception of Section 6, under this alternative, current open road densities would remain unchanged within the project area. Should the courts not rule favorably towards the mine, DEQ would require that some of the roads constructed on Section 6 in association with the mine be reclaimed. Such action would substantially reduce the amount of open and total road within the section, and be a benefit for grizzly bears. Thus, under the no action alternative minimal direct and indirect effects would be expected for grizzly bears.

Alternative B

Under the action alternative: timber would be harvested on approximately 870 acres from 1,355 forested acres within the project area; approximately 16.53 miles out of 27.74 miles of currently open road would be closed (brushed in, gated, or earthen berm), obliterated, or abandoned after the project would be completed; and open road densities would be reduced from 1.52 miles of open road per square mile to 1.45 miles per square mile within the analysis area, and from 10.15 miles per square mile to 4.2 miles per square mile within the project area. Table IV-3 shows the reductions in open road densities by affected School Trust parcel for compliance with ARM 36.11.433 (1) (a). While none of the affected parcels would have an open road density ≤ 1 mi/mi^2 after the proposed action, substantial progress would be made in reducing open road densities in Section 6. Due to gentle, open terrain, the presence of 1.73 miles of Highway 200 and county road, and 2.7 miles of road that access DNRC cabin sites, it would be difficult to further reduce open road densities within Section 12. Similar problems exist within Section 36 for effectively reducing open road densities.

The proposed timber harvest would retain visual screening cover along the riparian area associated with the Landers Fork (in accordance with ARM 36.11.433 (1)(c)), as well as along open roads, where practicable (in accordance with ARM 36.11.433 (1)(b)). However, in the short term (i.e., <20 years) timber harvest would reduce the amount of overall screening cover within the project area until shrubs and regeneration would be able to respond. In spite of this, the parcel that would receive the most vegetative change, Section 6, would also be the most protected from vehicular access (i.e., reductions in open road density, installation of earthen berms, and improved fencing). Additionally, stands proposed for harvest that are west of the Landers Fork are proposed for winter harvest to avoid potential conflicts with bears. Thus, while the proposed action would change the level of vegetative cover within the project area, it would retain visual screening cover along open roads and riparian areas, while also reducing open road density. Therefore, grizzly bears would expect a low level of direct and indirect effects as a result of the proposed action.

Cumulative Effects

The project area is part of a larger landscape that receives heavy recreational use by the public, with adjoining privately-owned parcels permitting public recreation. Within the past year, 22% of the analysis area was radically changed through the Snow Talon Fire, which burned 32,370 ac, 26,500 of which in stand replacement fire. Portions of the Scapegoat Wilderness area also comprise 34% of the analysis area (see Table III-4). The remaining lands are composed of a mixture of School Trust lands, Plum Creek, BLM, USFS, and private lands, all of which are subject to land management. Large portions of these lands have been subject to both recent and

historic timber harvest, as well as livestock grazing, including a significant sheep herd on private and DNRC lands. Historically, grizzly bears have had trouble with the sheep, and have either been re-located or destroyed.

Past and recent vegetation changes within the analysis area will provide a shifting mosaic of food sources for grizzly bears for several years. On the private lands surrounding the project area, the effects of past timber harvest have progressed to provide berry fields and hiding cover, as well as food sources for deer and elk. The 2003 Snow Talon fire will begin by providing lush grasses which would feed deer and elk, bolstering their populations, which may in turn provide a food source for grizzly bears. As the Snow Talon area progresses vegetatively, fruit-bearing shrubs, seedlings, and saplings will develop that would provide additional food and hiding cover for bears. The availability of these food sources close to grizzly bear dens may persuade grizzly bears from staying down in the valley near the project area in late spring, early summer, and help prevent conflicts between bears and ranchers and recreationists. The addition of the proposed action would create additional early successional habitat in the short term, which may provide additional food sources, while providing better visual screening as the vegetation develops over time (>20 years). Because the project area is so close in proximity to high recreation use areas, and the potential for mine development (dependent upon court rulings), the effects of the proposed action would vary with the burned area's ability to attract grizzly bears. However, the proposed project's reduction in open road density and retention of visual screening cover along open roads and riparian areas should provide for low risk of cumulative effects to grizzly bears.

4.3.4.1.2 Canada Lynx (Federally Threatened)

Alternative A

Under the no action alternative, current land management practices would continue, including sheep grazing, fire suppression, small timber permits to salvage insect and disease killed trees, etc. Forest vegetation would continue its upward successional trend, and not provide early or late foraging habitat until insects or disease create sufficient openings, or until succession naturally produces additional mature foraging habitat (possibly 40 - 60 years). Thus, the no action alternative would have low risk of direct or indirect effects for lynx.

Alternative B

With the proposed action, open road density would be reduced within Section 6 and the proposed timber harvest would create early successional foraging habitat through girdling 13 acres of lodgepole pine and implementing light, irregular seed tree harvest on 330 acres. This early foraging habitat would be within 1.5 miles of 33 ac of potential denning/mature foraging habitat in the NE corner of Section 6. Due to the heavy winter recreational use along the main Landers Fork Road in Sections 12 and 36 by snowmobilers, the proposed timber harvest may not affect lynx because this species may avoid this area because of the recreational use. Following the proposed timber harvest, there would be short-term (5-10 years) effects to lynx until the regeneration takes hold in the proposed harvest units to provide early foraging habitat. The early foraging habitat should be functional for approximately 20 years (25 - 30 years post-harvest). Such habitat may eventually be subject to pre-commercial thinning, however, such action has not been proposed and would be subject to either our current Administrative Rules or a subsequent Habitat Conservation Plan. Given the conservation of lynx mature foraging habitat in Section 6, as well as the creation

of potentially 343 ac of early foraging habitat and reduction in open roads, there should be low risk of direct or indirect effects to lynx as a result of the proposed action.

Cumulative Effects

Within the cumulative effects analysis area (the same analysis area used for grizzly bears), lynx would be affected by many sources of disturbance: the proposed action, heavy winter recreation use involving snowmobiles, the Snow Talon Fire of 2003, and past and future timber harvest on private lands. Prior timber harvest on private lands adjoining the project area have created a mosaic of grassland and brushy thicket, which, although not ideal habitat, may provide for snowshoe hares, the lynx's primary prey. As these private lands gradually become reforested with seedlings and saplings, the value of these lands for early lynx foraging habitat will increase. Within the 32,370 ac burned area of the Snow Talon Fire, those 28,190 ac that experienced moderate and high burn severity will gradually revegetate, become populated with seedlings and saplings, and provide many acres of early foraging habitat for lynx for 20-30 years. However, until seedlings and saplings become established in the burned area, lynx may look elsewhere for food, because approximately 22% of the analysis area burned. The area surrounding Lincoln, MT is a popular winter destination for snowmobile enthusiasts from Helena, Great Falls, and Missoula. As such, the extensive snowmobile trails created by these enthusiasts provide pathways for competing carnivores (e.g., coyotes, mountain lions) to gain access to prey within the lynx's winter habitat.

Given the existing effects within the analysis area, the proposed action would: (1) conserve 33 ac of mature foraging/potential denning habitat in Section 6 that is part of a larger 144 ac block of similar habitat; (2) reduce open road densities primarily in Section 6, but also in Sections 12 and 36; and (3) create approximately 343 acres of potential early foraging habitat within 1.5 miles of potential denning habitat. While there would be delays between the proposed harvest and establishment of the early foraging habitat, it would be possible that at any given time within the 10 - 15 years post-harvest there would be at least 25% of the analysis area in early foraging habitat, with potential denning habitat scattered throughout, largely on USFS land. Thus, while the proposed action would create minimal short term cumulative impacts to lynx, the long term benefits would include creation of early foraging habitat, conservation of potential denning/mature foraging habitat in Section 6, and reduction in open road densities.

4.3.4.2 Sensitive Species

4.3.4.2.1 Black-backed Woodpecker

Alternative A

Under the no action alternative, forest management on School Trust land would continue as before, with periodic small salvage permits for trees killed by insects, diseases, or other abiotic factors (e.g., blow down). Largely, for the next 5 to 6 years, black-backed woodpeckers would likely be located within and around the nearby Snow Talon and Moose-Wasson Fires. These recent fires would be a source of wood boring beetles, their primary food source, as well as nest sites. Within the Snow Talon fire, the USFS estimates that there is approximately 16,700 ac of potential black-backed woodpecker habitat. Given the planned salvage on USFS land within the Snow Talon Fire, estimates are that 80% - 95% of the available black-backed woodpecker habitat would remain untreated, depending on which action alternative was implemented (Scott Schrenk, Helena N. F.,

personal communication, March 2004). Thus, under the no action alternative there would be low risk of direct, indirect, or cumulative effects to black-backed woodpeckers.

Alternative B

The proposed action would harvest timber on approximately 870 acres, of which 540 ac would be improvement harvest to reduce the prevalence of mistletoe and reduce susceptibility to insect and disease outbreaks, as well as stand replacing fire. Thus, while small pockets of insects may exist within the project area, and black-backed woodpeckers will nest and forage in stands killed by insects (Bull et al. 1986, Hutto 1995), the likelihood of these small pockets supporting black-backed woodpeckers is low. Additionally, while the proposed timber harvest is designed to reduce the risk of stand replacing fire (stand replacing fire would create desirable black-backed woodpecker habitat), there would be a low likelihood of stand replacing fire occurring due to the effectiveness of DNRC Initial Attack for fire suppression (96% effectiveness at keeping fires <10 ac). Thus, there would be low risk of direct or indirect effects from the proposed action on black-backed woodpeckers.

Cumulative Effects

Currently, there are approximately 16,700 ac of suitable black-backed woodpecker habitat within the area burned by the Snow Talon Fire of 2003, located 1 mile NW of the project area. Until 2008 or 2009, implementing the proposed harvest should have minimal effects to the black-backed woodpecker population that should inhabit the burned area, largely due to the abundance and availability of preferred habitat (Hutto 1995). However, by implementing the proposed harvest, DNRC would be reducing the susceptibility of the affected stands to stand replacing fire, which could reduce the future availability of black-backed woodpecker habitat. Although, with the abundance of summer recreational use Sections 12 and 36 receive, the disturbance generated by recreationists may deter use by black-backed woodpeckers of any future burned habitat that may be created by future fires. Thus, due to the localized abundance and availability of new black-backed woodpecker habitat within the burned area, and the prevalence of summer recreation on the project area, there would be low risk of cumulative effects to black-backed woodpeckers as a result of the proposed action.

4.3.4.2.2 Pileated Woodpecker

Alternative A

Under the no action alternative forest management would continue as usual, with periodic timber permits to salvage insect-killed timber or recent blow down, fire suppression, and sheep grazing. However, forest stands within the project area would gradually progress into additional stands with multi-storied structure. With DNRC and USFS fire suppression effectiveness, many of these stands would tend to be overstocked, where fire would normally thin understory tree densities. As a result, the project area would be more susceptible to insect infestation, which would create additional roosting and nesting snags for pileated woodpeckers, as well as the eventual large diameter downed logs for foraging substrate. Thus, there would be low risk of direct or indirect effects of the no action alternative on pileated woodpeckers.

Alternative B

Under the proposed action alternative, approximately 310 ac of the 473 ac of pileated woodpecker habitat would be harvested, largely through improvement harvest (approximately 254 ac). Within the acres to be treated with the improvement harvest prescription, poorer trees of all age classes would be harvested to create growing space for the residual trees while promoting and maintaining the uneven aged stand structure. Where present, ponderosa pine would be the preferred leave tree species. While the proposed harvest would reduce stand density, it would also reduce the susceptibility of the affected stands to insect infestations that could create nesting and roosting snags, as well as provide forage. However, the proposed action would also retain healthy ponderosa pine that over time would be the source of future nesting and roosting sites, and eventually become foraging substrate. The proposed action would provide low to moderate risk of direct and indirect effects to the few pileated woodpeckers that may reside within the project area over the next 30 years, while the affected acres respond to the proposed harvest and can provide a more closed forest canopy of ponderosa pine. However, beyond 30 years post-harvest, the proposed action should provide better pileated woodpecker habitat than is currently available within the project area. Snags would be retained pursuant to ARM 36.11.411, with 1 snag and 1 recruit over 21 inches dbh per acre.

Cumulative Effects

Within the project area and the 1-mile radius surrounding it, the landscape is a mosaic of forest and intermingled grassland. Most notable of the grasslands, is an approximately 2,100 ac grassland in the southern portion of the analysis area. Much of the timber on the 8,250 ac of private lands within the analysis area has been harvested in the past, and is no longer suitable for pileated woodpeckers. Habitat on the 2,657 ac of USFS land is a mixture of lodgepole and ponderosa pine, and may provide additional habitat for this species. The proposed action would reduce the amount of pileated woodpecker habitat within the analysis area, relegating what would be the more suitable habitat to approximately 2,000 ac of USFS land in the southern end of the analysis area, for approximately 30 years. However, approximately 34% of the 473 acres of pileated woodpecker habitat within the project area would still remain unharvested post-harvest. The effects of the proposed action would likely be to re-distribute the few pileated woodpeckers that might use or reside in the project area to the boundaries of the analysis area or beyond. Thus, there would be low to moderate risk of cumulative effects to the few pileated woodpeckers that may inhabit the analysis area as a result of the proposed action.

4.3.4.2.3 Fisher

Alternative A

Under the no action alternative, the approximately 454 acres of fisher preferred habitat types would largely remain unchanged, except for the gradual change associated with forest succession or potential future timber permits or as of yet, unplanned timber sales. The majority of this habitat is associated with the confluence of the Landers Fork and Copper Creek in Section 36. Both water bodies would serve as suitable travel corridors for fisher. However, much of the habitat on adjoining private lands has been logged in the recent past, and is currently unsuitable for fisher due to low canopy closure and inadequate forest structure. Thus, until habitat on adjacent private lands achieves multi-storied forest structure with canopy closure > 70%, the existing fisher habitat within the project area would function as habitat fragments and would be unlikely to provide much for

fisher except for occasional foraging sites. Thus, the no action alternative would have low risk of direct or indirect effects to fisher.

Alternative B

The proposed action would harvest approximately 279 ac of the 454 ac of fisher preferred habitat types within the project area using a combination of improvement and light irregular seed tree harvests. Such action would reduce the amount of suitable fisher habitat by either removing the multi-storied structure of affected stands (light irregular seed tree harvest) or reducing the canopy closure (improvement harvest). Forest structure and canopy closure would eventually return to these stands within 20 to 60 years post-harvest. However, approximately 187 acres of this habitat would have the most influence on fisher use of the project area because these acres are within 0.25 mile of the Landers Fork and Copper Creek, and could serve as part of a travel corridor. Thus, within only the project area, the proposed action would have low to moderate risk of direct and indirect effects to fisher. However, see the cumulative effects for discussion of the proposed action's effects in a larger landscape context.

Cumulative Effects

As discussed under Alternative A, the no action alternative, much of the habitat on adjoining private lands has been logged in the recent past, and is currently unsuitable for use by fisher. This causes existing fisher habitat within the project area to function more as habitat fragments within the larger landscape that may provide occasional foraging opportunities for fisher. This raises the question of would the proposed action temporarily remove suitable habitat that is of value to fisher? Looking at the surrounding landscape, with heavily logged private lands and the 2003 Snow Talon Fire, the more "valuable" fisher habitat, where value denotes large, contiguous blocks of habitat with travel corridors, would be located 2 miles west of the project area on USFS lands. In the context of the USFS landscape, fisher habitat would be the matrix of the landscape, with patches of timber harvest scattered throughout. Thus, in that landscape, there is better connectivity and more extensive habitat. However, in the 1-mile radius surrounding the project area and the landscape to the east and NE, the matrix is predominantly recently harvested timber exhibiting little vertical structure (i.e., a stand cannot exhibit single or multi-storied structure until trees exist at sufficient density over enough area to be considered a "forested stand") and very open canopy closure, with scattered fragmented patches of fisher habitat. Thus, the proposed action, through removal of approximately 279 ac of fisher habitat would contribute additive cumulative effects, albeit minor, to the already existing nature of the landscape for fisher. Retention of the 279 ac of fisher habitat types would not likely sustain fisher during a breeding season.

4.3.4.2.4 Flammulated Owl

Alternative A

Under the no action alternative, forest management activities would continue as usual, including fire suppression activities. As a result of fire suppression activities, Douglas-fir and other shade intolerant tree species would continue to grow and dominate ponderosa pine stands, decreasing those stands' suitability for flammulated owls. The continued loss of flammulated owl habitat may not be caused so much by the no action alternative, rather, the ultimate cause is most likely continued fire suppression activities. However, because such activities would continue under the

no action alternative, there would be low to moderate risk of direct and indirect effects to flammulated owls within the scope of this analysis area as a result of the no action alternative.

Alternative B

The proposed action would harvest timber within 726 ac of the 1,135 ac of flammulated owl habitat types within the analysis area. The vast majority of those acres to be harvested would be done using the improvement harvest prescription, which would harvest the poorer trees of all age classes to create growing space for the residual trees while promoting and maintaining the uneven aged stand structure. Where present, ponderosa pine would be the preferred leave tree species. Such a silvicultural prescription would improve existing flammulated owl habitat because the prescription would: (1) reduce canopy closure; (2) retain larger diameter ponderosa pine, while reducing the density of shade intolerant species, such as Douglas-fir; and (3) still retain clumps of seedlings and saplings which would serve as potential foraging sites for flammulated owls. Because many of the acres of flammulated owl preferred habitat types are currently unsuitable for use by this species due to high tree densities and canopy closure, the proposed action's direct and indirect effects would serve to improve the long term habitat for this species within the analysis area. However, there would likely be a 10 to 20 year post-harvest delay, while new snags are generated as well as vegetative response from seedlings, saplings, and shrubs, before the affected acres may be used by this species.

Cumulative Effects

As previously stated, the proposed timber harvest should improve habitat for flammulated owls that has been negatively impacted by nearly a century of fire suppression. Because of Sections 12 and 36 proximity to the Landers Fork and Copper Creek, flammulated owls in habitat adjoining these water bodies would have access to a more abundant prey source, insects associated with aquatic habitats. Through implementation of the improvement harvest prescription in these areas, habitat for this species would be improved. Thus, there would be low risk of cumulative effects as a result of the proposed action.

4.3.4.2.5 Harlequin Duck

Alternative A

Under the no action alternative, the proposed timber harvest would not occur. However, sediments from the Snow Talon Fire would still be washed downstream and potentially impact this species. Despite this, the proposed action would not mitigate for effects from the burned area upstream.

Alternative B

Under the proposed action, laws regarding streamside management zone protection would be implemented, existing roads would be brought up to BMPs, 0.29 miles of road would be constructed, and 0.55 miles would be obliterated or abandoned. As a result, sediment sources should be controlled, and water clarity downstream may not be impacted as a result of the proposed project (however, see hydrology report for more detailed information pertaining to water clarity and quality).

Cumulative Effects
The major impact to downstream harlequin ducks will be the sediment yield from the Snow Talon Fire, located upstream from the project area. Additional contributions to the fire's sediment runoff from the proposed action would be minor in comparison. As a result, minor cumulative impacts to this species would be expected from the proposed action.

4.3.4.3 Big Game

4.3.4.3.1 White-tailed Deer

Alternative A
Under the no action alternative, the 984 ac of potential snow-intercept/thermal cover within the project area for white-tailed deer would remain unchanged in the short term. However, these acres may be more susceptible to future insect infestation due to their current stocking levels. As a result, should those acres become insect infested, they may be subject to small timber permits, or larger scale salvage sales, depending on the extent of future infestations. Thus, there would be low risk of direct or indirect effects to white-tailed deer as a result of the no action alternative.

Alternative B
Under the proposed action, approximately 870 acres would be harvested, including approximately 116 acres within white-tailed deer winter range habitat. Additionally, approximately 735 ac (75%) of the 984 ac of snow-intercept or thermal cover would be affected by the proposed harvest. Thus, within the project area, snow intercept cover would be reduced by approximately 75%, as well as winter range cover. However, as a result of the proposed action, in the short term, growth of new, more succulent forage would be stimulated, as well as the provision of hiding cover 15 - 20 years post-harvest when seedlings and saplings reach sufficient height and density to obscure deer at a given distance. Thus, within the project area, there would be low to moderate risk of direct and indirect effects to white-tailed deer as a result of an approximate 75% reduction in snow-intercept cover, as well as a reduction of 116 acres in winter range cover.

Cumulative Effects
With the proposed action alternative, the majority of the snow-intercept cover that would remain within the analysis area post-harvest would be located on USFS land south of Hwy. 200. While small blocks (< 400 acres) of snow-intercept cover would exist on private lands within the analysis area, those blocks would not be able to accommodate as many white-tailed deer during a hard winter. Much of the private lands within the analysis area are currently composed of regenerating forest that is intermixed with grassland. Through implementation of the proposed timber harvest, snow-intercept cover in close proximity to winter range would be further reduced by approximately 735 ac (approx. a 22% reduction from the current 3,322 ac within the analysis area). While canopy closure would be < 10% within those 330 acres proposed for light irregular seed tree harvest, canopy closure would likely be 40% on the 540 ac proposed for improvement harvest. Thus, while abundant and nutritious forage would likely be created by the proposed action within the 10 years post-harvest, such conditions are currently available throughout the analysis area on private lands. The proposed action would likely alter the over-wintering white-tailed deer population's movements in winters with deep snow to the snow-intercept cover provided on USFS

land south of Hwy. 200. As a result, the proposed action alternative would have low to moderate risk of cumulative effects for the white-tailed deer population within the analysis area.

4.3.4.3.2 Elk

Alternative A

Due to open roads within the southern portion of the cumulative effects analysis area, almost all of the approximately 58,921 acres of elk security habitat is located on USFS land, with 41,039 acres within the Scapegoat Wilderness Area. Within the project area, there currently is no elk security habitat due to open roads within and adjacent to the affected parcels. Under the no action alternative, roads and access to Section 6 would remain unchanged, whereby it would be relatively easy for motorized vehicles to gain access to the heavily roaded section. Thus, aside from forgoing the opportunity to restrict motorized access, there would be low risk of direct and indirect effects to elk as a result of the no action alternative.

Alternative B

Within the project area, the due to open road densities on adjacent private land, elk security cover would not be created through the proposed action. Additionally, the effect of the proposed harvest on snow-intercept cover for elk would be similar to that discussed for white-tailed deer. Thus, aside from the creation of more nutritious and highly palatable forage within the project area, there would be low to moderate risk of direct and indirect effects to elk as a result of the proposed action.

Cumulative Effects

Within the 146,851 acre cumulative effects analysis area, approximately 58,921 acres (40%) are considered to be elk security cover. The proposed action would not change this. Additionally, of the 58,921 ac of elk security cover, 41,039 ac (70%) are located within the Scapegoat Wilderness Area. The major reasons for the majority of elk security habitat being located within the wilderness boundary are largely due to the extent of open roads on private and some USFS lands, and the 2003 Snow Talon Fire, which burned much of the hiding cover within its boundaries. Because of the Snow Talon Fire, the burned area will be an area full of highly nutritious and palatable forage for several years post-fire. However, the same area will also be devoid of hiding cover until seedlings and saplings are of sufficient density and at least 4 to 6 feet in height, and will be absent snow-intercept cover for 40 to 50 years post-fire.

The analysis area is truly a gradient (NW to SE) of security cover (NW) to winter range (SE), with the fire in between. Unfortunately, the security cover occurs at the higher elevations, where elk would likely only make use of them for a portion of the hunting season (depending upon winter onset), and the lower elevation security cover occurs on the fringes of the analysis area in 3 disjunct blocks, each < 4,100 acres. Thus, elk would likely be more vulnerable to hunting pressure on their migration from summer to winter range as a result of past effects. Of the approximately 12,812 acres of elk winter range within the analysis area, the proposed action would harvest timber on approximately 353 acres of winter range (2.75%). Thus, while the proposed action would only harvest timber within < 3% of the available winter range within the analysis area (and remove no additional security cover), the Snow Talon Fire removed mid-elevation elk security cover.

Therefore, the proposed action would likely have minimal additional cumulative effects for elk within the analysis area.

4.3.4.3.3 Moose

Alternative A
Under the no action alternative, no changes would be expected to occur to moose habitat. Thus, no direct or indirect effects to moose would be expected as a result of this alternative.

Alternative B
Under the proposed action, approximately 883 acres of timber would be harvested (13 ac of which would be girdled) within moose winter range habitat. However, approximately 48 densely forested acres in Section 12, and 93 acres in Section 36, that are adjacent to the Landers Fork and Copper Creek would not be harvested, and would provide cover adjacent to foraging habitat. Such harvest would likely create additional foraging opportunities for moose within the project area within 10 to 15 years post-harvest. Such opportunities, however, would be at the expense of mature forest that would provide shelter from snow or heat. Thus, for the occasional moose that would utilize the project area, the proposed action would have low to moderate risk of direct and indirect effects.

Cumulative Effects
Put in a larger landscape context, private lands near the valley floor have been extensively logged over the past 20 years, and currently provide foraging opportunities for moose, while much of the habitat on USFS land is still densely forested (except for the 37,000 acres burned by the 2003 fire) and would provide shelter from snow and heat. Additionally, with the extensive recreational use on Sections 12 and 36 from cabin site lessees, anglers, camping, and winter recreationists, the project area would not likely receive much use by moose. Thus, the proposed action would likely have low risk of cumulative effects for moose within the cumulative effects analysis area.

4.3.5 Archeology

Alternative A
Under the no action alternative, no changes would be expected to occur to archeological resources.

Alternative B
As part of the action alternative, all known cultural resources that are found near proposed management activities would be physically marked in the field with fluorescent ribbon and lathe and efforts would be made to avoid disturbance of those resources with proposed activities. If any of those cultural resources could not be avoided with proposed activities, they would be evaluated to determine National Register listing eligibility and appropriate mitigation measures would be considered before the commencement of project related ground-disturbing activities. As a result, no negative direct, indirect, or cumulative effects are expected to occur to acheologically important resources within the project area.

4.3.6 Economic Analysis

The economic analysis for the Golden Arches Project estimates the revenue from timber harvesting and nonadministrative costs for the alternatives considered and displays the current returns from the Southwest Land Office timber program and the total program state wide.

4.3.6.1 Project Costs and Revenues

The following assumptions were used to estimate the revenue and site treatment costs for each alternative:

1. The harvested volumes for the alternatives were estimated by Clearwater Unit personnel.

2. The stumpage value was estimated using a residual value approach. The estimated stumpage value equals the delivered log prices subtracted from logging cost, haul cost, Forest Improvement (FI) fee, development cost and an amount for profit and risk. The amount for profit and risk was based on 15% of the logging and hauling costs.

3. The estimated delivered log price is based on a telephone quote to the closest mill, which is the Pyramid Mountain Lumber mill in Seeley Lake.

4. The cost for tractor logging = $115 per MBF (Wichman, 1998). The haul costs were estimated by using the following equation: Haul costs = 5.549 + 0.5656 x paved haul distance in miles + 0.982 x unpaved haul distance in miles + 0.4787 x logs per MBF (Niccolucci, 1996).

TABLE IV-4
Residual Value Appraisal (per MBF)

	Alternative B
Delivered Log Prices	$400
Logging Cost	$115
Haul Cost	$52
Development Costs	$10
Forest Improvement Fee	$48
Profit and Risk	$25
Estimated Stumpage Value	$150

5. Development costs were estimated for each alternative by Clearwater Unit personnel. Development costs on this proposal are the estimated costs of roads, easement acquisition and watershed improvement items that would be paid for by the purchaser. These improvements

provide access to the State Trust Lands involved and improve water quality on state land and downstream.

6. Forest Improvement (FI) cost is based on the cost to maintain the ongoing staffing, stand and road maintenance treatment needs for the current year, right-of-way acquisition and program wide costs. Funds collected under FI from a purchaser provide the State with funding to accomplish projects such as tree planting, site preparation, slash treatment, thinning, road maintenance, right-of-way acquisition, and for some timber sale related activities. Thus, the State is able to improve the long-term productivity of timber stands on state land and maintain or acquire access for future revenue producing projects.

7. Sale specific FI costs are the current cost estimates for the amount and types of treatments (site preparation, hazard reduction, planting, etc.) that would be done related to each of the alternatives being considered. Funding to complete these projects will be collected from current or future timber sales depending on the timing of the treatments.

8. Limitations of the economic analysis: (a) Only known costs and benefits that are related to timber harvesting activities are considered; (b) None of the potential nonmarket benefits associated with leaving trees (i.e., snag recruitment, structural diversity, aesthetics, wildlife habitat, nutrient recycling, etc.) are considered.

9. The costs related to the administration of the timber sale program are only tracked at the Land Office and state wide level. DNRC does not keep track of these costs for individual timber sales.

10. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return.

11. The school trust currently receives income from grazing activities on all three parcels. These activities are independent from the proposed project, although the action alternatives would create a temporary increase in forage for livestock.

TABLE IV-5
Costs and Revenues Associated With This Project by Alternative

	Alternative A	Alternative B
1. Harvest Volume (MBF)	0	5600
2. Development Cost ($/MBF)	0	$10
3. Stumpage Value ($/MBF)	0	$150
4. Forest Improvement Cost (FI) ($/MBF)	0	$48
5. Stumpage Value, FI Cost, and Development Cost ($/MBF) (line 2 + line 3 + line 4)	0	$208
6. Total $ Value based on Stumpage Value, FI Cost, and Development Cost times Harvest Volume (line 5 x line 1)	0	$1,164,800
7. Stumpage Value and FI Cost ($/MBF) (line 3 + line 4)	0	$198
8. Total $ Revenue to the State (line 7 x line 1)	0	$1,108,800
9. Total $ Revenue to the Trust (line 1 x line 3)	0	$840,000
10. Current Lease Revenue to the Trust From the Project Area ($/year)	$23,126	$23,126
11. Sale Specific FI Cost ($/MBF)	0	$5
12. Total $ Sale Specific FI Cost (line 11 x line 1)	0	$28,000

4.3.6.2 Costs and Revenues from the DNRC Forest Sale Program

The DNRC does not have an accounting system to track costs for individual projects from start to finish. An annual cash flow analysis was conducted of the DNRC's forest product sales program. Revenue and costs are calculated by land office and state-wide. The revenue-to-cost ratio for the Southwestern Land Office for fiscal year 2003 slipped to 1.61 down from 2.57 in 2002, which

averages around the statewide ratio of just under 2 to 1. Roughly, for every $1 spent by the agency on managing its lands, it brings in approximately $2 in revenue.

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.

Alternative A

As the preceding table shows, only grazing leases would be generating income for the associated school trusts from these parcels of state land. No additional income would be generated as a result of this project. The timber stands would continue to grow at poor rates, but would increase slowly in size, volume, and value as time goes on assuming market rates stayed static.

Alternative B

Approximately $1,108,800 would be generated to the state of Montana as a result of the proposed action. Approximately $840,000 of that would go to the schools of Montana. The timber harvesting in the proposed project is designed to maximize revenue to the trust accounts by capturing value in the present-term and by improving growth rates on the harvested acres by removing trees that are past their culmination of mean annual increment (they are past their best growth rates and are declining in growth and vigor). Harvesting would create growing space for the residual trees and initiate young vigorously growing regeneration. This would greatly improve the amount of wood fiber produced on the site, which would help to maximize revenue from these lands in the long-term.

If some of the stands with poor health that were deferred from harvest (approximately 37 acres (33 acre stand in northeast corner of Section 6 and 80 foot buffers along fisheries)) were harvested sometime in the future before a large value-reducing disturbance occurred such as a fire or insect epidemic, there would be a net loss in revenue as compared to harvesting them now. This net loss through deferral would exist because of the currently poor growth rates that would be allowed to continue instead of capturing value in the present and improving growth rates for the long-term. Therefore on these acres, long-term revenue would not be maximized and the project objective of maximization of revenue would not be completely met, however these stands are providing other resource benefits primarily to wildlife and fisheries and are being deferred to find a balance in meeting biological diversity objectives. As a whole, the project is maximizing long-term revenue of the timber resources while finding a balance with other project objectives. None of the proposed management activities would preclude this tract of land from other future income generating uses and no cumulative impacts are expected to occur as a result of the proposed project.

APPENDIX A

LIST OF PERSONS AND ORGANIZATIONS CONTACTED

Alliance for the Wild Rockies, Missoula, MT
Anderson, Brent, Lincoln, MT
Bason, Richard, Great Falls, MT
Big Blackfoot Chapter of Trout Unlimited, Lincoln, MT
Bjork, Todd, Billings, MT
Blackfoot Legacy, Ovando, MT
Blackfoot Valley Dispatch, Lincoln, MT
Bouma Post Yard, Lincoln, MT
Clark, Barbara, Helana, MT
Combs, Gene, Great Falls, MT
DeBorde, Brian, Hoquiam, WA
Dept. of Fish, Wildlife & Parks, Missoula, MT
Ecology Center, Missoula, MT
F. H. Stoltze Lumber Company, Columbia Falls, MT
Frey, Charles, Missoula, MT
Friends of the Wild Swan, Swan Lake, MT
Grindeland, Gary, Great Falls, MT
Grismer, Leo, Great Falls, MT
Heggen, Wayne, Great Falls, MT
Johnston, Cindy, Great Falls, MT
Larum, Michael, Helena, MT
Lewin, Stuart, Great Falls, MT
Lewis and Clark County Weed Department, Helena, MT
Lincoln Community Council, Lincoln, MT
Lincoln Ranger District, Lincoln, MT
McDonald Gold Project, Lincoln, MT
Montana Department of Environmental Quality, Helena, MT
Montana Wood Products Association, Helena, MT
Odegard, Colleen, Sun River, MT
Pearson, Frank, Great Falls, MT
Peterson, Rayma Jo, Lewistown, MT
Plum Creek Timber Company, Jim Krantz, Columbia Falls, MT
Ponderosa Snow Warriors Snowmobile Club, Lincoln, MT
Purviance, Greg, Cheney, WA
Richard, William, Missoula, MT
Seven Up Pete, Golden, CO
Sieben Ranch Company, Helena, MT
Sowell, John, Great Falls, MT
Tribal Historic Preservation Office, Pablo, MT
Tronstad, Aimee, Chad, and Lawrence, Lincoln, MT
Wollenberg, James, Helena, MT

APPENDIX B

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