Fish Creek Salvage
Environmental Assessment

October 2003
Montana Department of Natural Resources and Conservation
Southwestern Land Office
Missoula Unit

FINDING
FISH CREEK SALVAGE TIMBER SALE

An interdisciplinary team (ID Team) has completed the Environmental Assessment (EA) for the proposed Fish Creek Salvage Timber Sale prepared by the Montana Department of Natural Resources and Conservation (DNRC). After a review of the EA, project file, public correspondence, Department policies, standards and guidelines, and the Administrative Rules for Forest Management (*ARM 36.11.401-450)*, I have made the following decisions:

1. ALTERNATIVE SELECTED

Two alternatives were presented and the effects of each alternative were fully analyzed in the EA:

1. Alternative A: No Harvest
2. Alternative B: Harvest

The Alternative B: Harvest proposes to harvest approximately 52,000 tons of timber on 3,176 acres. The Alternative A; No Harvest did not include the harvest of any timber.

For the following reasons, I have selected the Action Alternative without additional modifications:

a) The Alternative B: Harvest meets the Purpose of Action and the specific project objectives as described on page 1-2 of the EA. Implementation of this alternative would produce an estimated $1,300,000 ($25/ton) return to the Common School and Public Building Trusts.

b) The analysis of identified issues did not disclose any reason compelling the DNRC not to implement the timber sale.

c) Alternative B: Harvest includes mitigation activities to address environmental concerns identified during both the Public Scoping phase and the project analysis.

2. SIGNIFICANCE OF IMPACTS

For the following reasons, I find that implementation of Alternative B; Harvest will not have significant impacts on the human environment:

a) Water Quality- Harvest activities and road construction have low risk of increased sediment yield to stream channels. Sediment yield associated with the implementation of Alternative B: Harvest would be below the high levels, as a result of the Fish Creek Complex fires, expected with Alternative A: No Harvest (No Action). BMP's and erosion control mitigation measures would be implemented to prevent sediment delivery from roads to streams. No timber harvest would occur in SMZ's.

b) Water Yield- The proposed salvage harvest is not expected to increase water yield, surface runoff, or magnitude and duration of peak flows above existing post-fire conditions. This is due to the fact that only dead trees will be harvested.

c) Cumulative Watershed Effects-The proposed harvest and road construction would present a low to moderate risk of cumulative impacts to sediment delivery by disturbing burned soil. The risk of cumulative effects to sediment delivery would be reduced or eliminated by placing erosion control measures in these areas. There is little risk of measurable adverse impacts to downstream water quality and beneficial uses occurring as a result of Alternative B.

d) Soils- Tractor skidding and cable harvest could cause soil disturbance that may result in increased erosion. However, we expect the indirect effect of erosion to be similar to, or not substantially more than, Alternative A. Harvest mitigation measures would maintain soil resources and minimize disturbance impacts by implementation of mitigation measures during project activities. Mitigations include requiring winter harvest on tractor (<40% slope) units, cable harvest of steep slopes and installation of erosion control measures where needed. Retention of coarse (>3" in diameter) woody debris on site would have long term beneficial effects on nutrient cycling, maintain long-term soil productivity and reduce on-site erosion.

e) Cold Water Fisheries- A majority of the cutthroat trout population in severely burned Deer Creek was extirpated by fire effects of temperature and ash, based on a post fire fish mortality survey. Fish populations in severely burned Thompson Creek, may also be affected, but are unknown. Fish habitat will be affected by increased water temperatures where high intensity fire removed vegetative shade, until riparian areas become revegetated. Implementation of Alternative B would not include logging in the SMZs, thereby maintaining those (burned) trees adjacent to stream channels, which may provide shade and/or coarse woody material until the SMZs re-vegetate. Erosion and sediment delivery will increase in 2004, largely as a result of the Fish Creek Complex fires, and ameliorate over several years.

f) Noxious Weeds- Similar or slight increase in noxious weed density and occurrence compared to Alternative A: No Harvest (No Action) due to soil disturbance and decreased tree canopy. Integrated weed management efforts would continue on the site. Control efforts would promote revegetation and emphasize treatment of any new noxious weeds.

g) Economics-Implementation of Alternative B will provide approximately $1,300,000 in short-term revenue to the Common School and Public Building Trusts and does not limit the DNRC's options for generating revenue from these sites in the future.

h) Road Dust- If hauling of logs on private lands is done concurrent with that on State Lands during times when dust could be a nuisance, dust abatement would be applied by the DNRC, thus lowering the presence of road dust. Speed limits for logging trucks would be established and enforced on Fish Creek and Wig Creek Roads.

i) Recreational Site Use- Use of Fishing Access Sites (FASs) in conjunction with this project would be restricted. Contractors may contact Montana Fish Wildlife and Parks to seek permission to utilize FASs.

j) Wildlife-The proposed harvest operations present a minimal likelihood of negative impacts to Threatened and Endangered Species. Those potential impacts that do exist have

been mitigated to levels within acceptable thresholds. The same is true for those species that have been identified as "sensitive" by the DNRC. Alternative B presents a low risk of cumulative effects due to implementation of additional road closures in the Fish Creek drainage.

3. PRECEDENT SETTING AND CUMULATIVE IMPACTS-

The project area is located on State-owned lands, which are "principally valuable for the timber that is on them or for growing timber or for watershed" (MCA 77-1-402). The proposed action is similar to past projects that have occurred in the area. Since the EA does not identify future actions that are new or unusual, the proposed timber harvest is not setting precedence for a future action with significant impacts.

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within established threshold limits. Proposed timber sale activities are common practices and none of the project activities are being conducted on fragile or unique sites.

The proposed timber sale conforms to the management philosophy adopted by DNRC and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of action.

4. 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 pertinent decisions.

b) Evaluation of the potential impacts of the proposed timber sale indicate that significant impacts to the human environment will not occur as a result of the implementation of Alternative B: Harvest.

c) The ID Team provided opportunities for public review and comment during project development and analysis.

Jonathan E. Hansen
Missoula Unit Manager
November 3, 2003

FISH CREEK SALVAGE ENVIRONMENTAL ASSESSMENT

Fish Creek Salvage Environmental Assessment

Cover Sheet

Proposed Action:	The Montana Department of Natural Resources and Conservation (DNRC) proposes the salvage harvest of timber on state School Trust Lands. The sale under consideration would, at this time, salvage harvest approximately 52,000 tons of timber from 1,314 acres in sections 6, 8, 16, and 18, T13 N, R 24 W sections 12 and 14, T13N, R25W and section 30, T14N, R24W. Up to an additional 1,365 acres may be harvested if significant tree mortality occurs as a result of insect infestation brought about by the fire. The proposed action would be implemented as early as December 2003 and could be completed by September 2004. These dates are approximate.
Type of document:	Environmental Assessment
Lead agency:	Montana Department of Natural Resources and Conservation (DNRC)
Responsible official:	Jonathan Hansen Missoula Unit 1500 Tower Missoula, MT 59804 (406) 542-4309
For further information:	Cindy Bertek Missoula Unit 1500 Tower Missoula, MT 59804 (406) 542-4245
Special Note:	Comments received in response to this Environmental Assessment will be available for public inspection and will be released in their entirety if requested pursuant to the Montana Constitution.

How to Read this EA
(Environmental Assessment)

To read this EA more effectively, carefully study this page. Following State regulations, we have designed and written this EA (1) **to provide** the Project Decision Maker with sufficient information to make an informed, reasoned decision concerning the proposed Fish Creek Salvage and (2) **to inform** members of the affected and interested public of this project so that they may express their opinions to the Project Decision Maker.

This EA follows the organization and content established by the MEPA Rules (ARM 36.2.521-36.2.543). The EA consists of the following chapters.

1.0 Purpose and Need for Action
2.0 Alternatives, Including the Proposed Action
3.0 Affected Environment
4.0 Environmental Consequences
5.0 List of Preparers
6.0 List of Agencies and Persons Consulted
7.0 References
8.0 Appendix

Chapters 1 and 2 together serve as an Executive Summary. We have written these two chapters so that non-technical readers can understand the potential environmental, technical, economic, and social consequences of **taking** and of **not taking** action.

- **Chapter 1** introduces the Fish Creek Salvage. It provides a very brief description of the proposed Fish Creek Salvage and then explains three key things about the project: (1) the relevant environmental issues, (2) the decisions that the Project Decision Maker must make concerning this project, and (3) the relevant laws, regulations, and consultations with which the DNRC must comply.

- **Chapter 2** serves as the ***heart*** of this EA. It provides detailed descriptions of Alternative A: No Entry (No Action) and Alternative B: Harvest. Most important, it includes a **summary comparison** of the predicted effects of these two alternatives on the human environment, providing a clear basis for choice between the two alternatives for the Project Decision Maker and the Public.

- **Chapter 3** briefly describes the past and current conditions of the relevant resources (*issues*) in the project area that would be meaningfully affected, establishing a part of the baseline used for the comparison of the predicted effects of the alternatives.

- **Chapter 4** presents the detailed, analytic predictions of the consequences of implementing Alternative A: No Harvest (No Action) and Alternative B: Harvest. These predictions include the direct, indirect, short term, long term, irreversible, irretrievable, and cumulative effects of implementing the alternatives.

This page left blank intentionally

CHAPTER 1

PURPOSE AND NEED FOR ACTION

1.0 Chapter 1: Purpose of and Need for Action

1.1 Proposed Action: Harvest

The Montana Department of Natural Resources and Conservation (DNRC) proposes to salvage harvest timber in the Fish Creek area. Under Alternative B: Harvest, the department would harvest approximately 52,000 tons of burned timber from approximately 1,314 acres to generate a net positive rate of return for the Common School (CS) and the Public Building (PB) grants. If significant tree morality occurs as a result of insect infestation brought about by the fire, there could be an additional harvest of subsequent bug killed timber on up to another 1,365 acres. The proposed action would be implemented as early as December 2003 and could be completed by September 2004. These dates are approximate.

1.2 Location

The location of the proposed project is: sections 6, 8, 16, and 18, T13N, R24W and sections 12, and 14, T13N, R25W, section 30, T14N, R24W, Mineral County. The proposed sale is located approximately 8 miles west of Alberton, Montana in the Fish Creek watersheds. See Appendix A: Figure A-1.

1.3 Need for the Action

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and Department of Natural Resources and Conservation (DNRC) are required by law to administer these Trust Lands to produce the largest measure of reasonable and legitimate advantage over the long run for these beneficiary institutions (Section 77-1-202, MCA).

In August 2003 the Fish Creek Complex fires burned 2,900 acres of Montana State Trust Lands. The merchantable value of burned and insect infected timber declines with the passage of time. To maximize revenue to the school trusts, it is necessary to expedite the salvage of burned or insect infested timber. Pursuant to ARM 36.11.409 and MCA 77-5-207, the DNRC has conducted the planning process to prepare the salvage harvest in a timely manner. At this time DNRC proposes to salvage harvest 1,314 acres, however, up to an additional 1,365 acres may be harvested if significant tree mortality occurs as a result of insect infestation brought about by the fire.

1.4 Objective of the Action

In order to meet the goals of the management philosophy adopted through programmatic review in the Administrative Rules for Forest Management (ARM), the Department has set the following specific project objective:

1.4.1 Objective

Generate revenue for the Public School (CS) and Public Building (PB) trust grants by salvage harvesting approximately 52,000 tons of timber killed by wildfires. If significant tree morality occurs as a result of insect infestation brought about by the fire, there could be an additional volume harvested of subsequent bug killed timber.

1.5 Decisions to be Made

- Determine if alternatives meet the project objectives.
- Determine which alternative should be selected.
- Determine if the selected alternative would cause significant effect(s) to the human environment, requiring the preparation of an Environmental Impact Statement (EIS).

1.6 Relationship to the Administrative Rules for Forest Management

On March 13, 2003, the Department adopted Administrative Rules for Forest Management (ARM 36.11.401 through 450). The Department will manage the lands involved in this project in accordance with the Rules.

The proposed action is limited to specific management activities that are needed to implement the salvage sale and provide resource protection. This assessment documents site-specific analysis and is not a general management plan or a programmatic analysis of the area. The scope of this environmental analysis (EA) was determined through DNRC interdisciplinary analysis and public involvement.

1.7 History of the Planning and Scoping Process Public Involvement - Agencies, Individuals or Groups Contacted

Comments from the general public, interest groups, and agency specialists were solicited in September of 2003. Newspaper legal notices were run in the Missoulian on September 23, 2003 and in the Mineral Independent on October 8, 2003. Scoping letters were mailed to 10 organizations and individuals (a list of the organizations/individuals contacted is available in the project file). Written comments were received from the following organizations: Montana Department of Fish, Wildlife and Parks and The Ecology Center.

The following resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures: Bob Rich, Supervising Forester, Missoula Unit; Cindy Bertek, Forester, Missoula Unit; Rich Stocker, Forester, Missoula Unit; Mike McGrath, Wildlife Biologist, Southwest Land Office; Jeff Collins, Soil Scientist, Forest Management Bureau; Renee Hanna, Hydrologist,

Southwest Land Office; Pat Rennie, Archeologist, Agriculture and Grazing Management Bureau, Helena.

1.8 Other environmental assessments (EAs) related to this project

1.8.1 Fish 12 Roads EA

1.9 Permits, Licenses, and Other Authorizations Required

1.9.1 124 Permits for Culvert Installation and Temporary Bridge

A Montana Department of Fish, Wildlife & Parks "Section 124" permit has been applied for for culvert installation for a stream crossing in sec 16, T13N, R24W.

Montana Department of Fish, Wildlife & Parks: A "Section 124" permit has been applied for for a temporary bridge in sec 8, T13N, R24W.

1.9.2 Road Use Agreements

USFS Nine Mile Ranger District: A Road Use Permit has been acquired for temporary use of existing national forest system roads.

Plum Creek Timber: A Road Use Permit has been acquired for temporary use of existing Plum Creek Timber system roads.

Doug Bromley: A Road Use Permit is required for temporary use of existing roads, to access section 14, belonging to Doug Bromley.

1.10 Issues

The following issues were identified during the scoping process. They constitute the basis for the formation of project specifications, development of mitigation measures, and assessment of environmental impacts.

1.10.1 Issues Studied in Detail

1.10.1.1 Water Quality, Soil, Fisheries, Weeds

1.10.1.1.1 Water Quality

What are the expected effects of the fire and proposed action on water quality?

1.10.1.1.2 Water Yield

What are the expected effects of the fire and proposed action on water yield?

1.10.1.1.3 Cumulative watershed effects

Will the proposed harvest result in adverse cumulative watershed effects?

1.10.1.1.4 Geology/ Soil Resources

Are there unstable geologic or soil resources that would be adversely affected by the fire or proposed management activities?

1.10.1.1.5 Cold Water Fisheries

Are there sensitive fisheries in the project area?
Would the proposed fire salvage adversely impact fish habitat?

1.10.1.1.6 Noxious Weeds

Do noxious weeds occur on the project area and what combination of prevention and control measures would be used for noxious weed management?

1.10.1.2 Human Environment

1.10.1.2.1 Road Dust and Truck Speeds

Road dust caused by log truck traffic could be a nuisance near private residences and Fishing Access Sites (FAS's). Traffic speed could cause safety problems on Wig Creek and Fish Creek Roads residences and FAS's.

1.10.1.2.2 Recreational Site Use

There is concern there could be a potential of site damage to public recreational sites that might become camps and/or parking lots for logging equipment.

1.10.1.2.3 Economic Benefits and Project Revenue

What is the revenue that this project will provide to the trust beneficiaries?

1.10.1.3 Wildlife

1.10.1.3.1 Endangered Species

Implementation of the proposed project could negatively impact threatened and endangered species.

1.10.1.3.2 Sensitive Species

Implementation of the proposed project could negatively impact sensitive species.

1.10.1.3.3 Big Game

Implementation of the proposed project could negatively impact big game.

1.10.2 Issues Eliminated from Further Study and Rationale for Elimination from Further Study

1.10.2.1 Historical and Archaeological Sites

Patrick Rennie, DNRC Archeologist, consulted with the Montana State Historic Preservation Office (SHPO) per DNRC mandates under the State Antiquities Act. A search was conducted of the Cultural Recourse Inventory System (CRIS) and Cultural Resource Annotated Bibliography System (CRABS) databases at the SHPO and the DNRC's TLMS database. The project area maps were reviewed; and a ground inspection of cultural resources within selected portions of the proposed project area was conducted. The results of the CRIS, CRABS and DNRC TLMS database searches indicate no record of previously identified cultural resources within the project area. Project area topographic maps suggest that the majority of the project area exhibits slopes of 30% or greater. Further, geologic survey maps indicate that sedimentary mudstones, siltstone and quartzites dominate the local geology. Because of the very steep terrain and lack of geology conducive to sources of tool quality stone and rock shelters, an on the ground inspection was not warranted for much of the project area. The portions of the project area inspected on the ground consist largely of relatively level terraces and other topographic features with grades of less than 20%. As such, only portions of the project area in Section 8, T13N R24W; Section 18, T13N R24W; and Section 14, T13N R25W were inspected to Class III survey standards, but no evidence of cultural resources were identified. It is believed that no Heritage Properties will be effected with the proposed undertaking. No further cultural resource investigative work is recommended in order for the project to proceed.

1.10.2.2 Wildlife

1.10.2.2.1 Threatened and Endangered Species

1.10.2.2.1.1 Bald Eagle (Federally threatened)

There is concern that timber harvest activities would disturb nesting bald eagles. The nearest known nest is located approximately 7.2 miles NE of the affected area. This distance is generally considered to be outside the scope of a bald eagle's home range. Thus, no direct, indirect, or cumulative effects to this species would be expected under the proposed action.

1.10.2.2.2 Sensitive Species

1.10.2.2.2.1 Peregrine Falcon (recently de-listed from Federally threatened)

There is concern that timber harvest activities would disturb nesting peregrine falcons. The nearest known peregrine falcon nest is located

approximately 15 miles NE of the affected area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.10.2.2.2.2 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, habitat attributes that do not occur within the affected area. No such structures are listed in the affected area on USGS 7.5' maps. As a result, the occurrence of this species is unlikely, and the risk of direct, indirect, or cumulative effects is low to this species from the proposed action.

1.10.2.2.3 Other Sensitive Species

1.10.2.2.3.1 Coeur d'Alene Salamander

There is concern that timber harvest activities could affect this species. This species requires waterfall spray zones, cascading streams, or talus near such water features. There are no known areas of 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.

1.10.2.2.3.2 Columbian Sharp-tailed Grouse

There is concern that timber harvest activities could affect this species. The nearest known population of Columbian Sharp-tailed grouse occurs near Ovando, MT. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.10.2.2.3.3 Common Loon

There is concern that timber harvest activities could affect this species. The common loon requires lakes and ponds for breeding. The nearest pond or lake is located approximately 4 miles SW of the affected area. However, the proposed harvest would occur far enough away from the pond so that effects of the proposed activity to this species would be minimized.

1.10.2.2.3.4 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 project area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.10.2.2.3.5 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 project area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

CHAPTER 2

ALTERNATIVES

2.0 Alternatives Including the Proposed Action

2.1 Introduction

Chapter 2: Alternatives Including the Proposed Action is the heart of this EA. The purpose of Chapter 2 is to describe the alternatives and compare the alternatives by summarizing the environmental consequences.

Alternatives were planned through scoping and development of issues, input from Interdisciplinary Team (IDT) specialists, and requirements of the Administrative Rules for Forest Management. In addition, compliance with trust mandates helped to shape alternatives. This chapter describes the activities of Alternative A: No Harvest (No Action) and Alternative B: Harvest. Then based on the descriptions of the relevant resources in Chapter 3: Affected Environment and the predicted effects of all alternatives in Chapter 4: Environmental Consequences, this chapter presents the predicted attainment of project objectives and the predicted effects of all alternatives on the quality of the human environment in **comparative** form, providing **a clear basis for choice among the options for the decisionmaker and the public.**

This chapter has seven sections:

- History and Process Used to Formulate the Alternatives
- Alternative Design, Evaluation, and Selection Criteria
- Alternatives Considered But Eliminated from Detailed Study
- Description of Proposed Alternative
- Suggested Mitigation Measures of Alternative B: Harvest
- Description of Relevant Past, Present, and Reasonably Foreseeable Future DNRC Actions Not Part of the Proposed Action
- Summary Comparison of the Activities, the Predicted Achievement of the Project Objectives and the Predicted Environmental Effects of All Alternatives

2.2 History and Process Used to Formulate the Alternatives

In September 2003, following the Fish Creek Complex fires, a DNRC Interdisciplinary Team began analyzing the project area and initiated internal review and public scoping to develop a management plan. Only two responses were received from external parties. The major environmental issues identified during the scoping

process were defined and are summarized in Chapter I. In order to understand how the proposed harvest would effect the environment, its effects were contrasted to those of Alternative A: No Harvest (No Action). Using the guidance of the MEPA Rules, the responses received, and the issues developed during the internal scoping, the team designed Alternative B: Harvest to satisfy the needs and meet the objectives of the project.

2.3 Alternative Design, Evaluation, and Selection Criteria

The DNRC IDT the following design and evaluation criteria.

- Meet objectives of Trust Lands stewardship.
- Comply with MEPA Rules.
- Retain coarse woody debris to reduce soil erosion.
- Retain at least the minimum number of snags required to accommodate wildlife needs.
- Design harvest units and systems to minimize impact on the soils and stream.
- Control noxious-weed infestations and prevent dispersal.
- Maintain current ongoing recreational opportunities where possible.

2.4 Alternatives Considered But Eliminated from Detailed Study

No other alternatives were developed, because proposed Alternative B: Harvest met all environmental guidance and IDT specialists' specifications, while providing income for the trust.

2.5 Description of Alternatives

2.5.1 Alternative A: No Harvest (No Action)

Salvageable fire and subsequent insect killed trees would not be harvested. No revenue would be generated for the Common School and Public Building Trusts. However, ongoing DNRC permitted and approved activities would continue in the project area.

2.5.2 Alternative B: Harvest

The proposed salvage harvest would yield approximately 52,000 tons of fire-killed timber from approximately 1,314 acres at this time. If there is future mortality from subsequent insect infestations of species such as Douglas fir beetles, mountain pine beetles, or western pine beetles, additional salvage harvest

may occur in the same project area on an additional 1,365 acres. See Appendix A: Figure A-2. Approximately 169 acres would be salvage harvested with ground-based equipment, 1095 acres with a cable harvesting system, and 50 acres with a helicopter at this time.

Harvesting would remove fire killed or insect infested timber. Approximately 2 snags per acre would be retained to serve as snag recruitment. Trees selected for snags would be greater than 21" dbh. If 2 snags over 21" dbh are not available then the next largest available size tree would be left.

Logging slash would be return skidded and dropped on skid trails in ground-based units.

Build approximately 6.1 miles of road: 4.5 miles new permanent, 1.0 mile new temporary and 0.6 miles of reconstruction temporary.

This alternative would provide approximately $1,300,000 (estimated at $25/ton) in revenue to the Common School and Public Building Trusts. Additional revenue may occur through subsequent harvest of insect infested timber in the analysis area.

The table below outlines the status of acreage involved in this project.

Table 2-1: Breakdown of Acres involved in this project

Total acres in harvest analysis area	3,176
Acres burned	2,614
Acres deferred for 5 years for black-backed woodpecker habitat	497
Acres to salvage harvested now	1,314
Acres that may be salvage harvested later	1,365
Acres open to salvage harvest (including possible bug kill)	2,679

2.6 Mitigation Measures of Alternative B: Harvest

The following mitigation measures would be implemented through the administration of the timber sale contracts.

2.6.1 Water Quality, Soil, Fisheries, Weed Mitigations

Harvest Unit General Design

- Minimize soil impacts by limiting the total soil disturbance area in a unit. Accomplished this by using existing trails, skid trail planning and design, and maintaining nutrient cycling by retaining woody debris and foliage.

- Limit ground skidding to slopes of 45% or less, except on sensitive soils, where slope limitations would be 35% or less.

- Limit equipment operations to moderate slopes and periods when soils are frozen or snow covered, to minimize disturbance that results in compaction, displacement, rutting, and erosion.

- Install surface drainage features on skid trails, landings, and roads to minimize erosion and protect water quality.

- Protect localized sensitive soils, steep slopes, and moist areas by implementing equipment restriction zones.

- Follow all Streamside Management Zone Laws and Rules and Administrative Forest Management Rules.

- Protect all ephemeral draws, springs, and wet areas with marked equipment restriction zones (ERZ). Mark and maintain a Riparian Management Zone (RMZ) along fish bearing steams (Deer Creek, Fish Creek & Thompson Creek) and specific sites with high erosion risk adjacent to streams. Trees falling into protection areas shall be cable yarded or winch-line skidded back to skid trails approved by the Forest Officer.

Road Design

- Implement forestry BMPs as the minimum standard for all operations with the proposed timber sale.

- Plan, design and improve existing road systems to meet long-term access needs and to fully comply with current BMPs.

- Construct drain dips, grade rolls and other drainage features where necessary and practical to insure adequate road surface drainage. Install and maintain all road surface drainage concurrent with harvest activities, reconstruction, and reconditioning.

- Grass seed newly constructed or reconstructed road cut and fills immediately after excavation.

- Leave temporary or abandoned roads in a condition that will provide adequate drainage and will not require future maintenance. Rip and seed partially obliterated roads that are abandoned. Where it is available, scatter slash across the ripped road surface. Install water bars at regular intervals to facilitate surface drainage.

- Construct additional drainage features on all approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. Locate drainage features close enough to crossings to minimize the runoff contributing area

but at an adequate distance away from the crossing to provide for effective sediment filtering.

- Clean the inlets and outlets of culverts. Implement additional sediment mitigation measures where necessary.

- Contain any fuel storage for helicopter operations to prevent spillage and located on a stable site away from surface waters or drainages.

- Monitor road drainage conditions as part of the on-going project operations and make repairs as needed, including culvert cleaning and revegetation. If cutslope or fillslope slumps occur on existing roads, stabilize to control erosion as part of the harvest project.

Site-Specific Design

- **Down Woody Material:** During harvest operations, retain five to ten tons per acre of woody material larger than 3 inches diameter scattered throughout the sale units. On old harvest areas and low tree volume sites where 5 tons is not possible, retain all available slash on site. On slopes over 30% retain all slash on site by log length skidding or whole tree harvest if tops are left on site. On slopes less than 30% whole tree harvest would be allowed when 90% of all slash is return skidded or left within the harvest unit. Slash should be returned from the landings back into the harvest unit as it is created and well distributed, evenly throughout the unit. Large amounts of slash shall not be allowed to accumulate at the landings before it is returned in the unit.

- **Skyline Yarding:** Where cable harvest is required, log length harvest is preferred and tree length harvest would be allowed if the tops are left on site. Where ever possible skyline yarding sets would be located on ridges or convex slope sites to promote corridor locations that disperse water and avoid pulling logs up draws or concave spots that could concentrate runoff and erosion. Leading end of the logs would be carried free of the ground at all times except during lateral or downhill yarding.

- Install and maintain adequate erosion control in harvest units, skid trails and cable corridors as needed concurrent with operations. Steep disturbed areas would likely require a combination of waterbars and mulching with slash or straw, filter fence, and grass seeding due to the lack of fine slash and foliage following the fire. Where slash is used, the slash must be in good contact (may require lopping) with the ground to be effective. Erosion control shall be completed prior to acceptance of skidding operations by the Forest Officer.

- Fell trees for erosion control as directed. To control erosion on severely burned slopes over 30%, 10-20 submerchantable trees per acre (or as needed to provide adequate coverage) would be retained, felled, or aligned

predominantly perpendicular to the slope. The logs must be in ground contact to be effective to control erosion at the direction of Forest Officer.

- Slash disposal can be accomplished by in-woods processing or return slash skidding concurrent with harvest operations. Slash should be spread on trails.

- Install and maintain adequate erosion control in harvest units, skid trails, and cable corridors as needed. Steep disturbed areas would likely require a combination of waterbars and mulching with slash or straw, filter fence, and grass seeding due to the lack of fine slash and foliage following the fire.

- Drainage features located in areas with inadequate buffer capacity should be provided with effective sediment filtration through the use of slash filter windrows, filter fabric fencing, or straw bales. Note: straw bales alone may not be effective in areas with heavy concentrations of livestock or big game.

- Ditches with direct delivery to streams or ephemeral draws need to be filtered at the outlet by using slash or filter fabric and straw bales. Where feasible, rip, seed, water bar, and slash any non-system roads within the sale area concurrent with construction activities. Seed skid trails over 30%. Scatter slash on skid trails and cable corridors where needed to control erosion.

- Installation of the Deer Creek temporary bridge must meet requirements of 124 permit and should be installed winter 2003 and removed before spring runoff. Install bridge so as not to disturb creek banks. Install sediment fence or erosion control as needed to prevent sedimentation.

- Rock armor both the inlet and outlet of all CMP installations. Provide energy dissipaters at outfall of all CMP installations. Rock used for armoring should be 12 to 18 inches in diameter for expected high runoff flows.

- When excavating material in and around stream and draw crossings (i.e. installing new CMPs, cleaning inlets and outlets, constructing ditches, etc.) special care should be taken so as not to cause an excessive amount of disturbance to the stream channel or area immediately adjacent to the crossing site. Excess or waste material should be disposed of at a location where it will not erode directly into the stream or draw bottom.

- Limit road use and hauling to dry, frozen, or snow covered conditions. Suspend operations when these conditions are not met before rutting occurs.

- Mark and maintain minimum SMZ width consistent with law and ARM requirments. These widths may be extended for erosive soils based on specialist site specific review as noted in Forest Rule requirements for RMZ's. The RMZ widths are dependent on: the erosion potential of soils at the site, the steepness of the side slope, and the presence of any topographic breaks.

- Protect all ephemeral draws, springs, and wet areas with marked equipment restriction zones (ERZ). If absolutely necessary, designate locations for skid trail crossings. Minimize number of crossings and space at 200 feet where feasible. This will minimize soil disturbance within the vicinity of the draws. Use designated crossings only under dry or frozen conditions.

- No slash burning may occur in or near areas of concentrated ephemeral flow.

Integrated Weed Management
To reduce current noxious weed infestations and limit the spread of weeds implement the following integrated weed management mitigation measures for prevention and control:

- Clean all road construction and harvest equipment of plant parts, mud, and weed seed to prevent the introduction of additional noxious weeds. Subject equipment to inspection by the Forest Officer prior to moving on site.

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

- Establish biocontrol agent sites for knapweed within the project area on larger infestations, where appropriate, such as the south slopes in section 8 Deer Creek.

- Weed treatment measures include herbicide applications along portions of project roads and treatment of spot outbreaks of noxious weeds as designated by the Forest Officer. Have a certified applicator implement any restricted herbicide treatments according to herbicide label directions with applicable laws and rules of Mineral County Weed Board. Apply no herbicides where runoff could affect surface waters.

- Monitor disturbed sites in the project area for new noxious weeds and develop plans as needed to address weed problems. If new infestations of noxious weeds are noted, develop a weed management plan and implement and coordinate efforts with the permittee.

2.6.2 Social and Environmental Mitigations

Road Dust and Speed
- Apply 1.1 miles of dust abatement to the Fish Creek and Wig Creek roads adjacent to residences and FAS's if hauling is done during time periods when road dust is created. Abatement would be applied from mile 3.0 - 3.2, 4.3 -

4.55, 5.45 - 5.60, 9.30 - 9.65, and 10.4 - 10.55 on Fish Creek Road and from mile 2.35-2.6 on Wig Creek Road.

- For log trucks hauling of DNRC timber sales: (1) Restrict speed limits for log trucks to mile 30 mph on the main Fish Creek Road from mile 2.9 mile to 15.6. (2) Restrict speed limits for log trucks to 20 mph on Fish Creek Road from mile 2.4 to mile 2.9. (3) Restrict speed limits for log trucks to 5 mph past the residence on Wig Creek at mile 2.4 to 2.5.

Recreational Site Use

- Restrict contractor use of Fishing Access Sites (FASs) in conjunction with this project. Allow contractors to contact Montana Fish Wildlife and Parks to seek permission to utilize FASs.

2.6.3 Wildlife Mitigations

Threatened and Endangered Species

- If any threatened or endangered species are encountered during the project planning or implementation periods cease all project-related activities that would potentially affect that species and inform a DNRC biologist immediately. Design and implement additional habitat protection measures where appropriate.

- If active den sites or nest sites of threatened, endangered, sensitive species, or raptors were located within the Project Area, cease activities until a DNRC biologist can review the site and develop species appropriate protective measures.

- Cease all operations if a threatened or endangered species is encountered, all operations and consult a DNRC biologist, and develop additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435).

- Cease all operations if nesting raptors are encountered, and consult a DNRC Biologist to develop additional mitigation measures to ensure the security of the nest site and specific animals, consistent with the Migratory Bird Treaty Act.

Grizzly Bears

- Implement sanitation restrictions during the non-denning period (April 15 - November 15) for operations related to the proposed action if grizzly bear activity is documented in the analysis area,

- Close roads within section 12 through road closure devices (i.e., locked gates, tank traps, coarse woody debris).

Black-Backed Woodpeckers

- Retain at least 1 snag and 1 snag recruit per acre within the proposed harvest units (pursuant to ARM 36.11.411).

- Minimize mechanized activity within 0.25 mile of black-backed woodpecker habitat during the period of April 15 through July 1 for a minimum of 5 years (pursuant to ARM 36.11.438 (1)(a)).

- Manage 497 acres of burned acreage in an unharvested condition that is broadly representative of the burned area on DNRC land for a minimum of 5 years (pursuant to ARM 36.11.438 (1)(b)).

Big Game: White-tail deer, Elk, Moose

- Locate all newly constructed or reconstructed roads associated with the proposed action behind effective closure devices (e.g., locked gates, tank traps, slash piles the first 200 feet of the road, etc.) at project's completion.

2.7 Description of Relevant Past, Present, and Related Future State Actions Not Part of the Proposed Action

2.7.1 Past Relevant Actions

- **Hunting and other recreational uses:** Under the rules of the Montana Department of Fish, Wildlife, and Parks deer, elk, and upland game hunting has been allowed. Walk in and non-motorized vehicle recreational use has been allowed.

- **Biological control for weeds:** *Larinus minutus* have been released to control knapweed in numerous locations in all State owned sections in the analysis area.

- **Public vehicle access:** All existing closed roads have been closed to motorized use except for administrative use by DNRC and Plum Creek Timber Company and during emergencies such as fire suppression and rescue operations.

2.7.2 Present Relevant Actions Not Part of the Proposed Action

- Present actions include those listed under 2.7.1.

- The nearest other action is a road building project located in section 8, 12, and 16 T13N, R25W.

2.7.3 Related Future State Actions Not Part of the Proposed Action

- All actions listed in 2.7.1 would continue in the future.

2.8 Comparison of Activities, the Predicted Summary Achievement of the Project Objectives, and the Predicted Environmental Effects of All Alternatives

2.8.1 Summary Comparison of Project Activities

Table 2-2: SUMMARY COMPARISON OF PROJECT ACTIVITIES OF ALTERNATIVES A AND B.

The following table provides a comparison of the on-the-ground activities that would occur if either Alternative A or B were implemented.

Activity	Alt. A	Alt. B
SALVAGE HARVEST ANALYSIS AREA	0	3,176
Acres currently planned for harvest	0	1,314
Tractor yarding (acres)	0	169
Cable yarding (acres)	0	1,095
Helicopter (acres)	0	50
Road construction (miles) permanent	0	4.5
Road construction (miles) temporary	0	1.0
Road reconstruction (miles) temporary	0	0.6
Additional acres that may be harvested due to insect caused mortality	0	Up to 1,365

All roads currently closed in the project area would remain closed to motorized public use after the project is completed.

2.8.2 Summary Comparison of Predicted Achievement of Project Objectives

Table 2-3: SUMMARY COMPARISON OF PREDICTED ACHIEVEMENT OF PROJECT OBJECTIVE

Objective	Indicators	Alt. A	Alt. B
Harvest approximately 52,000 tons of timber to generate revenue for the School (CS) and Public Building (PB) grants	Stumpage receipts in dollars	0	$1,300,000

This page left blank intentionally

2.8.3 Summary Comparison of Predicted Environmental Effects

Table 2-4: SUMMARY PREDICTED ENVIRONMENTAL EFFECTS

ISSUE	Alternative A: No Harvest (No Action)	Alternative B: Harvest
WATER QUALITY, SOIL, FISHERIES, WEEDS		
WATER QUALITY	Water quality would be affected by increased erosion and sediment delivery as indirect effects of the fires in the Fish Creek Complex. In-stream channel scour and bank instability are expected to increase as a result of increased water yield and sediment associated with then fire. Three DNRC culverts at risk of flood damage and sediment delivery would be replaced with larger culverts to reduce risk of loss and increased sediment from roads. Lolo NF roads would be reclaimed in Deer & Thompson Creeks to reduce risk of erosion and sediment delivery.	Proposed salvage harvest activities and road construction have low to moderate risk of minor and temporary increased sediment yield above the high levels expected due to the Fish Creek Complex fires. BMP's and erosion control mitigation measures would be implemented to prevent sediment delivery from roads to streams. No timber harvest would occur in SMZ's. There is low to moderate risk of direct, indirect, or cumulative effects.
WATER YIELD	Within the fire area, watershed with extensive moderate to high burn severity would have very high potential water yield increases due to loss of vegetation. Actual water yield effects would depend on magnitude and duration of spring runoff and storm events.	The proposed salvage harvest is not expected to increase water yield, surface runoff, or magnitude and duration of peak flows above existing post-fire conditions. There is low risk of direct, indirect, or cumulative effects from implementation of this alternative. This is due to the fact that only dead trees will be harvested.
CUMULATIVE WATERSHED EFFECTS	Alternative A: No Harvest (No Action) would maintain measurable cumulative effects from past management activities of poorly located roads with inadequate drainage on other ownerships and recent wildfire effects (refer to	The proposed harvest and road construction would present a low to moderate risk of cumulative impacts of increased sediment delivery by disturbing burned soil. The risk of cumulative effects from sediment delivery would be reduced or eliminated by using erosion control measures in

	existing conditions discussion). Cumulative effects are expected to decline as hydrologic recovery continues to occur.	these areas. There is a low risk of adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed project.
SOIL RESOURCES	Alternative A: No Harvest (No Action) would have some direct and indirect effects on soil resources. Direct effects of the fire are varying levels of loss of vegetative cover, surface duff in severe burn, coarse woody debris on the soil surface and heat altered soils. The indirect effect is potential increased soil erosion related to burn severity and increased runoff. Erosion would decrease as vegetation is reestablished.	Tractor skidding and cable harvest could cause direct effect to soils that could result in increased erosion. However, we expect the direct and indirect effect of erosion to be similar to, or not substantially more, than Alternative A: No Harvest (No Action). Harvest mitigation measures would maintain soil resources and minimize disturbance impacts by implementation of mitigation measures with project. Mitigations include: restricting ground based equipment to the winter season, cable harvesting of steep slopes, and installation of erosion control measures where needed. Retention of coarse woody debris on site would have along term beneficial effect to nutrient cycling, maintain long-term soil productivity and reduce on-site erosion.
COLD WATER FISHERIES	A majority of the cutthroat trout population in severly burned Deer Creek was extirpated by fire effects of temperature and ash, based on a post fire fish mortality survey. Fish populations in severly burned Thompson Creek may also be affected, but this is unknown. Fish habitat would be affected by increased water temperatures where high intensity fire reduced vegetative shade to stream until shade is reestablished. Erosion and sediment delivery will increase in 2004 and ameliorate over several years	There is a low risk of direct, indirect, or cumulative effects to cold water fisheries associated with the proposed action. Direct effects are potential sediment delivery from road construction and soil disturbance. Mitigations to control sediment are minimizing disturbance, applying erosion control measures, and using a temporary bridge crossing for Deer creek in winter. No harvest would occur in the SMZ's to retain large woody debris and stream shade.
NOXIOUS WEEDS	High initial increase in weed density on	Similar or slight increase in noxious weed density and

	moderate burn sites with established weeds and gradual increase over time. Integrated weed management efforts would continue on the site, but with less funding than Alternative B: Harvest.	occurrence compared to the Alternative A: No Harvest (No Action) due to soil disturbance and decreased tree canopy. Integrated weed management efforts would continue on the site. Control efforts would promote revegetation and emphasize treatment of any new noxious weeds. More weed control funds would be available with Alternative B: Harvest.
HUMAN ENVIRONMENT		
ROAD DUST	Some increase in road dust would occur from the logging of timber in private lands.	If log hauling is done during periods when dust is produced, dust abatement measures would be applied. Speed limits for logging trucks on Fish Creek and Wig Creek Roads would be implemented. Minimal direct and cumulative effect.
RECREATIONAL SITE USE	No change in the use of FAS sites use would occur due to harvest activities on State Lands. Use may decline due to post fire conditions.	Use of FAS's in conjunction with this project would be restricted. Contractors may contact Montana Fish Wildlife and Parks to seek permission to utilize FAS's. Minimal direct and cumulative effect.
ECONOMIC BENEFITS AND EXPECTED REVENUES	No economic contribution or benefits to the School Trust would occur within the foreseeable time frame. This would have a direct effect upon the School Trust and DNRC's obligation to provide the School Trusts with income from Trust Lands.	The investment into the road infrastructure under this alternative would be approximately $120,000 ($25/ton). This investment would decrease future management costs. The forest improvement collections would be approximately $354,120. This money would be deposited in the forest improvement fund to be used for thinning, prescribed burning, planting, weed management, etc. on Trust Lands. The projected revenue for this alternative to the School Trust is about $1,300,000. The proposed project would provide work for a road-building contractor, logging contractor, their subcontractors, and their employees. The forest products would most likely be processed by local mills providing

		further job opportunities.
ENDANGERED SPECIES		
BALD EAGLE	No cumulative effect.	Minimal direct and cumulative effect.
GRIZZLY BEAR	Low risk of cumulative effects.	Low risk of cumulative effects.
GRAY WOLF	Low risk of cumulative effects.	Low risk of cumulative effects.
LYNX	Low to moderate risk of cumulative effects.	Low to moderate risk of cumulative effects.
SENSITIVE SPECIES		
FLAMMULATED OWL	No change. Minor short-term positive effect and a minor long term negative effect.	Minor positive indirect and cumulative effect.
PILEATED WOODPECKER	Positive effect in the short and long term.	Low to moderate risk of cumulative effects.
BLACK-BACKED WOODPECKER	No change from current condition.	Low risk of cumulative effects.
FISHER	No change from current conditions.	Low risk of cumulative effects.
HARLEQUIN DUCK	Low risk of cumulative effects.	Low risk of cumulative effects.
BIG GAME		
BIG GAME	Moderate risk of cumulative effects without implementation of road closures to help defer potential for over harvest.	Low risk of cumulative effects due to implementation of some road closures.

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 Affected Environment

3.1 Introduction

Chapter 3: Affected Environment succinctly describes the relevant resources that would affect or that would be affected by the alternatives if they were implemented. This chapter also describes relevant factors of the existing environment and includes effects of past and ongoing management activities within the analysis area that might affect project implementation and operation.

From the description of Alternative A: No Harvest (No Action) and Alternative B: Harvest in Chapter 2 in conjunction with the predicted effects a comparison can be made of the effects of both alternatives.

3.2 Description of Relevant Affected Resources: Existing Conditions

3.2.1 Water Quality, Water Quantity, Soils, Fisheries, and Weeds

3.2.1.1 Water Quality

3.2.1.1.1 Analysis Area

The analysis area for water quality, water quantity, soil, fisheries, and weeds are those portions of the Fish Creek watershed affected by the Fish Creek Complex fires. The proposed salvage timber sale project is located on several parcels of State land situated within the South Fork of Fish Creek. This area includes the tributary watersheds of Deer Creek, Thompson Creek, and several unnamed tributaries to South Fork Fish Creek. Descriptions of these tributaries are included in the segments of this analysis concerning water, soils, weeds, and fish. The area burned was approximately 36,710 acres. There are small segments of wetlands directly adjacent to Deer Creek in Section 8, T13N, R24W and Thompson Creek in Section 14, T13N, R24W. No large wetland complexes including marshes, bogs, fens, or potholes were identified on State land within the Fish Creek Salvage project area. Land ownership within the fire area is noted in Table 3-1.

Table 3-1: Landownership in the Fish Creek Fire Area

Land Owner	Acres	Percent
Lolo National Forest	19,986	54
Plum Creek Timber Company	13,763	37
Montana State	2,808	8
Small private	153	1
Totals	36,710	100

Fish Creek

Fish Creek is a perennial 5th order Class 1 stream that is a tributary to the Clark Fork River. The Fish Creek watershed drains approximately 166,094 acres. Elevations in this drainage ranges from 3,220 feet at Fish Creek's confluence to 7,324 feet at Schley Mountain on the divide between the West and South Forks of Fish Creek. The precipitation in this area ranges from 25-70 inches, mostly occurring as snow. The geology of the project area is argillites, siltites, and calcareous limestone derived from Precambrian (Belt Series) meta-sediments bedrocks. Valley floor alluvial deposits are mainly gravels and cobble deposits derived from the belt rocks and localized lacustrine deposits of Glacial Lake Missoula silts. (Refer to soils and geology discussion.)

The only harvest planned at this time outside of South Fork Fish Creek and the tributaries described are those located in the States ownership in section 30, T14N, R24W. These parcels contain about 860 acres located on mountain sideslopes and toeslopes above the Fish Creek in the lower portion of the drainage. There are rocky ephemeral draws, but no streams on the sideslopes of the proposed harvest area and there is no delivery potential from this site.

Deer Creek

Deer Creek is a perennial 3rd order Class 1 stream that is tributary to Fish Creek. The Deer Creek watershed drains approximately 7,456 acres. The main stem of the stream channel is 5.8 miles long. The elevation ranges from 3,223 feet to 6,719 feet. The precipitation ranges from 25-50 inches, occurring mostly as snow. Steep gradient Rosgen A type channels form the headwaters of the Deer Creek drainage that include incised ephemeral and perennial stream reaches, some of which are discontinuous. The middle portions of the Deer Creek drainage (DNRC's section 8) are relatively stable with 2-4% gradient Rosgen B stream channel types with predominately gravel, cobble, and sand class substrate. At the western boundary of State section 8, Deer Creek's channel is steep, deep, and incised. It flows down to an alluvial fan at Fish Creek Road and across a flat to Fish Creek. The DNRC owns about 1,200 acres in the middle portion of the Deer Creek watershed. The majority of the watershed is Lolo National Forest and Plum Creek Timberlands' ownership.

Thompson Creek
Thompson Creek is a perennial 3rd order Class 1 stream that is a tributary to the South Fork of Fish Creek. The Thompson Creek watershed drains approximately 5,226 acres. The stream is 5.7 miles long. Elevations range from 3,240 to 5,550 feet. The precipitation ranges from 25-50 inches, mostly occurring as snow. Steep gradient Rosgen A type channels form the headwaters of the Thompson Creek drainage that includes incised ephemeral and perennial stream reaches, some of which are discontinuous. The middle portion of the Thompson Creek drainage are relatively stable 2-4% gradient Rosgen B stream channel types with predominately gravel, cobble, and sand class substrate. The DNRC ownership is about 240 acres in the lower portion of the watershed and has stable stream channels. The majority of this watershed is Lolo National Forest and Plum Creek Timberlands' ownership.

Camelia Gulch
Camelia Gulch is a 1st order Class 2 stream that is a tributary to the South Fork of Fish Creek. Camelia Gulch is not a fishery. The elevation ranges from 3,190 to 5,600 feet. The precipitation ranges form 25-40 inches, mostly occuring as snow. The Camelia Gulch stream is a steep gradient Rosgen A type channel with a relatively stable rocky channel and segments having intermittent flow. The DNRC owns is about 280 acres in the mid portion of this small watershed. The majority of the watershed is Plum Creek Timberlands' ownership. There is a mosaic of burn severity in this area with small areas of high intensity burn.

An unnamed tributary to South Fork of Fish Creek flows through the W ½ of DNRC Section 12, T 13N, R25W. The unnamed tributary is a 2nd order, Class 1 stream and a possible fishery in the lower reaches above the confluence with the South Fork of Fish Creek. The elevation ranges from 3,220 feet at Fish Creek confluence to about 5,040 feet. The precipitation ranges from 25-40 inches, which is mostly snow. The DNRC ownership is about 320 total acres, with about 200 acres in the lower portion of this small watershed and the remaining 120 acres are located on an east facing slope about 1/8 mile from the South Fork of Fish Creek. The majority of the watershed is Lolo National Forest and Plum Creek Timberlands' ownership.

The State owns about 180 acres in Section 18, T14N, R25W on the valley floor with the South Fork of Fish Creek flowing through the middle of the parcel. The parcel includes toeslopes on the east flank of the alluvial bottom adjacent to Fish Creek. The elevation ranges from 3,240 to 4,200 feet in this section.

3.2.1.1.2 Analysis Method

The following section contains the existing conditions analysis methods for the geology, soils, watershed, hydrology, and fisheries portions of the Fish Creek Salvage Environmental Assessment. This analysis includes an existing condition assessment of the watersheds draining the proposed sale area. The assessments are based on a coarse filter screening approach, reference to Burned Area Emergency Rehabilitation (BAER) fire assessments, and an on-site field review of State lands, stream channels, and access roads in the proposed salvage area.

DNRC was involved in surveys of fire severity mapping and reconnaissance surveys of the burned area. Surveys to assess risk of potential erosion and storm damage following the fire were completed with particular attention focused on areas of high and moderate burn severity, steep slopes, and roads. Soils were evaluated for burn severity, hydrophobicity (water repellency from burning), potential for natural revegetation, and landslide and erosion potential. Burned riparian areas and streams were reviewed and evaluated for anticipated affects to downstream fisheries. Stream crossing culverts were inspected for evidence of recent flow, culvert size and capacity, condition, and extent and severity of burn in the contributing watershed.

Information for the fisheries assessment was also based on a review of the Montana Natural Information System MFISH stream records for fish surveys, relevant peer reviewed literature, data, and habitat records from the Lolo National Forest, Montana Department of Fish, Wildlife and Parks, and personal communication with local agency experts. Reconnaissance field reviews occurred from September 6 through October 18, 2003.

3.2.1.1.3 Water Regulatory Framework

Montana Surface Water Quality Standards

According to MCA 17.30.608 (1), this portion of the Middle Clark Fork River basin (HUC 1701024) including the Fish Creek drainage and its tributaries are all classified as B-1. Among other criteria for B-1 waters no increases are allowed above naturally occurring levels of sediment and minimal increases over natural turbidity. "Naturally occurring" as defined by MCA 17.30.602 (17) includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices, commonly called BMP's, have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include but are not limited to structural and non-structural controls and operation and maintenance procedures. Appropriate practices may be

applied before, during, or after completion of potentially impactive activities.

Designated beneficial water uses within the project area include agriculture, irrigation, aquatic life support, industrial, recreation, cold-water fisheries (partial watershed), and multiple domestic water uses.

Water Quality Limited Water bodies

Fish Creek, Water body MT76M002-060, from the confluence of the South and West Forks to the Clark Fork River was listed as a water quality limited water body in both the 1996 and 2002 303(d) list. The 303(d) list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards or where beneficial uses are threatened or impaired. These water bodies are then characterized as "water quality limited" and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a water body within a watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards. The listed probable causes of impairment in lower Fish Creek are fish habitat degradation and other habitat degradation due to construction and highway/road/bridge construction.

The Montana Water Quality Act (MCA 75-5-701-705) also directs the DEQ to assess the quality of State waters, insure that sufficient and credible data exists to support a 303(d) listing, and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded non-point source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil, and water conservation practices. MDL's have not been completed for the Middle Clark Fork river and Fish Creek drainages these are scheduled for 2008. The State of Montana has adopted Forestry Best Management Practices (BMP's) through its Non-point Source Management Plan (DHES 1991) as the principal means of meeting Water Quality Standards. DNRC will comply with the Law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including Best Management Practices and Forest Land Management Rules.

Montana Streamside Management Zone (SMZ) Law
By the definition in ARM 36.11.312 (3), the majority of the mainstem Fish Creek stream channel including the South Fork Fish Creek, Deer Creek and Thompson Creek are class 1 streams that support fish. Some of the smaller first order tributaries may be classified as class 2 or 3 based on site-specific conditions.

3.2.1.1.4 Water Quality

The majority of the proposed fire salvage is located in Deer Creek sections 8 and 16, and parts of sections 12 and 18 on Fish Creek and section 14 on Thompson Creek. For this project we consider the effects of the fire, effects of rehabilitation measures implemented to control sediment, and the ongoing project of culvert replacement and road construction following the wildfire and suppression activities.

The greatest pollutant of concern within the proposed project area is sediment. Increased sediment delivery and deposition can affect water quality both physically and biologically as well as affecting channel stability and geomorphology. Increased and accelerated sediment delivery and deposition have impacted the streams within the analysis area. The primary sources of chronic sediment delivery are roads, particularly at stream crossings, and road segments located adjacent to stream channels.

Fish Creek, Deer Creek and Thompson Creek
Initial fire suppression related rehabilitation included site assessments, reshaping equipment fire lines, extensive grading of system roads, reshaping road surface drainage, grass seeding disturbed soils, and herbicide treatment of main system roads by the Lolo N.F. These activities resulted in an improvement of main system roads when compared over the recent past.

Post fire surveys and field reconnaissance by the BAER Team identified flood risks to stream crossing structures that are under-capacity as one of the greatest risks for increasing sediment in the fire area. An extensive survey was completed to identify existing and potential sources of sediment in the analysis area following the Fish Creek Complex fires. The Deer Creek drainage was identified as the highest risk area for potential storm damage to existing roads and culverts. There was an extensive network of old closely spaced jammer roads (recently reclaimed) in the headwaters of Deer Creek that had inadequate surface drainage and culvert capacities.

Sediment delivery from existing open roads on other ownerships within the drainage are expected to be greater following the recent wildfires than in the recent past. This is due to increased road surface runoff and loss of stabilizing vegetation on road surfaces, cuts, and fills. These road

segments will continue to provide chronic sources of sediment delivery until additional improvements and restoration measures are implemented and revegetation occurs. Based on field reviews of the fire areas and risk assessments, the Lolo NF implemented a plan to decommission and stabilize the high erosion risk road segments of jammer roads. Proposed road stabilization projects that were prioritized through the BAER report are near completion in Deer Creek and Thompson Creek. Fire rehabilitation and stabilization efforts include road decommissioning, culvert removal, culvert replacements with larger capacity structures, seeding disturbed areas for stabilization, and repairing and updating road surface drainage. The Fish Creek Road crossing of Deer Creek had a culvert at flood risk that was replaced with a 70-foot temporary bridge by the Lolo N.F.

The road system located on DNRC ownership is relatively stable. No road sediment problems were noted on DNRC roads within the project area. DNRC evaluated three culverts at risk of flood damage on State lands and is in the process of replacing the culverts with larger capacity culverts and the incorporation of emergency spillways into the road design. DNRC also identified high erosion risk on a 1/4-mile segment of old road that is being reclaimed and stabilized. The improvements are expected to handle an anticipated higher runoff and overland flow following spring runoff and summer thunderstorms from burned areas.

Erosion and sediment delivery are expected to increase from past levels within moderate and high severity burn areas located in and around the proposed project area. Streams and draws in the more severely burned Deer Creek may see substantial increases in sediment delivery from adjacent slopes due to the fire and potential severe weather events. This increase is a result of increased runoff from upland areas and loss of ground cover vegetation on existing road surfaces, cuts, and fills on other ownerships. The amount of sediment delivery and subsequent impacts to water quality resulting from the recent wildfires are expected to be substantial. Additional direct sediment delivery to the headwaters of Deer Creek may occur through the increased risk of debris flows and mass soil movements following the fire. These events could potentially deliver large volumes of sediment to the streams on an isolated basis. Slope stability is further discussed in the soils portion of this analysis. Streams are discontinuous in the State's Deer Creek section 16 and do not currently deliver water or sediment to Deer Creek. DNRC seeded native grass species adjacent to stream segments and draws in section 16 to promote a vegetative buffer that would help trap sediment.

Increased nutrients, increased stream temperatures, and loss of tree canopy following the fire may also have indirect effects on water quality by contributing to increased periphyton algal growth (Beschta 1987 and

Spencer 1990). Fire ash from the fire may increase aquatic nutrient levels by 2-3 times present levels the first year after fire and decline over time. Concentrations of both phosphorus and nitrogen are expected to increase in streams draining severe burned areas. Many published studies show elevated levels of these nutrients immediately following wildfires and during subsequent spring runoff (Spencer and Hauer 1990, Salminen and Beschta 1991).

The risk of sediment deposition and increased nutrient loads to streams is expected to decrease by 2005 as ground cover vegetation continues to recover. Vegetative regrowth is expected to help reduce additional delivery from summer and fall rain events. This is due to the natural buffering and sediment trapping that occurs along vegetated surfaces versus bare soils.

Another indirect impact to water quality is increased summer maximum stream temperatures. Within the Deer and Thompson Creek watersheds, most streamside trees and shrubs were consumed in those stream reaches affected by stand replacement fire. Streams with mixed burned severity and partial shade on bank-edges and deeper stream pools should have less temperature affect.

There will be substantial inputs of large woody material into creeks as burned trees continue to fall across streams. This woody material input may create short-term bank scour by deflecting flows but will have a long-term effect of stabilizing the channel. Large woody material creates sediment storage and reduces the erosive power of streams. This input will also benefit fish habitat over the long term. Due to the stand replacement nature of the fire on Deer Creek and segments of Thompson Creek, the large woody material left by the fire will be the only recruitment of large woody debris for 80 to 100 years.

3.2.1.1.3 Water Quantity

There is extensive literature and observations that water yield and stream flows will increase following fire. Increased water yield is a function of vegetative cover loss, reduced evapo-transpiration, snowmelt modification, and burn area severity in a watershed. Summer storms present the highest risk of flood damage. During post-fire survey efforts there was concern that hydrophobic (water repellant) soils may occur that would limit water infiltration and further increase surface runoff. Hydrophobic soils in the Fish Creek watershed are limited in extent following the fires (refer to soils section) and are not expected to affect runoff as greatly as initially modeled following the fires. Extensive ground surveys found only low to moderate soil burn severity. The soil hydrophobicity observed was limited in area and degree and more a function of soil drying by the fire, rather than fire altering the soils. This

hydrophobic condition of surface soil drying was generally relieved by increased humidity and light precipitation in October and soils have begun to absorb water from rain and snow. Modeled flow calculation may be less based on reduced area and degree of hydrophobic soils.

Effects from the fire cover a full range of burn intensities. Table 3-2 displays the estimated acres of burn severity by watershed for the Fish Creek Complex fires.

Table 3-2: FISH CREEK FIRE
Estimated Acres of Burn Severity By Watershed BAER Report 2003

Burn Severity	Fish Creek HUC 5	Fish-Fire Area	Deer Creek	Thompson Creek	Deer Section 8 North Tributary
High	10523(6%)	9488	6711	871	430
Moderate	14710(9%)	5551	280	3078	26
Low / Mosaic	140861(85%)	18223	465	1277	16
Total Acres	166094	33,262	7456	5226	470

The most extensive areas of high burn severity are in the Deer Creek and Thompson Creek watersheds (see Burn Severity Map, Appendix B: Figure B-1). Vegetation killed by the Fish Creek Complex fires could lead to water yield increases in the Fish Creek, Deer Creek, and Thompson Creek watersheds. Areas with more extensive high burn severity are expected to have higher water yields.

The BAER team projected storm flow increases for 16 sub-watersheds in the Fish Creek Fire area using the Fire Hydrology V .3 spreadsheet model. The water yield calculations are based on the projected two, five, and ten year 6 and 24 hour storm precipitation events forecast for the drainage area and average slope of each watershed with NRCS methodology (NRCS Cerelli). The watersheds modeled were selected based on extent of burn, burn severity, slope steepness, and downstream values at risk. Only the watersheds that were considered potential problem areas that may require treatment were modeled (BAER 2003).

Peak discharge flows were modeled for the first year after fire using forecasted 10-year recurrence interval storm intensity. Summer thunderstorms could have a dramatic effect with intense short duration rains. Modeled results showed ranges of increased flow from 6.5 times in Thompson Creek to 19 times in the Deer Creek watershed. Due to expected hydrophobicity, the post fire water runoff was initially calculated assuming a 700% increase for severely burned areas. Based on field observations, DNRC determined the actual degree of hydrophobicity

following the fire was low to moderate on severely burned sites and not extensive over the project fire area. Based on the verified lower hydrophobicity, actual water yields are anticipated to be lower than modeled.

Each of the streams in watersheds with extensive moderate to high burn severity are anticipated to exhibit in-channel scour as a result of the increases in water yield. The potential increase in water yield could destabilize streambanks in severely burned watersheds and increase the failure of existing debris jams in streams. These anticipated effects of channel scour could result in changes in channel morphology.

3.2.1.2 Existing Conditions of Geology/ Soil Resources

The Fish Creek project area is located on moderate to steep slopes with soils weathering from Belt series, Precambrian age sedimentary argillites, quartzites, and limestone bedrock. There are no especially unique or unusual geologic features in the sale area. Landscapes within the Fish Creek Complex area are stable owing to the extensive shallow bedrock and very gravelly soils from belt rocks that are resilient to erosion. There are areas of structural breaklands (unit 64) (see Table 3-3) and localized areas of instability that have considerable soil creep of surface gravels due to the very steep slopes and frost action. Two localized areas of slope instability were identified on steep slopes in the Deer Creek drainage (west ½ of section 16 and south ½ of section 8).

The dominant landtypes in the Fish Creek project area are steep mountain sideslopes with relatively narrow alluvial valleys. General soil characteristics are listed in Table 3-3. Soil Map units 60QA/B and 60QC are on steep mountain sideslopes of 40-80% slopes with some benches. The 60 A/B soils are on mainly dry south aspects with shallow to moderate depth soils supporting ponderosa pine and Douglas fir. Topsoils are very gravelly silt loams over shallow to moderately deep extremely gravelly sandy loams derived from quartzite and argillite bedrock. Most soils in the area have a volcanic ash surface layer with a silt loam texture that may be mantled by surface gravels. These soils are excessively well drained and droughty which can lead to plant mortality and difficulty to revegetate cutslopes on slopes of southerly aspects. Erosion hazard is moderate due to the high gravel contents. Material is good for road construction and well suited to outslope construction. Cutslopes can be slow to revegetate and susceptible to weed establishment.

TABLE 3-3: Soil Interpretations for Fish Creek Complex Project Area
Complete descriptions of the soils in the burned area are found in the Lolo National Forest – Land System Inventory (USFS 1989).

Map Unit & Slope Range	Parent Material	Soil Texture	Displace-ment Hazard	Erosion Hazard	Sedime nt Hazard	% of Fire area
10UA	Riparian Alluvium	Gravelly Loams	Mod	Mod	High	5%
13UA on 0-20 % slopes	Alluvium	Gravelly Loams	Mod	Mod	High	
30Q E	Colluvium Mtnsides	Very Gravelly	Mod on slopes less than 40%	Mod	Low	
60Q A/B on 40-70 % slopes	Colluvium Mtnsides	Very Gravelly Loams	High	Mod	Mod	60%
60Q C/D on 40-70 % slopes	Colluvium Mtnsides	Very Gravelly Loams	High	Mod	Mod	
61QA/B	Colluvium Mtnsides	Very Gravelly	High	Mod	High	35%
64Q C/D	Breaklands Mtnsides	Very Gravelly	High	Mod	Low	

The 60QC soils primarily on north aspects with volcanic ash surface soils and tend to be more productive soils supporting ponderosa pine and Douglas fir, with lesser areas of western larch and lodgepole pine. By contrast, north and easterly aspects tend to have deeper soils, higher moisture and nutrient retention, and associated (moderate) productivity. Primary concern for soil productivity is maintaining the shallow topsoils by minimizing displacement, controlling erosion, and retaining a portion of woody debris for long term nutrient cycling. Both map units have moderate erosion risk that requires cable harvest or winch line skidding to existing roads to avoid excessive disturbance.

Map unit 13UA soils form the broader well drained stream terraces and alluvial fans along Fish Creek, Thompson Creek, and Deer Creek drainages. These deep soils are typically well drained supporting ponderosa pine and Douglas fir. Map unit 10U includes the alluvial bottoms and flood plains adjacent to streams.

Narrow alluvial deposits occur adjacent to Fish Creek, Thompson, Deer Creek, and the smaller tributary creeks. These alluvial deposits are somewhat poorly drained and seasonally wet supporting riparian species (willow, dogwood, and

some cedar, spruce). The complex terrain and narrow nature of some wet areas require site specific review for design of SMZ's and mitigation measures.

Past road construction and harvest on State lands occurred mainly in the early 1950's. These roads access most of the proposed ground skidding units. Existing roads and skid trails and previous harvest disturbance are estimated to have affected 5-15% of the land on a per acre basis. Main skid trails are still evident on some locations but most dispersed skid trails revegetated prior to the fire and are beginning to ameliorate over time.

A Burned Area Emergency Rehabilitation (BAER) survey and report was completed on September 17,2003 for the Fish Creek Complex area by an interdisciplinary team of resource specialists. The watershed group assessed potential soil and water changes within the watersheds from the top of the drainages to outlets well past the fire perimeter. The goal of the survey was to map and assess burn severity and flood risk and determine if fire rehabilitation and restoration measures were needed and to prioritize the implementation of the most effective watershed treatments.

Burn Severity
The fires of the Fish Creek Complex were generally a mosaic burn with the exception of the Deer Creek drainage which was more severe and entirely a stand replacement burn. Both the Deer Creek and Thompson Creek drainages have experienced moderate to high vegetative burn severity. The Deer Creek riparian area was completely burned.

Even within the severely burned areas there are considerable variations in degree of burn (residence time) in short distances such that all coarse woody debris, duff, and vegetation is ashen on some sites, or more commonly, some surface woody debris remains and root crowns of shrubs and grass are apparent that should help reoccupy the areas over time. Deeply rooted shrub species, such as the willow species along creek bottoms along with ninebark and snowberry, are expected to resprout. Beargrass, mountain maple, and alder have already respouted in portions of the fire but make up less than 5 % of the cover in Deer Creek.

Stormflows would likely increase in this drainage with attendant increases in erosion and sediment delivery. The entire steamside riparian area of Deer Creek burned. Thompson Creek watershed also was burned over in part.

Table 3-5: Vegetation and Soil Burn Severity for Fish Creek Complex

Vegetation burn severity	Acres	Percent	Soil Burn Severity	Acres	Percent
Low	7,954	22 %	Low	31,000	85 %
Moderate	17,187	47 %	Moderate	5,710	15 %
High	11,569	32 %	High	------	0
Total	36,710	100 %	Total	36,710	100 %

*Totals vary slightly between tables because of small differences in GIS analyses.
A burn severity map is included in Appendix B: Figure B-1

Areas of moderate to high burn severity were tested for soil hydrophobicity where soil duff was burned off and mineral surface soils were subject to erosion. Field observations and tests showed low to moderate soil hydrophobicity on all sites reviewed in September and October therefore infiltration of runoff will not be as greatly affected as initially predicted. Where hydrophobic conditions occur, natural surface runoff and erosion will be accelerated, especially in the more severely water repellent areas. The hydrophobic effect is expected to break down with rain and freeze/thaw conditions over years one to three following a fire event.

Natural erosion rates are expected to be highest on severely burned sites where the tree canopy was lost and surface litter and duff was incinerated. Naturally high levels of erosion will continue until these sites are revegetated, typically within three to five years. Within the severely burned areas, the potential for erosion generally increases with slope steepness and will be highest in draws and on existing roads where cutslopes and fillslopes are burned, poorly vegetated, and have inadequate surface drainage. Slopes on southern aspects in the Deer Creek drainage had lower levels of vegetative cover and may have more elevated levels of erosion compared to those on northerly aspects. Erosion rates are expected to be highest on severely burned sites the first year following the fire. Relative erosion rates are expected to decline the 2nd and 3rd years until a relatively steady rate of erosion is reached and revegetation improves. Eroded sites in draws and gullies could take longer to stabilize. DNRC seeded native grass species in draws in high burn severity to accelerate revegetation.

In areas of moderate to low burn severity, existing plants are expected to resprout promptly from root crowns and provide some ground cover and erosion control similar to the range of natural fire conditions that would occur historically. It is likely there will be some short-term spurt in plant growth from nutrients released by the fire. On the Sleeping Child burn of 1961, vegetative cover was about 4% in severely burned area the first year and cover rose to 30% in three years. Vegetative cover was about 10% the year following fire on severely burned sites within the Sula State Forest in 2001.

The following is a summary of emergency BAER treatments recommended and largely completed by the USFS in September and October 2003. Treatment areas were prescribed based on the potential for damaging floods, loss of soil productivity, and for the mitigation of loss of life and property.

The BAER Report Treatments are designed to:

- Mitigate hydrologic effects of high-density local roads and steep erodable slopes in old harvest units for the steep upper reaches of Deer Creek.
- Mitigate hydrologic effects of local roads in old harvest units for the upper reaches of Thompson Creek.
- Mitigate possible loss of Deer Creek culvert at confluence with Fish Creek (main Fish Creek road accesses homes).
- Mitigate sediment impacts to Fish Creek, a migratory route for bull trout.

Roads Repairs

- Upper Deer Creek roads – remove culverts, rip road beds, straw mulch and seed disturbed areas where culverts removed.
- Deer Creek at the confluence with Fish Creek – remove culvert, construct temporary bridge above unstable alluvial fan.
- System roads on Thompson Creek - clean ditches, culverts, install drain dips.
- DNRC replaced three culverts in Deer Creek at risk of flood loss.
- DNRC grass seeded steep draws and streamsides in severely burned areas in section 16.

3.2.1.3 Cold Water Fisheries

Fish creek provides habitat and supports westslope cutthroat trout, bull trout, and other salmonid fish species. One federally listed threatened fish species (bull trout) and one sensitive species (cutthroat trout) occupy streams in the Fish Creek Complex fire area.

The entire Fish Creek watershed is listed as bull trout core area in the Bull Trout Restoration Plan for Montana. DNRC is committed to the design of forest management practices to protect bull trout and westslope cutthroat trout habitat, pursuant to: 1) the Restoration Plan for bull trout in the Clark Fork River, 2) MOU & Conservation Agreement for westslope cutthroat trout in Montana, and 3) ARM36.11.436. Within the Fish Creek Complex fire area, three watersheds are proposed critical habitat for bull trout. The proposed watersheds are: the main stem of Fish Creek, South Fork Fish Creek, and the West Fork Fish Creek.

Westslope cutthroat trout are considered a sensitive fish species in western Montana. The fire burned in the Fish, Deer, and Thompson watersheds all of which are inhabited by westslope cutthroat trout.

For fishery information DNRC referred to the Natural Resource Information System (NRIS) MFISH records of fish population surveys completed by the Department of Fish Wildlife and Parks, a post fire stream survey completed by the Rocky Mountain Research Station (Ethan Mace RMRS), and findings of the BAER team. The following are reported fish populations for the project area streams.

- Fish Creek provides habitat and supports westslope cutthroat trout, bull trout, brook trout, and other salmonid fish species.

- Deer Creek supports westslope cutthroat trout to the 5.8 stream mile based on MFISH survey data.

- Thompson Creek supports westslope cutthroat trout to the 4.4 stream mile based on MFISH survey data and possibly bull trout.

- Camelia Gulch is not a fishery.

- An unnamed tributary to South Fork of Fish Creek flows through the W ½ of DNRC Section 12, T 13N, R25W. The unnamed tributary is a 2nd order, Class 1 stream and a possible fishery in the lower reaches above the confluence with the South Fork of Fish Creek.

Fish habitat impacts could occur from excessive sediment loads, both fine and coarse sediments, due to surface erosion following the fire or from potential culvert or hillslope failures associated with high water flows. High water flows and loss of vegetation could also result in channel scour and migration that alter in-stream pool locations or depth of pools that fish prefer. Changes in stream habitat, temperature, and nutrients will all challenge the tolerance of fish species and their adaptability to changing conditions.

For the analysis the direct effects of sediment to stream channels were considered. DNRC reviewed segments of Deer Creek and Thompson Creek channels with fishery biologists to assess existing stream conditions. All roads adjacent to streams and stream channel crossings on State land and roads accessing State land were reviewed for sediment sources. No existing sediment sources were noted on current or historic crossing sites that could potentially deliver to streams. Three culverts on State lands were determined to be under-capacity for projected storm flood frequencies and could be potential sediment sources. A project is underway to replace the culverts and these sites will be considered stable for analyzing existing condition. This project will reduce the potential for flooding and sediment delivery to streams. This action was analyzed with a project specific environmental review (Fish 12 Roads EA) on October 28, 2003.

Future indirect effects on fish habitat are increasing stream water temperature and aquatic nutrients. Stream water temperature increases will likely occur following the fire. Some elevations of summer maximum stream temperatures are expected due to the increased amount of direct solar radiation reaching the stream as a result of the loss of shade. Deer Creek will be affected the most due to the extensive high burn severity that consumed vegetation along the entire stream length. Thompson Creek has more of a mosaic burn but has considerable high severity burn in riparian habitats. Solar radiation to the streams will be increased and subsequent increases in stream temperature will follow until a new stand of streamside vegetation is established. It is unknown to what degrees the stream temperature changes may affect fish habitat.

A combination of lethal water temperatures and ash delivery occurred during the fire resulting in fish mortality in the headwaters of Deer Creek, the most severely burned drainage, and possibly other drainages of the Fish Creek Complex fires. A USFS Rocky Mountain Research Station Crew completed a fish mortality and stream channel survey directly after the fire in September 2003. The 1,500-meter survey of lower Deer Creek found 138 dead cutthroat trout and 2 live trout. The survey included an inventory of pool depths and in channel large woody debris.

Both bull trout and cutthroat trout have existed with wildfire for eons. However the addition of forest roads and timber harvest units have had direct and indirect effects. Other existing indirect effects associated with fish habitat within the Fish Creek drainage include accelerated rates of erosion following the fire and subsequent sediment deposition, increased nutrient loading, increased channel instability, loss of stream bank vegetative cover and shade resulting in increased stream temperatures.

As a result of the wildfire, a reduction in large woody debris (LWD) available for recruitment into fish-bearing streams has a potential indirect impact to cold-water fish habitat. The importance of LWD and its role in fish habitat and channel and pool development has been described in recent literature (Bragg et al. 2000). Streamside areas that were subjected to high intensity burns are expected to provide a high initial pulse of LWD recruitment over the next few years as dead streamside trees fall. Long-term recruitment is expected to decrease until new trees grow to maturity.

3.2.1.4 Noxious Weeds

Noxious weeds, mainly knapweed (Centaurea maculosa) and to a lesser extent sulphur cinquefoil (Potentilla recta) and spots of thistle (Cirsium arvense), occur within the project area mainly along roads and more open forest stands on southerly slopes across all ownerships. The dominant forest vegetation types are drier Douglas-fir, snowberry, pinegrass, and ponderosa pine types on southerly aspects. These slopes are more susceptible to knapweed encroachment (Losensky 1987). Northerly aspects on high elevation sites have

lodgepole, Douglas-fir, western larch, and more competitive vegetation. These sites will be less susceptible to weed invasion, although small infestations may occur. The extent of noxious weed infestation is limited to isolated plants within forest sites on most north and east aspects.

3.2.2 Human Environment

3.2.2.1 Road Dust

Fish Creek Road and Wig Creek Road are unpaved. There are five residences along the main Fish Creek Road and one on the Wig Creek Road. The residence on the Wig Creek Road is behind a closed gate. The main Fish Creek Road passes Fishing Access Sites (FASs). There has historically been log traffic down both roads. Dust is presently produced by both log truck and passenger vehicle traffic along the main Fish Creek road.

3.2.2.2 Recreational Sites

There are two campgrounds along the main Fish Creek Road: Big Pine and Forks FASs. These FASs have a 7-day camping limit (out of every 30 days). Both sites are typically snowed in during the winter months and receive minimal use during that period, which helps each FAS recover from heavy summer use.

3.2.2.3 Economics

There is no current revenue being generated from the management and sale of timber in these sections.

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

Table 3-6: Revenue cost ratios

	FY98	FY99	FY00	FY01	FY02
SWLO	1.8	1.44	2.36	2.69	2.57
State	1.7	1.36	2.78	1.62	1.75

3.2.3 Wildlife Issues, Existing Conditions

3.2.3.1 Endangered Species

3.2.3.1.1 Grizzly Bears (Federally threatened)

Grizzly bears are the largest terrestrial predators in North America, feasting upon deer, rodents, fish, roots and berries, as well as a wide assortment of vegetation (Hewitt and Robbins 1996). Depending upon

climate, abundance of food, and cover distribution, home ranges for male grizzly bears in northwest Montana can range from 60 - 500 mi^2 (Waller and Mace 1997). The search for food drives grizzly bear movement, with bears moving from low elevations in spring to higher elevations in fall, as fruits ripen throughout the year. However, in their pursuit of food, grizzly bears can be negatively impacted through open roads (Kasworm and Manley 1990). Such impacts are manifested through habitat avoidance, poaching, and vehicle collisions.

The project area is approximately 32 miles SW of the Northern Continental Divide Ecosystem grizzly bear recovery area. In recent years, there have been unverified reports of grizzly bears in the Fish and Pettee Creek drainages (J. Jonkel, MT FWP, personal communication, September 2003). The nearest known grizzly bear activity in 2003 is located approximately 16 miles NE of the affected area. Although no known activity has been reported for the affected area, future use of the area by grizzly bears is possible.

Grizzly bears are known to be more vulnerable to human interaction in areas with high open road densities or ineffective road closures. Currently there is approximately 1.0 mile of open road per square mile (simple linear calculation; 286 miles of open road), and 3.11 total miles of road per square mile (883 miles of road), within a 284 square mile (182,045 acres) grizzly bear analysis area (Appendix C: Figure C-1). With construction and re-construction of approximately 1.2 miles of new road under the Fish Creek Road project, and construction and re-construction of 6.1 miles of road in sections 5, 6, 8, 16, 17, and 18 open road density would not increase, due to installation of locked gates to restrict motorized access on the affected road system. Total road density would increase from 3.11 to 3.13 miles per square mile.

3.2.3.1.2 Gray Wolves

Wolves were recently classified as threatened in Montana under the Endangered Species Act. Cover, and road and prey densities likely have some influence on wolves. Currently, there is approximately 1.0 miles of open road per square mile (simple linear calculation) within a 284 square mile area surrounding the project area (Fig. 1). Three wolf packs are known to have activity centers within a twenty mile radius of the affected area: (1) Fish Creek, which is located in the Fish Creek drainage; (2) Lupine, to the south in Idaho; and (3) Ninemile, on the north side of Interstate 90. With the prevalence of deer, elk, and moose in the affected area, it may be attractive for foraging by wolves (U. S. Fish and Wildlife Service 2002). Mule deer, elk, and moose are known to use the area. The affected area is known to contain winter range for white-tailed deer, mule deer, elk, and moose. Currently, no known wolf den or rendezvous site is

located within 1 mile of the project area (J. Fontaine, US FWS, personal communication, September 2003).

3.2.3.1.3 Lynx (Federally threatened)

Lynx are currently classified as Federally threatened 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 (Ruediger et al. 2000). 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 1009, Ruediger et al. 2000) .

Within the project area, elevations range from 3,072 to 6,520 feet. On the 8,506 acres of School Trust land and approximately 73,000 acres of USFS land within a 5 mile radius of the project area, there are 18,095 acres of primary lynx habitat types (i.e., those habitat types which lynx would use if present on the landscape), on USFS land, and 23,140 acres of secondary lynx habitat types (e.g., those habitat types which lynx would utilize only if primary habitat types are in close proximity; (Ruediger et al. 2000)), on both ownerships. Lynx tracks have been located in the area (Montana Natural Heritage Database).

3.2.3.2 Sensitive Species

3.2.3.2.1 Pileated Woodpeckers

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 (Bulland Jackson 1995). The pileated woodpecker nests and roosts in larger diameter snags, typically in mature to old-growth forest stands (McClelland et al. 1979, Bull et al. 1992) . 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. Studies that have examined woodpeckers following stand-replacement fires, such as those characterized by the Fish Creek Complex fire, found very low use by pileated woodpeckers (Hutto 1995, Murphy and Lehnhausen 1998). Newly created snags would provide high quality feeding habitat within the next 2 to 5 years, while boring beetles are active. Fire-killed snags and coarse woody debris would also be expected to provide good feeding substrates for up to several decades following later infestation by carpenter ants.

Within stands occurring on School Trust parcels, and burned in the Fish Creek Complex of fires, 39 stands, totaling approximately 1,389 acres, have western larch or ponderosa pine as the predominant species, with the average dbh on 97% of the acreage of these stands ranging from 10 to 22 inches (Stand Level Inventory). Within a 1 mile radius of the Fish Creek Complex, there are approximately 6,649 acres of School Trust land in 19 parcels. On these lands, there are 89 stands, totaling approximately 3,025 acres, containing western larch or ponderosa pine as the predominant species, with average dbh on 98% of the acreage in these stands ranging from 10 to 22 inches. Thus, the proposed project area, and surrounding habitat contained potential pileated woodpecker habitat, prior to the fire.

3.2.3.2.2 Black Backed Woodpeckers

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 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 (Goggans et al. 1989).

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 seven major fires near the project area, the Dirty Ike, Black Mountain 2, and Boles Meadow fires, and the Mineral Primm, North Howard, Beaver Lake, and Cooney Ridge Complex fires (Appendix C: Figure C-3). Current information regarding burn intensity was unavailable for the Mineral Primm, North Howard, and Beaver Lake

Complexes. However, these fires likely created sizable acreages of suitable black-backed woodpecker habitat. The Mineral Primm Complex is located largely within the Rattlesnake Wilderness area. Those portions of this fire occurring in the wilderness area will remain unharvested. The Boles Meadow Fire occurred largely on USFS and Plum Creek lands, with potential black-backed woodpecker habitat on USFS lands. Table 3-6 provides estimates of the acres burned and stand replacement acres created in each fire.

Table 3-6:. Estimates of acres burned and stand replacement severity acres for the Fish Creek Complex and seven fires within 70 miles of the project area.

Fire Name	Acres Burned	Acres Burned in Stand Replacement
Beaver Lake	51,471	Unknown
Black Mountain 2	7,263	3,337
Boles Meadow	4,210	688
Cooney Ridge	26,628	14,724
Dirty Ike	776	203
Fish Creek	36,683	11,557
Mineral Primm	20,737	Unknown
North Howard	2,555	Unknown
Total	**150,353**	**≥30,509**

3.2.3.2.3 Flammulated Owl

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

Within lands affected by the Fish Creek Complex, there are approximately 12,217 acres of flammulated owl preferred habitat types, with 2,496 acres on School Trust lands and 9,721 acres on USFS lands (SLI data). Within the proposed salvage area, there are approximately 1,578 acres of flammulated owl preferred habitat types, 457 acres of which were burned in a high intensity, stand replacing fire.

3.2.3.2.4 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, Powell 1977, Kelly 1977, Clem 1977, 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 a 1-mile radius of the areas burned during the Fish Creek Complex, there are approximately 24,489 acres of fisher preferred habitat types on School Trust (4,269 acres) and USFS lands (20,220 acres). Of these acres, approximately 2,295 acres occur within the burned area on School Trust land, and approximately 802 acres would be considered under the proposed salvage.

3.2.3.3 Other Sensitive Species

3.2.3.3.1 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, and 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.

Since 1991 4 nests and a lone male harlequin duck have been located in the Fish Creek drainage (Montana Natural Heritage Database). Three nests were located upstream (i.e., south) of the burned area, and should thus, be unaffected by the proposed action. The fourth nest is located in section 2, T13N, R25N, on a tributary to Bear Creek, outside of the burned area, and upstream of the proposed action. No effects are expected for this nest as a result of the proposed action. The sighting of a lone male harlequin duck was in section 7 of the Deer Creek drainage, and would be located downstream of proposed actions in this drainage. With the high intensity, stand replacing fire that burned Deer Creek, there currently are no shrubs under which nesting could occur. However, because of the prevalence of harlequin ducks in the Fish Creek system, effects of the proposed action on this species will be analyzed.

3.2.3.4 Big Game

3.2.3.4.1 White-tail Deer

White-tailed deer can be highly migratory animals, sometimes migrating 30 to 40 miles between summer and winter ranges (B. Henderson, MT FWP, pers. comm., March 2003). White-tailed deer require thermal/snow-intercept cover habitat during the winter months. For thermal cover, white-tailed deer require at least 40 acres of forest with canopy closure > 70%, with the base canopy > 20 feet high, intermixed with open grassland areas, preferably away from human disturbance (e.g., roads, houses, etc.).

The fires of the Fish Creek Complex burned 36,683 acres of varying severity in 2003. Approximately 7,946 acres experienced low burn severity, 17,180 acres moderate severity, and 11,557 acres experienced high severity fires. Within these same acres, the fires affected 2,614 acres of School Trust land. On School Trust lands, approximately 14 acres experienced low severity burn, 1,549 acres moderate severity, and 1,051 acres experienced high severity, stand replacing fire (BAER Team GIS data). Thus, those areas that experienced low to moderate severity fire intensity would still retain value for this species.

3.2.3.4.2 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.

The analysis area for elk is described in the grizzly bear affected environment. As such, the analysis area is 182,045 acres (284 sq. mi.), and is largely composed of USFS, Plum Creek Timber lands, and School Trust lands. Open road densities are presented in the description of the grizzly bear affected environment. After accounting for a 0.5 mile buffer around open roads, non-hiding cover, areas which experienced stand replacing fire, and non-vegetated land on USFS lands, there are roughly 64,800 acres of elk security cover, for an estimated 35% of the analysis area.

3.2.3.4.3 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). As such, much of the project area receives overall use by moose. Currently much of the private industrial land within the 182,045 acre analysis area is in regenerating seed tree harvest stands. Additionally, there are approximately 11,557 acres of stand replacement fire from the Fish Creek Complex fires, within the analysis area, and 1,051 acres within the project area.

This page left blank intentionally

CHAPTER 4

ENVIRONMENTAL EFFECTS

4.0 Environmental Consequences

4.1 Introduction

Chapter 4: Environmental Consequences forms the scientific and analytic basis for the summary comparison of effects presented in Chapter 2, 2.8.3, Table 2-4 of this EA. This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of concurrent and future state activities within the analysis area. This chapter focuses on the following effects:

- Direct, indirect, and cumulative effects
- Adverse effects that cannot be avoided
- Relationship between local short-term uses of the environments and the maintenance and enhancement of long-term productivity
- Irreversible and irretrievable commitment of resources that would be involved if the alternatives were implemented

This chapter has the following two major sections:

- Predicted Attainment of the Project Objectives of All Alternatives
- Predicted Effects on Relevant Affected Resources of All Alternatives

4.2 Predicted Attainment of the Project Objective of all Alternatives

4.2.1 Predicted Attainment of Project Objective

Harvest approximately 52,000 tons of timber killed by wildfires and subsequent insect attack to generate revenue for the School (CS) and Public Building (PB) trust grants.

4.2.1.1 Alternative A: No Harvest (No Action)

Under this alternative, no trees would be salvaged. No economic contribution to the School Trust would occur. This would have a direct effect upon the DNRC's obligation to provide the School Trusts with income.

4.2.1.2 Alternative B: Harvest

Under this alternative, approximately 52,000 tons of timber killed by wildfires and subsequent insect attack would be harvested. This timber sale would generate an estimated $1,300,000 to the Common Schools (CS) and Public Building (PB) trust grants.

4.3 Predicted Effects on Relevant Resources of All Alternatives

4.3.1 Water Quality, Water Quantity, Soils, Fisheries, and Weeds

4.3.1.1 Water Quality and Quantity

4.3.1.1.1 Alternative A: No Harvest (No Action)

Within the fire analysis area direct effects are from increases in peak flows and surface runoff are anticipated. Indirect effects are: anticipated increases in erosion, sediment delivery, nutrient levels, and stream temperatures due the recent wildfire. Several changes to water quality are expected as a result of the Fish Creek Complex fire. The Deer Creek and Thompson Creek drainage areas with severe burn intensities are expected to be more affected by increased levels of waters yield, sediment delivery, nutrients, and temperature in local stream channels. Potential sediment delivery would be lower on areas of moderate/mosaic burn where patchy vegetation would help trap surface sediments in areas such as DNRC Thompson Creek. Sediment associated with spring runoff and rainfall events following the fire are anticipated to increase dramatically the first year and reduce water quality. Sediment delivery is expected to decline up to 45% the second year following the fire (BAER 2003) and water quality will gradually improve. Effects from the recent wildfire will continue to decline as natural recovery occurs. Measurable quantities of these impacts may vary across the fire area and would be dependent on the nature of the stream channels, intensity of burned area, local soils, geology, and the timing, duration, and intensity of snowmelt and rain events.

Each of the streams in watersheds with extensive moderate to high burn severity are expected to exhibit in-channel scour as a result of the increases in water yield. The potential increase in water yield can be expected to destabilize streambanks.

Under the Alternative A: No Harvest (No Action), existing substandard roads with inadequate road surface drainage in the burned portion of the Fish Creek drainage would continue to impact water quality and downstream beneficial uses unless mitigation and remedial actions are undertaken by the landowners. Road reclamation and road improvements in the Deer and Thompson Creek drainages would greatly reduce the potential for storm damage and sedimentation associated with existing roads. No sediment sources to fishery streams were identified on State lands. Anticipated effects to water quality under Alternative A: No Harvest (No Action) are considered similar to existing conditions for watershed analysis.

As part of rehabilitation efforts, an Environment Assessment Checklist was completed for reclamation of 0.2 miles of old road and replacement of three culverts at risk of flood and about 1.5 miles of low standard single lane road is being constructed on stable terrain and crosses no surface water features.

4.3.1.1.2 Cumulative Watershed Effects of Alternative A: No Harvest (No Action)

Cumulative impacts to water quality are those impacts caused by the combined effect of past, present, and proposed activities within the watershed. These impacts include effects of increased channel instability, increases in water yield, and increased sediment yield.

Water yields are expected to increase as a result of the recent fire. Anticipated water yield increases are expected to cause increased erosion on steep slopes and existing roads with inadequate drainage in the burned area. The cumulative effects of Alternative A: No Harvest (No Action) would be similar to those described in the Existing Conditions portion of this document which discusses water yield and sediment delivery.

BAER treatments on federal lands in Deer Creek have reclaimed extensive jammer roads and reduced cumulative effects. Cumulative effects are expected to decline as hydrologic recovery continues to occur.

4.3.1.1.3 Alternative B: Harvest

The proposed salvage harvest could occur in stands of dead timber on up to 2,679 acre. These trees are no longer capable of removing water from the soil profile through the evapo-transpiration process and they no longer provide substantial green canopy critical for snow and rainfall interception. The proposed salvage harvest of dead trees is not expected to increase water yield, surface runoff, or magnitude and duration of peak flows above existing post-fire conditions.

Harvest units and roads can directly impact water quality if not properly located or buffered. The primary risk of impacts is greatest along streams and wetlands. The SMZ Law and Administrative Forest Management Rules regulate forest management activities that occur adjacent to streams, lakes, or other bodies of water. All proposed activities would be conducted in accordance with the SMZ Law and Administrative Forest Management Rules to reduce impacts. All areas requiring SMZ and RMZ delineation have been field reviewed by a DNRC resource specialist to determine their adequacy in meeting the requirements of the law and satisfying the Administrative Forest Management Rules to protect water quality and aquatic resources.

Mitigation measures implemented during salvage operations are expected to minimize impacts to water quality resulting from the proposed salvage harvest. These measures are also expected to help reduce the effects from the proposed harvest activities and the recent wildfire. Mitigation and rehabilitation measures planned for the proposed harvest areas have been demonstrated to be effective in reducing erosion and sediment delivery to stream channels (Robichauld 2000 and Klock 1975). Mitigation measures include providing drainage on roads and skid trails, revegetating disturbed sites by grass seeding, minimizing the area effect by skidding, and retaining logging residue on disturbed areas for use as protective cover and mulch. Full suspension of logs would be required across SMZ's, RMZ's, and complex terrain. Slope skidding restrictions would also be utilized to provide additional protection and reduce soil disturbance on sensitive slopes. Portions of the sale area are drained by ephemeral draws, swales, and wet areas that lack discernable stream channels. Equipment restrictions and designated crossings would be utilized to protect all wet areas and ephemeral draws.

Recent studies concluded that trees killed by wildfire and left standing could provide some shade to small mountain streams (Amaranthus 1988). DNRC would not harvest in SMZ's and would retain a majority of recruitable trees in the RMZ that could provide LWD to streams. Monitoring of shade effects following the fires of 2000 on Sula State Forest found that: 1) bare tree trunks did provide appreciable shade to stream banks, 2) by retaining all trees in the first 50 feet perpendicular to the stream there was minimal change in stream shading (Frank & Mathieus DNRC unpublished report 2001). A combination of not harvesting in the SMZ and retaining larger diameter snags within the harvest units outside the SMZ would retain 98% of recruitable trees that could fall into streams. DNRC inventoried the number, height, diameter, and distance of trees from streams along 100 foot transects perpendicular to streams to determine the representative number of trees that could fall and be recruited into streams. These mitigations would maintain available stream shading and provide all available woody debris for stream channel stability and fish habitat.

Based on implementation of mitigation measures, increases in sediment yields are expected to be low to moderate with Alternative B: Harvest. There will also be a number of dead trees falling across the creeks in the next few years. This inlux of logs to the streams may cause some bank erosion where stream flow is directed to the stream banks. In the long term these logs will help slow stream flow and trap sediment.

Sediment delivery increases associated with the proposed project are expected to be minor and temporary due to the rocky soils, area treated, location of harvest units on the landscape, SMZ locations, and mitigations

designed to minimize erosion. Mitigations include limiting ground equipment skidding to winter operations, cable harvesting on steep slopes, maintaining adequate streamside buffers to harvest, and helicopter harvesting for steep sites not accessible by cable. The valley floor of Deer Creek provides a wide flat buffer to the base of steeper slopes that would be cable harvested. Existing roads would be utilized for access to salvage harvest units in the Thompson Creek parcel (Section 14) and Camelia (section 6). These sections would be primarily cable harvested, which could potentially disturb up to 5% of the harvest units and would present low sediment risk. Erosion control would be installed in all disturbed cable and tractor harvest units where required.

About 6.1 miles of new road would be constructed under the proposed action, four of which would be in the Deer Creek drainage. The new construction would be primarily in portions of Section 16 that have not been harvested and do not have roads for access. The new proposed roads cross steep slopes and are well spaced to maximize the distance of cable harvest and minimize number of roads. Soil materials are typically very gravelly and resistant to erosion (refer to soils section). The direct effect of the roads is an addition of about 12 acres of disturbance in the Deer Creek watershed. Bare soil from these roads could increase the risk of sediment delivery to a stream. These roads would have long-term erosion control features placed in them to control erosion and sedimentation. The proposed roads would include a stream crossing on a perennial stream segment in section 16. The stream currently goes underground prior to reaching Deer Creek. Due to fire effects, the stream may have some future overland flow and contribute sediment to Deer Creek. Culverts in this channel and in other draws have been sized to meet flow capacity expected for potential increased runoff associated with the fire. There may be minor temporary sedimentation associated with culvert installation. Erosion control measures would be implemented to minimize sediment.

In the winter, a temporary bridge would be placed on a site previously used in section 8. No new excavation or disturbance is expected and the portable bridge would have adequate span to reach well past the channel banks to prevent disturbance of the channel banks. Even with winter conditions, on-site erosion control would be used to prevent sedimentation. The crossing would be removed in the winter following use. No other direct effects to water quality or water yield are expected with Alternative B: Harvest. Alternative B: Harvest has a low risk of directly affecting sediment by placing a portable bridge on Deer Creek.

Indirect effects to the Fish Creek watershed could occur with Alternative B: Harvest on up to 2,679 acres with a current harvest of 1,095 acres. Tractor yarding would occur on 169 acres, cable yarding on 1,acres, and 50 acres would be helicopter yarded. The ground disturbance from these

activities could increase the risk of erosion and sediment delivery on skid trails and cable yarding corridors. This risk would be reduced or eliminated by placing erosion control measures in these areas.

Alternative B: Harvest could also indirectly affect sediment delivery to the Deer Creek watershed by building 4.5 miles of permanent road. DNRC would utilize all reasonable mitigation and erosion control practices during all reconditioning, reconstruction, and new construction for all roads and stream and draw crossings during the proposed activities. Site-specific design recommendations from DNRC resource specialists would be fully implemented under the Alternative B: Harvest.

Implementation of BMP's and erosion control measures for new road construction are expected to control erosion and prevent sedimentation. New road construction will be located and constructed incorporating BMP's and site-specific measures to control erosion and prevent sedimentation. There is low risk of adverse impacts to downstream water quality and beneficial uses occurring as a result of Alternative B: Harvest.

4.3.1.1.4 Cumulative Effects of Alternative B: Harvest

The proposed salvage harvest is not expected to increase water yield, surface runoff, or magnitude and duration of peak flows above existing post-fire conditions. This is due to the fact that only dead trees will be harvested. Increases in sediment yield are expected to be low to moderate due to the area treated, location along the landscape, and mitigation designed to minimize erosion. Mitigations include limiting ground equipment skidding to winter operations, cable harvesting of steep slopes, maintaining adequate streamside buffers, and helicopter harvesting.

The proposed tractor and cable yarding with Alternative B: Harvest could increase the risk of cumulative impacts to sediment delivery by disturbing burned soil if disturbance is excessive. Road construction proposed could also increase the risk of cumulative effects to sediment delivery. Proposed roads are on steep sideslopes and are located on stable soils. These high rock fragment soils are prone to raveling but the proportion of soil fines that could erode is typically low. Implementation of BMP's and site specific erosion control measures for existing roads, new road construction, and harvest actions are expected to control erosion and prevent sedimentation. The risk of cumulative effects of sediment delivery would be reduced or eliminated by implementing erosion control measures in these areas.

There is low risk of adverse cumulative impacts to downstream water quality and beneficial uses occurring as a result of the proposed Alternative B: Harvest.

4.3.1.2 Geology and Soil Resources

4.3.1.2.1 Alternative A: No Harvest (No Action)

For Alternative A: No Harvest (No Action) the potential effects of the fire and those of on-going planned and implemented restoration and emergency rehabilitation measures for erosion and sediment control were evaluated. Alternative A: No Harvest (No Action) would have some direct and indirect effects on soil resources. Direct effects of the fire are varying levels of loss of vegetative cover, surface duff in severe burn, coarse woody debris on the soil surface, and heat altered soils. The indirect effect is potential increased soil erosion related to burn severity and increased runoff. Soil erosion would be lower in areas of moderate burn. Heat effects to soils were estimated as low to moderate and of minimal hydrophobicity as observed by the BAER team and State personnel following the fire. The effects of Alternative A: No Harvest (No Action) would be similar to the description described in the Existing Conditions portion of this document.

The two small areas of slope instability (about one and five acres) in section 16 will likely expand slightly and deepen as dead surrounding trees are overturned by wind. These are natural slumps associated with a geologic contact and there is a possibility of debris flows in the existing stream is evidenced to have happened in the past. No previous management has occurred in this area. No new road construction or harvest is proposed in these small areas of slope instability. The stream does not deliver to Deer Creek but sediment could enter the existing culvert in the SW corner of section 16. The culvert will be replaced with a larger culvert to improve capacity and a spillway installed to prevent loss of road fill as part of rehabilitation efforts.

Roads

There is an extensive road system with secondary and spur roads throughout the Fish Creek drainage on State lands and adjacent ownerships that provide access to most areas. Existing roads on State lands are generally in good condition but require some periodic maintenance and additional drainage, mainly on short steep road pitches.

Roads built over 20 years ago, prior to BMP implementation, were not always planned with environmental concerns and some excessive roads and road segments are poorly located on steep roads grades and in some draw bottom locations (refer to hydrology section). The Lolo NF closed and stabilized roads at risk of erosion in the Deer and Thompson Creek drainages. It was not feasible to treat all roads in the area so landowners prioritized their road repairs and road reclamation efforts. Some unneeded roads remain in severe burn areas in the Fish Creek Complex fire area that

have lost their protective vegetative surface and are subject to chronic erosion and above average maintenance needs. Segments of existing skid trails and roads with inadequate drainage would continue to erode without maintenance. The Lolo NF is in the process of completing reclamation of 35 miles of road in Deer Creek and removing culverts at risk of flood loss. Reclaimed roads should have an immediate reduction in chronic erosion with improved drainage and removal of deep road fills over culverts at risk. Existing skid trails with live vegetation roots will continue to slowly stabilize and ameliorate past disturbance. Restoration treatments of road reclamation, culvert removal, road drainage restoration, and grass seeding for watershed emergency conditions are nearly completed under Alternative A: No Harvest (No Action).

4.3.1.2.2 Alternative B: Harvest

For Alternative B: Harvest, the effects of timber harvest and road construction were evaluated. During sale development, DNRC was very concerned about the effects of the fire on soils, loss of vegetation, and design of harvest systems relative to terrain and slope. Tractor skidding and cable harvest could cause direct effect of soil disturbance that could result in increased erosion. The indirect effect of erosion is expected to be similar or not substantially more than Alternative A: No Harvest (No Action), based on implementation of attached mitigation measures. Natural rates of erosion could be high and there is limited and conflicting research about whether or not erosion rates will be obviously greater with harvest effects (McIver et al. 2000, DNRC 2002). Monitered erosion rates were low overall on the DNRC Moose Fire salvage area in 2002. Erosion was observed to be lower, but not significantly different, on harvest sites than sites not harvested.

For Alternative B: Harvest site specific mitigations and BMP's would be implemented to minimize the area and degree of soil effects associated with proposed harvest and road construction (see mitigation measures listed in Chap. 2). Alternative B: Harvest incorporates watershed protection measures to minimize harvest disturbance through the retention of woody debris on site, the installation of road drainage features, grass seeding and stabilization of road segments considered at risk of erosion.

No ground skidding equipment would be operated on slopes over 40%. Winter harvested sites should have minimal disturbance and negligible effects on soils (Klock 1975) and Williams 1993, DNRC 2002). Slopes of 30-40% have increased risk of erosion associated with ground skidding disturbance. Slopes over 35% would be cable harvested or ground lead, winch-lined to trails. Cable harvest in summer has potential to cause more disturbances than winter operations that would be mitigated with cable corridor layout, erosion control measures, and administration of operations. DNRC would require cable sets to be located on ridges and

convex slopes to disperse water and avoid log skidding up draws. The direct effect of cable corridors could disturb 5% or less of the ground. Erosion may occur in segments of cable corridors and skid trails. Erosion control measures would be implemented where needed to control erosion and prevent sedimentation. Measures would include: installation of waterbars, slashing or mulching, and if disturbance was approaching excessive, operations would be modified or suspended and erosion remedies implemented.

All tree tops and portions of small diameter trees would be left on the ground to meet coarse woody debris requirements of 5-10 tons/acre for nutrient cycling and to contribute to erosion control. Approximately 10 to 20 submerchantable trees per acre laid predominately perpendicular to the slope would be maintained throughout the harvest units. On a landscape level, retaining coarse woody debris on the ground, a portion of which is perpendicular to the slope, is expected to help slow runoff and trap sediment on high intensity burn areas devoid of vegetation and duff. The stabilizing effect of woody mulch should help reduce erosion, speed revegetation of sites, and provide some moderating effects on temperature and moisture at the soil surface at a greater level than Alternative A: No Harvest (No Action). The effectiveness of this treatment is not quantified in research but contour felling logs is prescribed by NRCS as a conservation measure to reduce erosion.

No harvest is planned within the SMZ's on the severly burned sites in Deer Creek and Thompson Creek State parcels. RMZ's would be marked adjacent to streamside zones to delineate and provide protection of erosive soil areas from ground disturbance pursuant to ARM 36.11.425. There would be no road construction or timber harvest in the two small areas of slope instability.

DNRC's sale plan design incorporates overlapping mitigation measures to minimize disturbance, frequent project monitoring to keep erosion control measures current with harvest operations, and adaptive management to revise operations if needed or defer harvest as appropriate based on site specific review.

The table below summarizes the comparison of harvest acres and road work in the project area. Note the net miles of roads in the Deer Creek drainage would be reduced by 31 miles following road reclaimation by USFS and permanent road construction by DNRC.

TABLE 4-1: COMPARISON OF ALTERNATIVE EFFECTS

	HARVEST AREA (ACRES)	IMPROVEMENT ON EXISTING ROAD (MILES)	NEW ROAD CONSTRUCTION (MILES)	ROAD RECLAMATION (MILES)
ALT A:	0	0	0	USFS ROAD - 35
ALT B: DEER CREEK DRAINAGE ONLY	TRACTOR - 61 HELICOPTER - 50 CABLE - 803 TOTAL - 914	DNRC AND PLUM CREEK ROADS - 4.5	PERMANENT - 4.0 TEMPORARY - 1.0	USFS ROAD - 35
ALT B: ENTIRE PROJECT	TRACTOR - 169 HELICOPTER - 50 CABLE - 1095 TOTAL – 1314 TOTAL POSSIBLE ADDITIONAL CABLE – 1,365	DNRC AND PLUM CREEK ROADS - 38	PERMANENT - 4.5 TEMPORARY - 1.6	USFS ROAD - 35

4.3.1.2.3 Cumulative Effects of Alternative B: Harvest

Cumulative effects can occur from repeated disturbance in the harvest area as an additive process with each entry. Alternative B: Harvest involves ground skidding that could result in cumulative effects if disturbance is excessive. Existing roads and trails would be used in the event of reentry for the harvest of insect infested trees to minimize effects. The risk of cumulative effects to soils from the implementation of the proposed project is low based on implementation of the recommended mitigation measures. Cumulative effects would be limited by limiting the area of detrimental soil impacts, by using winter skidding, cable harvest on steep slopes and installing adequate drainage where needed.

Large woody debris will be retained on site to help reduce erosion, and maintain nutrient cycling and long term productivity.

Roads

Alternative B: Harvest would provide considerable improvement to the road systems through the installation of additional drainage in roads and providing road maintenance following the fire. On access routes, existing road conditions and drainage would be inventoried to prioritize site-specific improvements that control erosion with Alternative B: Harvest. Segments of old road within the burn that were poorly located have limited vegetation or inadequate drainage are anticipated to erode at higher rates without treatment.

DNRC would improve road drainage on existing roads to meet expected increased surface water runoff in burned areas. DNRC's road maintenance and stabilization work includes 38 miles of drainage improvements, 1.5

miles of additional road closure and 6.1 miles of road construction as noted in Table 4-1: comparison of alternatives. Alternative B: Harvest includes five miles of new road construction in Deer Creek sections 8 and 16 to provide for cable salvage operations. Proposed roads on segments of steep slopes would have sliver fills that would extend some distance and result in ravel of surface soils. Some short to mid term surface ravel and erosion of road cut and fill slopes while vegetation establishes on the roads DNRC is expected. Following use, roads would be monitored for drainage needs and repaired as needed. Any future harvest would likely use the same road system and skid trails and landings to reduce the risk of cumulative effects.

This combination of BMP's and mitigation treatments, some of which overlap, through the implementation of the proposed project are expected to help control runoff, erosion, and sedimentation. The effects of erosion and sedimentation associated with the implementation of Alternative B: Harvest should be similar or not considerably greater than effects of Alternative A: No Harvest (No Action). The effectiveness of these treatments may vary with climatic events. Improved road drainage and closures would reduce maintenance needs and levels of anticipated erosion compared to the Alternative A: No Harvest (No Action).

4.3.1.3 Cold Water Fisheries

4.3.1.3.1 Alternative A: No Harvest (No Action)

Alternative A: No Harvest (No Action) would continue to impact cold-water fisheries habitat through direct, indirect, and cumulative effects of erosion and sedimentation due to fire effects, temperature and nutrients, road drainage conditions and locations. No barriers to fish passage were identified on DNRC lands on Thompson, Deer, or Fish Creek. Refer to Existing Condition portion of this document that discusses water quality and quantity and the existing cold water fisheries sections.

4.3.1.3.2 Cumulative Effects of Alternative A: No Harvest (No Action)

Cumulative effects to cold water fish habitat could occur from increased water yield, sediment delivery, stream temperatures, and changes in channel morphology. The potential increase in water yield could destabilize streambanks in severely burned watersheds and increase the failure of existing debris jams in streams. These anticipated effects of channel scour could result in changes in channel morphology. Cumulative effects would be similar to those discussed in the Existing Conditions portion of this document under Fisheries.

4.3.1.3.3 Alternative B: Harvest

Increased levels of sedimentation resulting from the wildfire are expected to occur and will continue to occur until vegetative recovery is complete. The largest "pulse" of sediment from the fire is expected to have already occurred following fall rain events and the spring runoff prior to road construction activities in Deer Creek. Mitigation measures implemented during the proposed harvest operations are expected to present low risk of sediment delivery and subsequent impacts to local fish-bearing streams.

Forest harvest activities were planned to meet conservation strategies by not harvesting trees in the SMZ's, designating riparian management zones to minimize disturbance, restricting tractor units to winter operations, and maintaining 98% of large trees that could fall into fish bearing streams and benefit aquatic resources. Erosion control would be required on roads, skid trails, and cable corridors as needed. Based on implementation of these mitigation measures, it is unlikely that the proposed timber sale activities would affect large woody debris recruitment, riparian shade, in-stream temperature, or downstream fish-bearing habitat. There is low to moderate risk that the proposed action would result in sedimentation to streams. There is low risk that direct or indirect impacts would occur to fish habitat with the implementation of the proposed action in addition to the effects of the fire as described in the Alternative A: No Harvest (No Action).

4.3.1.3.4 Cumulative Effects of Alternative B: Harvest

Cumulative impacts to cold water fish habitat are those impacts caused by the combined effect of past, present and proposed activities within the watershed. These impacts include effects of increased channel stability, increases in water yield and increased sediment yield, stream temperature, nutrients. There is low risk of additional cumulative impacts to cold-water fisheries as a result of the proposed project. Retaining trees in SMZ's and RMZ's would help maintain available shade to moderate stream temperatures and provide LWD essential for fish habitat and stream complexity.

4.3.1.4 Noxious Weeds

4.3.1.4.1 Alternative A: No Harvest (No Action)

We expect existing populations of noxious weeds in moderate burn sites to be invigorated by the fire. Severe burn sites may initially have fewer noxious weeds due to burning of plants and residual weed seed, but will be the highest risk sites of weed spread. Knapweed and sulfur cinquefoil are expected to increase in the area, as weed seed is transported by wind and animals from existing infestations on roads and open sites within the burned area. In larger infestations we would have to tolerate some established populations (Category 1) weeds and promote long-term revegetation and biocontrol where suitable. DNRC would monitor sites for

new weed invaders (category 2 & 3) and implement some limited control measures, as funds are available.

Some noxious weeds may have been introduced from suppression activities. DNRC would monitor the area for new weeds, and treat as a priority. Under the Alternative A: No Harvest (No Action) we would have a continuing effort at weed control, but expect less funds would be available to treat noxious weeds, as current funding is limited.

4.3.1.4.2 Alternative B: Harvest

With the proposed timber harvest action, ground-disturbing activities have the potential to introduce or spread noxious weeds in susceptible habitat types. Alternative B: Harvest objective for weed management is to prevent new establishment of noxious weeds and control established populations along open roads, by promoting stable vegetation.

As part of Alternative B: Harvest, DNRC will complete seeding of disturbed sites and some weed control on forest roads to help offset the inevitable advance of knapweed. In larger infestations we would have to tolerate weeds and promote biocontrol and long-term revegetation. We would expect an increase of noxious weeds near established weeds, but would also reduce some weed infestations and expect to increase the level of long-term treatments with funds from the action project. Grass seeded roadsides should provide competition with weeds. As trees reoccupy the forest sites and grow to a stage that will increase shade, the shade intolerant weeds, such as knapweed, and sulfur cinquefoil, should decline in vigor and native plants increase, yet weeds will remain prolific in open areas.

For this project an Integrated Weed Management (IWM) approach would be implemented that would include a combination of: prevention, revegetation, biocontrol and spot herbicide treatments, which are considered the most effective weed management treatments. Herbicide applications would be primarily along disturbed roadside edges and spot treatments of new infestations to promote native plants and seeded grasses. To protect water quality, herbicide would be limited and not be applied where runoff could enter surface waters or riparian features. Where weeds are replaced with grasses and desired plants, erosion could be reduced due to the improved plant cover. Long term, our reforestation efforts would provide better coverage of the severe burned areas, which should enhance shade and competition against noxious weeds.

Mitigation measures would include washing equipment to prevent weed introduction, minimizing disturbance through logging design, monitoring revegetation, reseeding as necessary, and control measures, including biocontrol where most effective.

4.3.2 Human Environment

4.3.2.1 Road Dust

4.3.2.1.1 Alternative A: No Harvest (No Action)

Some increase in road dust would occur from the logging of timber in private lands.

4.3.2.1.2 Alternative B: Harvest

Commercial trucks can produce a significant amount of dust on dirt roads. If hauling was done in times when the road is dry, magnesium chloride or similar dust abatement product would be applied to the section of Fish Creek and Wig Creek Roads adjacent to residences and FAS's along the haul route. This application of dust abatement would reduce dust produced by truck traffic as well as private vehicle traffic adjacent to residential and recreational areas. Speed limits for log trucks hauling off of State lands would be required to comply with reduced speed limits on road segments adjacent to residences. Therefore, risk to safety from truck traffic would be low.

4.3.2.1.3 Cumulative Effects of Alternative B: Harvest

No cumulative effects.

4.3.2.2 Recreational Site Use Issue

4.3.2.2.1 Alternative A: No Harvest (No Action)

No change in the use of FAS's use would occur due to harvest activities on State Lands. Use may decline due to post fire conditions.

4.3.2.2.2 Alternative B: Harvest

No change in the use of FAS's use would occur due to harvest activities on State Lands. Use may decline due to post fire conditions.

4.3.2.2.3 Cumulative Effects of Alternative B: Harvest

No cumulative effects.

4.3.2.3 Economics Issue

4.3.2.3.1 Alternative A: No Harvest (No Action)

Under Alternative A: No Harvest (No Action) no harvesting would take place and no revenue would be generated.

4.3.2.3.2 Alternative B: Harvest

Approximately $1,300,000 would be generated for the Common Schools and Public Building grants from the harvest and sale of the estimated 52,000 tons. Stumpage value is estimated at $25/ton.

The amount of forest improvement collection from this sale would be $6.81 per ton. This would be applied to the sawlog volume harvested. The forest improvement collection would be approximately $354,120. This money would be deposited in the forest improvement fund to be used for thinning, prescribed burning, planting, weed management, etc. on Trust Lands.

If this proposed project was implemented, it would provide work for a road building contractor, a logging contractor, their subcontractors, and their employees. The forest products would most likely be processed in local mills providing further job opportunities.

4.3.3 Wildlife

4.3.3.1 Endangered Species

4.3.3.1.1 Grizzly Bears

4.3.3.1.1.1 Alternative A: No Harvest (No Action)

Over the short term, no change from the current condition would be expected for the grizzly bear. However, over time shrubs and trees would begin to recolonize the project area, providing food and hiding cover over the next 20 to 30 years. Thus, there would be low risk of direct or indirect effects to grizzly bears as a result of this alternative.

4.3.3.1.1.2 Cumulative Effects of Alternative A: No Harvest (No Action)

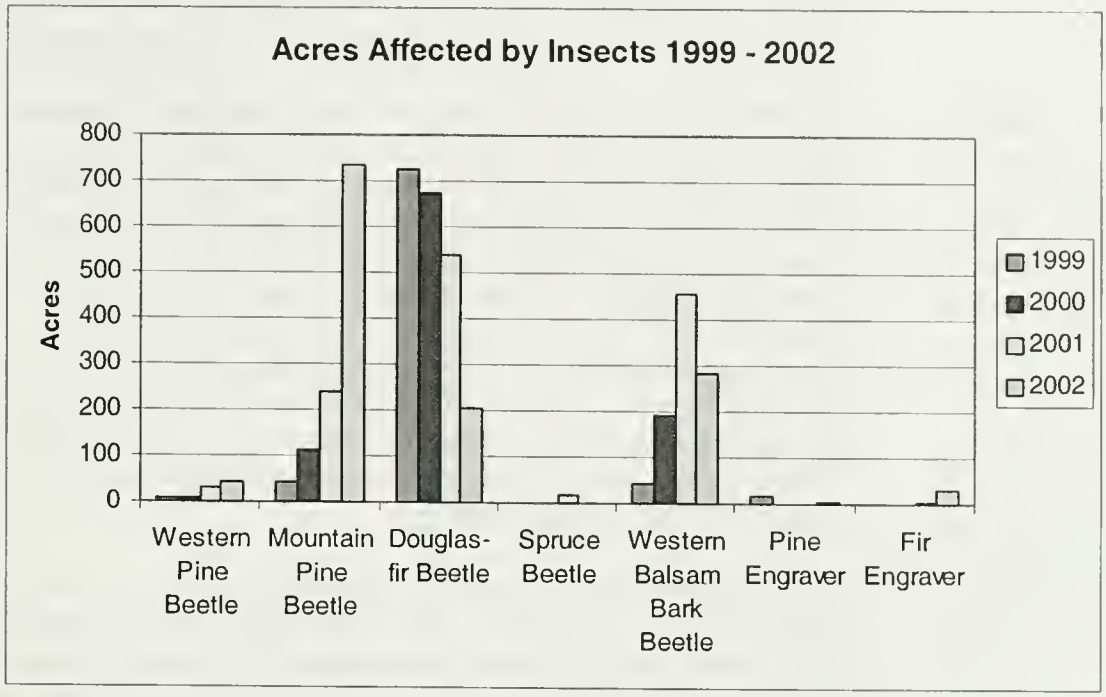
The Fish Creek drainage, and its tributaries, has been extensively harvested on private industrial lands through a seed tree/shelterwood silvicultural system. Additionally, the Fish Creek Complex fire of 2003 burned 36,683 acres, of which 1/3 were stand replacing. Thus, as the drainage gradually becomes re-vegetated through natural succession over the next 20 to 30 years there will be increases in forbs and shrubs that would provide future food sources for grizzly bears. Thus, there would be low risk of cumulative effects to grizzly bears as a result of this alternative.

4.3.3.1.1.3 Alternative B: Harvest

Over the next 2 years, the proposed action would harvest approximately 1,314 acres of School Trust land burned by the Fish Creek Complex fires of 2003. An additional 1,365 acres (for a total of 2,679 acres) may be entered for potential salvage of future insect-damaged timber associated with the fires. Since 1999, mountain pine beetles, Douglas-fir beetles, and western balsam bark beetles have had a substantial presence within a 5-mile radius of the Fish Creek

Complex fire perimeter (Fig. 4-1). Thus, there would be the potential of repeated entries over the next 5 years under the proposed action.

Figure 4-1: Acres affected by insects within a 5-mile radius of the Fish Creek Complex Fire, 1999 - 2002 (USFS Insect and Disease Activity Maps 2003).



Under the proposed action approximately 6.1 miles of road will be newly constructed or reconstructed within the project area. Upon completion of the proposed action, all of the aforementioned road would either be behind locked gates or made impassable through tank traps and logging slash. Thus, there would be no increase in open road density within the project area.

While areas that experienced stand replacement fire currently have open understories, devoid of forbs and shrubs, tree boles do inhibit sight-distance, thusly providing hiding cover (McTague and Patton 1989). Additionally, 50-foot buffers would be implemented along SMZ's, as well as provision for visual screening along the south side of Deer Creek in section 8. Along Deer Creek, there would be a 50 foot SMZ buffer along both sides of the creek, as well as leaving all trees <12 inches dbh between Deer Creek and the Deer Creek road for visual screening. Much like Alternative A: No Harvest (No Action), the affected area will be gradually re-vegetated through natural succession. Thus, under Alternative B: Harvest, hiding cover will likely be replaced in approximately 20 years through natural vegetative succession. Additionally, the proposed action would gate roads on School Trust land within section 12, T 13N, R 25 W.

However, grizzly bear activity has not been observed in the affected area in several years. Thus, fire-salvage operations would likely have little direct or indirect effect on grizzly bears.

Future harvest operations to salvage insect-killed timber would be more likely to affect grizzly bears. Although grizzly bear activity has not been observed within the affected area, the recent expansion of grizzly bears into the Ninemile Valley allow one to conclude that bears may occupy the affected area within several years' time. Repeated entry over several years to harvest insect-killed timber that was influenced by the Fish Creek Complex fire would lead to potential direct conflicts with grizzly bears with each passing year. Thus, it is recommended that future operations for insect-related salvage occur during the denning period (November 15 - April 15), or strict sanitation guidelines be implemented to reduce the availability of bear attractants. Additionally, it is recommended that, during the course of future bug salvage operations, should additional road construction be required to access affected timber, said road(s) would occur behind effective road closure devices (e.g., locked gates, tank traps, etc.) upon completion of the salvage operation.

Given the proposed fire salvage, there would be low risk of direct or indirect effect to grizzly bears. For future related harvest of insect-killed timber, there may be low to moderate risk of direct or indirect effects to grizzly bears, depending upon timing of the operations, and the extent, location, and closure status of potential roads, and the status of grizzly bear activity in the area.

4.3.3.1.1.4 Cumulative Effects of Alternative B: Harvest

There has been a lack of grizzly bear activity within the analysis area over the last several years. In addition to the recent Fish Creek Complex Fire, there is the added impact of recent large scale seed tree/shelterwood harvests and total road density on surrounding private industrial ground. Thus, the proposed fire salvage, potential salvage of insect-killed timber, and new road construction would bring ((1) repeated entries into the project and analysis areas, (2) increase total road density, but not open road density, and (3) reduce hiding cover within the analysis area, while fostering conditions that could produce an ample food source for grizzly bears.) Although there has not been recent grizzly bear activity within the analysis area, the presence of such activity in the nearby Ninemile Valley leads one to believe that grizzly bears may occupy the analysis area in the near future. As such, repeated harvest entries would increase risk of conflicts with operators. To reduce risk of conflicts, it is recommended that sanitation restrictions (i.e., food storage, garbage disposal) be implemented during the non-denning period (April 15 - November 15) for

operations related to this proposed action, both fire-killed and insect-killed timber harvest, should grizzly bear activity be documented. Due to the current absence of grizzly bear activity within the analysis area, and no net increase in open road densities, there would be low risk of cumulative effects to grizzly bears as a result of the proposed action.

4.3.3.1.2 Gray Wolves

4.3.3.1.2.1 Alternative A: Deferred Harvest (No Action)

Three wolf packs are known to have activity centers in or near the project area. Additionally, the area is known to be used by deer, elk, and moose. As the vegetation gradually recovers from the effects of the fire, succulent and highly palatable vegetation will be produced that would be heavily utilized by deer, elk, and moose, which may be attractive for foraging by wolves. Thus, there would be low risk of direct or indirect effects to wolves as a result of this alternative.

4.3.3.1.2.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

Use of the analysis area by wolves is known to occur (J. Fontaine, US FWS, personal communication, September 2003). With the effects of the recent Fish Creek Complex Fires, the area affected by the fire will gradually recover with succulent and highly palatable vegetation that would be heavily utilized by big game. Much of this area does not contain open roads. However, with the proposed Fish Creek Road project. Thus, there would be low risk of cumulative effects to wolves as a result of this alternative.

4.3.3.1.2.3 Alternative B: Harvest

Within the context of 2,614 acres burned on School Trust land, the proposed action would harvest fire-killed trees on approximately 1,314 acres, much of which was stand replacement fire. Such action would reduce hiding cover for wolves through removal of tree boles. While areas that experienced stand replacement fire currently have open understories, devoid of forbs and shrubs, tree boles do inhibit sight-distance, thusly providing hiding cover (McTague and Patton 1989). Much like Alternative A: No Harvest (No Action), the affected area will be gradually re-vegetated through natural succession. Thus, under the Alternative B: Harvest, hiding cover will likely be replaced in approximately 20 years through natural vegetative succession. Additionally, the proposed timber harvest is not located within 1 mile of a known wolf den or rendezvous site. Thus, fire-salvage operations would likely have little direct or indirect effect on wolves.

4.3.3.1.2.4 Cumulative Effects of Alternative B: Harvest

With the expected vegetative recovery of areas affected by the Fish Creek Complex Fires would be an expected increase in use of this area by big game species. Such use would likely concentrate activity by predators, such as the wolf. In addition to the proposed action, there is also (1) the DNRC proposed Fish Creek Road project, which would construct 1.5 miles of road within the project area and could disperse big game movements, an; (2) prior large-scale seed tree and shelterwood harvesting on private industrial lands; and (3) salvage efforts on surrounding private lands. Cumulatively, these actions could affect wolves through reduction in hiding and thermal cover for big game, which may indirectly affect wolves through potential reduction in foraging opportunities within the analysis area. Thus, there would be low risk of cumulative effects to wolves as a result of the proposed action.

4.3.3.1.3 Lynx

4.3.3.1.3.1 Alternative A: No Harvest (No Action)

Under Alternative A: No Harvest (No Action), fire-killed timber would not be harvested. As such, over time shrubs and trees would eventually begin to recolonize the project area, providing habitat for snowshoe hares, the lynx's preferred prey. Eventually, snags created from the Fish Creek Complex Fires would fall to the ground, likely creating a large pulse of coarse woody debris in the area. As a result, potential lynx denning habitat may result from potential jackstrawing of the fallen snags, or the presence of large diameter hollow logs. Thus, there would be low risk of direct or indirect effects to lynx as a result of this alternative.

4.3.3.1.3.2 Cumulative Effects of Alternative A: No Harvest (No Action)

As previously discussed under direct and indirect effects, foraging habitat would develop over the next 15 to 20 years under this alternative, as well as potential denning habitat as recently created snags fall over. However, the proposed DNRC Fish Creek Road project would increase the amount of road within the analysis area. Construction of new road may enable competing predators access to lynx foraging habitat in winter. Additionally, salvage logging on private lands affected by the fire may create additional roads, winter disturbance, and possibly delay the formation of future potential denning habitat within the analysis area. While Alternative A: No Harvest (No Action) would not construct road or harvest timber, there is low to moderate risk of cumulative effects from other proposed actions.

4.3.3.1.3.3 Alternative B: Harvest

The proposed action would salvage harvest timber from a total of 1,314 acres of School Trust land that were affected by the Fish Creek Complex fires. Through salvage harvesting, an average of 7 trees per acre ≥9 inches dbh will be retained within the harvest units, and may contribute to potential lynx denning habitat in the future, once they fall and become coarse woody debris. Additionally, 497 acres would be deferred from harvest for a minimum of 5 years. These acres are a mixture of low, moderate, and stand replacing fire. For 157 acres that would be deferred in Deer Creek, there are an average of 107 trees per acre ≥7 inches dbh that would be retained and could eventually provide the coarse woody debris structure for potential future denning habitat. Because the proposed action is largely avoiding areas that experienced mixed severity fire, more forest structure will be retained within these areas that would contribute to mature foraging habitat, once the understory vegetation recovers from the effects of the fire.

Although there are currently no plans to harvest within the areas that experienced mixed severity fire, or forest stands adjacent to the fire, these are the areas that are most likely to become infested with bark beetles within the next few years, due to fire/heat-induced stress on the trees. In all likelihood, these areas may then be subject to additional salvage harvesting to recover timber killed or damaged by insects. Thus, it is possible that additional mature foraging and denning habitat will be lost from the proposed action. Additionally, establishment of early foraging habitat within the burned area will likely require 15 to 20 years while the area becomes revegetated through natural succession. Therefore, there is low to moderate risk of direct and indirect effects to lynx from the proposed action.

4.3.3.1.3.4 Cumulative Effects of Alternative B: Harvest

Within the analysis area, there at least 41,235 acres of lynx preferred habitat types (18,095 ac primary habitat types, 23,140 acres secondary). The proposed action would harvest 1,314 acres of fire-killed timber, of which 476 acres are currently classified as being secondary lynx habitat types. As previously discussed, this would result in potential losses of future denning materials. With 36,683 acres of forest burned during the Fish Creek Complex Fires, there was a temporary loss of foraging habitat for lynx. The proposed action, which includes potential salvage of subsequent insect damage associated with the fire, coupled with the salvage on surrounding private lands, and prior timber harvesting on private industrial lands, could further reduce the availability of mature foraging habitat within 5 miles of the project area. Additionally, the proposed construction of 1.5 miles of new road under the Fish Creek Road project, and this project's scheduled winter harvest activities would likely permit

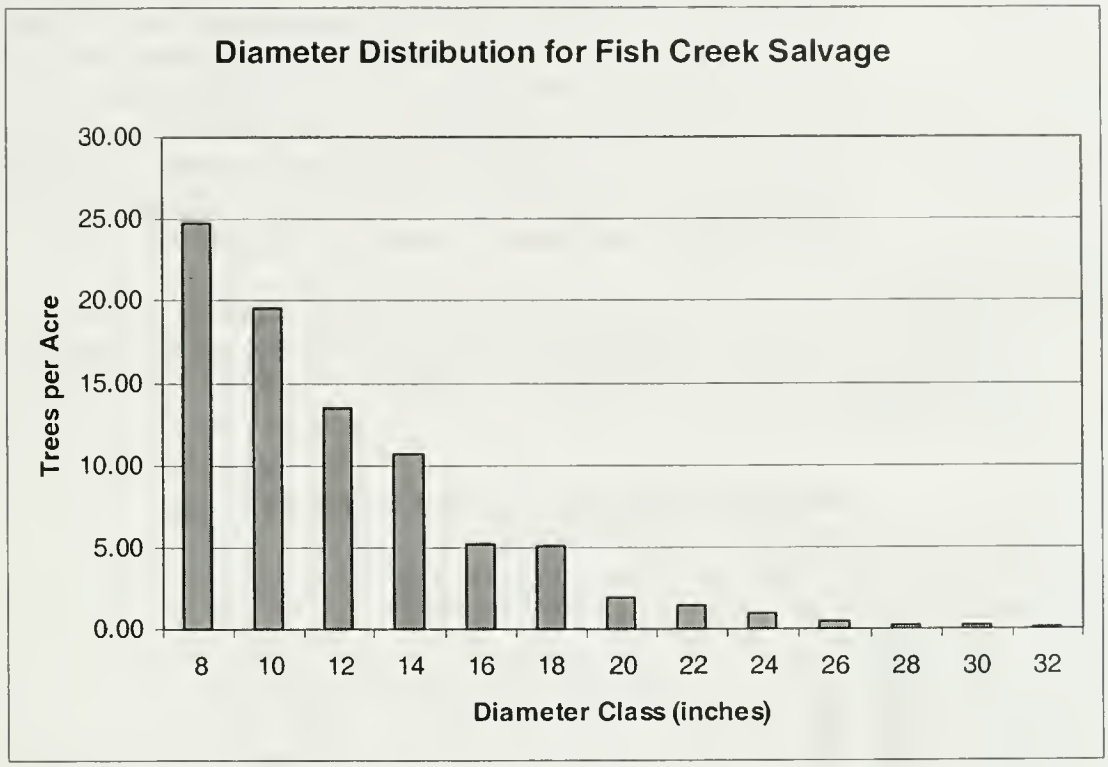
competing predators to temporarily gain access to lynx prey within the analysis area while operations are on-going during the winter. Thus, there are low to moderate risks of cumulative effects to lynx as a result of the proposed action.

4.3.3.2 Sensitive Species

4.3.3.2.1 Pileated Woodpeckers

4.3.3.2.1.1 Alternative A: Deferred Harvest (No Action)
Under Alternative A: No Harvest (No Action), no change from the current situation would be expected. Pileated woodpeckers require late successional forest with high canopy closure and large diameter snags (>15 inches dbh) for nesting and roosting. Thus, areas that experienced stand replacing fire would not suffice for nesting and roosting habitat for several decades, until vegetation has recovered and would provide late successional structural characteristics. Within sections 6, 12, 14, and 30, areas that experienced mixed-severity fire may still function as nesting and roosting habitat for pileated woodpeckers. Pileated woodpeckers feed primarily on carpenter ants and wood-boring beetle larvae (Bull and Jackson 1995). As such, there may be an increase in pileated woodpecker foraging activity within the burned area for 2 to 4 years post-burn, due to an increase in wood-boring beetle populations associated with post-burn areas. Currently, there are an average of approximately 3.43 trees per acre ≥21 inches dbh within the affected School Trust lands in the project area (Fig. 4-2). Thus, there would be low risk of direct and indirect effects to pileated woodpeckers as a result of Alternative A: No Harvest (No Action).

Figure 4-2: Average trees per acre per diameter class within areas proposed for harvesting in the proposed Fish Creek Salvage. Diameters presented are the midpoints for a range of diameters (e.g., 8 inches dbh for 7 ≤ dbh < 9).



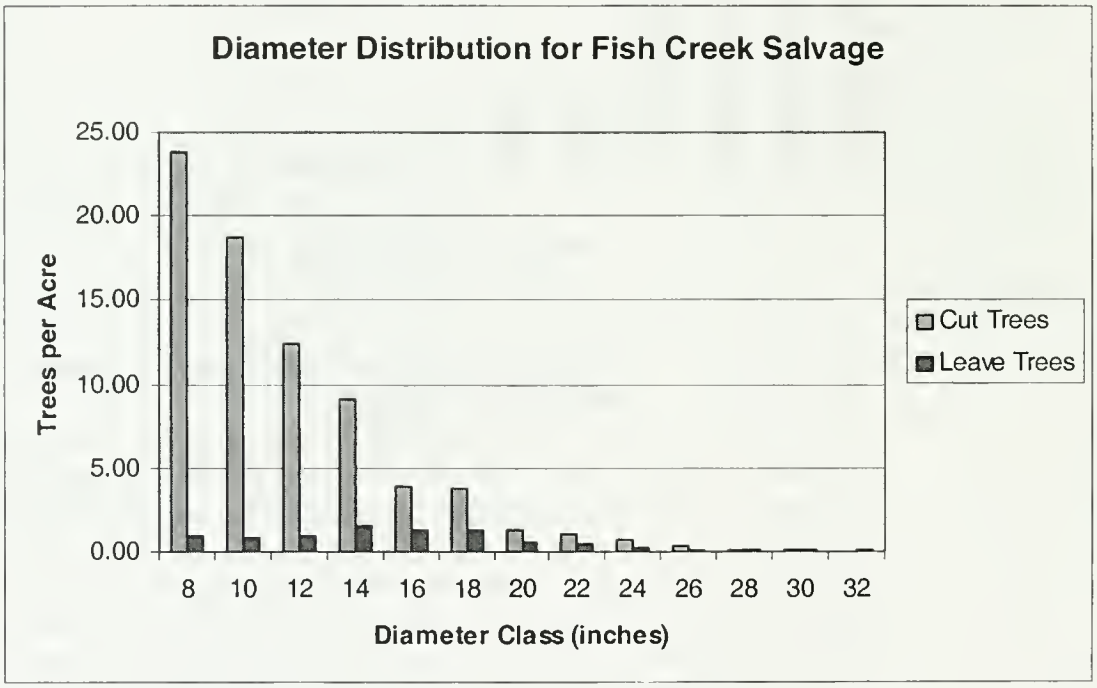
4.3.3.2.1.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

Post-fire, there are currently an average of approximately 3.43 snags per acre ≥21 inches dbh, which could serve as potential nesting and roosting structures for pileated woodpeckers. However, because this species generally prefers to nest and roost in late successional forest structure, the current conditions within the project area may not approach suitable conditions for pileated woodpeckers for at least 40 years. Additionally, the prevalence of the seed tree/shelterwood silvicultural prescriptions on surrounding private industrial lands had already reduced the availability of pileated woodpecker habitat in the landscape, prior to the fire. Alternative A: No Harvest (No Action) would merely promote an increase in available foraging substrate for pileated woodpeckers, as standing snags (wood-boring beetle larvae), and as coarse woody debris (carpenter ants) once snags begin to topple. Thus, there would be low risk of cumulative effects for pileated woodpeckers as a result of Alternative A: No Harvest (No Action).

4.3.3.2.1.3 Alternative B: Harvest

The proposed action would harvest fire-killed timber from approximately 1,314 acres on the affected parcels. However, pursuant to ARM 36.11.411, DNRC would retain an average of approximately one snag and one snag recruit over 21 inches dbh per acre. Where snags or snag recruits over 21 inches dbh are not present, the next largest size snag or recruit would be retained. Additionally, if sufficient snags or recruits are absent, some substitution among the two would occur. As such, there would be an average of 1 snag and/or recruits left per acre ≥21 inches dbh, as well as an average of approximately 3 trees/snags per acre 15 ≤ dbh ≤ 21 inches (Fig. 4-3).

Figure 4-3: Average trees per acre per diameter class within the proposed harvest units of the Fish Creek Complex, that would be retained and harvested. Diameters presented are the midpoints for a range of diameters (e.g., 8 inches dbh for 7 ≤ dbh < 9).



In the short term, the proposed action would have a minor adverse impact on the availability of pileated woodpecker foraging structures, largely snags. Studies that have examined woodpeckers following stand-replacement fires, such as those characterized by the Fish Creek Complex fire, found very low use by pileated woodpeckers (Hutto 1995, Murphy and Lehnhausen 1998). However, over a longer time period, the proposed action would reduce nesting, roosting, and foraging structures for this species. Nesting and roosting habitat would most likely be adversely impacted in 40 to 50 years, through a reduction in nesting and roosting structures, once mature or late

successional forest structure had developed in the project area. Long-term foraging structures would be adversely impacted through reduction in the number of available snags that would eventually be recruited into coarse woody debris and serve as habitat for carpenter ants, a primary food item for pileated woodpeckers.

Effects of the reductions in the snag population on pileated woodpeckers may be partially mitigated by the proposed deferment of approximately 497 acres of low, moderate, and high severity burn for a minimum of 5 years. These acres have largely retained their forest structure and snags. However, the low and moderate severity burned areas are also most susceptible to infestation by bark and wood-boring beetles, which may make them candidates for future salvage efforts. In which case, snags would be retained as described above (ARM 36.11.411). Thus, there would be low to moderate risk of direct and indirect effects to pileated woodpeckers as a result of the proposed action.

4.3.3.2.1.4 Cumulative Effects of Alternative B: Harvest

Cumulative effects of the proposed action relate primarily to long-term impacts from the removal of fire-killed trees, the absence of suitable pileated woodpecker habitat on adjacent private industrial land, and potentially compounding effects from salvage logging on adjacent private lands. The presence and abundance of seed tree/shelterwood harvests on private industrial lands within 1 mile of the project area demonstrate that the only potential pileated woodpecker habitat within the analysis area exists on School Trust land. With 2,614 acres of the School Trust's 4,549 acres within the analysis area burned to some degree (1,051 acres of stand replacement), the amount of potential pileated habitat was reduced by 23%. As previously alluded to, the potential for future salvage of insect-killed timber, as part of this proposed action, poses some of the greatest risk to pileated woodpecker habitat because it could reduce the presence of suitable snags or snag recruits within forested stands that possess structure suitable for nesting or roosting by pileated woodpeckers. However, under all proposed actions, salvage of current fire-killed and future insect-killed timber under this proposed action, snags would be retained as described above (ARM 36.11.411) to provide for future pileated woodpecker habitat. Thus, there would be low to moderate risk of cumulative effects to pileated woodpeckers as a result of this proposed action.

4.3.3.2.2 Black-backed Woodpeckers

4.3.3.2.2.1 Alternative A: Deferred Harvest (No Action)

No change from the current situation would be expected if this alternative were selected. The recent 36,683-acre Fish Creek Complex fire created approximately 953 acres of black-backed woodpecker habitat on School Trust land through stand replacement fire. Burned areas such as this tend to be used by black-backed woodpeckers for 1 to 5 years post-fire, in response to outbreaks of wood-boring beetles in the burned areas. Thus, there would be low risk of direct or indirect effects to black-backed woodpeckers as a result Alternative A: No Harvest (No Action).

4.3.3.2.2.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

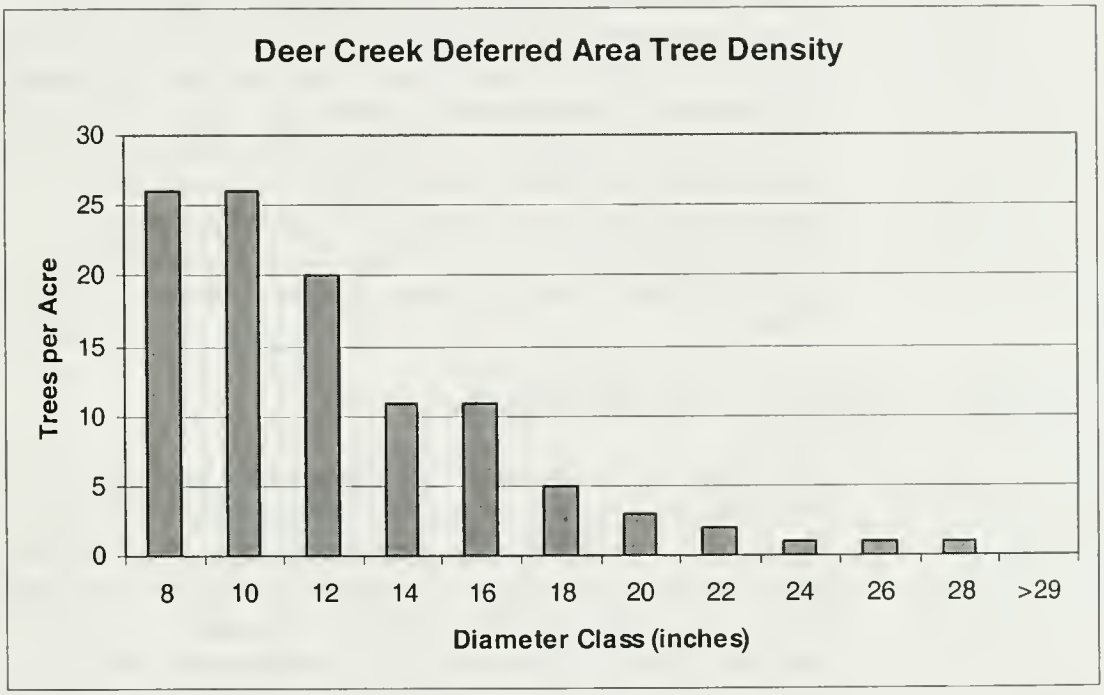
Cumulative effects would be associated with the proposed DNRC Fish Creek Road project, and salvage logging on surrounding private lands. The road project would construct 1.5 miles of new road in section 12 during the summer of 2004. Such road construction would permit motorized access within 0.25 mile of black-backed woodpecker. Additionally, salvage logging on surrounding private lands would reduce the abundance and availability of black-backed woodpecker habitat in the surrounding matrix, while reducing connectivity between black-backed woodpecker habitat on USFS and School Trust lands within the Fish Creek Complex. As such, mitigations that would be required of the Fish Creek Roads project would require DNRC to minimize mechanized activity within 0.25 mile of black-backed woodpecker habitat during the period of April 15 through July 1 (pursuant to ARM 36.11.438 (1)(a)). This mitigation would be expected to remain in effect for at least 5 years. Thus, there would be low risk of cumulative effects to black-backed woodpeckers as a result of Alternative A: No Harvest (No Action).

4.3.3.2.2.3 Alternative B: Harvest

The proposed action would harvest a total of 1,314 acres, of which 696 acres experienced stand replacing fire during the Fish Creek Complex fire in 2003. Within the proposed harvest units, an average of approximately 8 trees per acre ≥9 inches dbh would be retained (Fig. 5). The proposed action would defer harvesting all timber within 497 acres scattered throughout the project area, for a minimum of 5 years for black-backed woodpeckers (pursuant to ARM 36.11.438 (1)(b); (Figure 4-3). Of these acres, 323 acres experienced moderate fire intensity, and the remaining 209 acres experienced high intensity, stand replacing fire. For the 157 acres of black-backed woodpecker deferred habitat in sections 8 and 16, cruise data of these areas shows

that there is an average of 81 snags per acre, dbh ≥ 9 inches (Figure 4-4).

Figure 4-4: Diameter distribution for snags located on 157 acres of black-backed woodpecker deferred habitat (deferred for a minimum of 5 years) within sections 8 and 16. Diameters presented are the midpoints for a range of diameters (e.g., 8 inches dbh for 7 ≤ dbh < 9).



The proposed harvest area encompasses 731 acres of forest that experienced stand replacement fire in the Fish Creek Complex fire of 2003. Examining Figure 4-3, cruise data for the proposed harvest indicates that there are an average of 84 trees per acre ≥7 inches dbh, with an average of 3.43 trees per acre ≥21 inches dbh. Post-harvest, there would likely be an average of approximately 9 trees per acre ≥7 inches dbh, with an average of 1 trees per acre ≥21 inches dbh, and an average of 3 trees/snags per acre 15 ≤ dbh < 21 inches (pursuant to ARM 36.11.411). Thus, the proposed action would have low to moderate risk of direct and indirect impacts through reductions in suitable habitat that may affect a few pairs of black-backed woodpeckers.

4.3.3.2.2.4 Cumulative Effects of Alternative B: Harvest

The proposed action would harvest 731 acres of suitable black-backed woodpecker habitat resulting from the Fish Creek Complex fire on School Trust land. However, the same fire created 6,248 acres of black-backed woodpecker habitat on 20,102 acres of USFS land.

These USFS acres will likely remain unharvested (S. Kratville, Lolo NF, personal communication, September 2003). Additionally, within a 70-mile radius of the Fish Creek Complex, there were 7 other major fires (Appendix C: Figure C-2), totaling >150,000 acres of burn, of which >20% of the burned acreage was stand replacement fire. Thus, although the amount of suitable black-backed woodpecker habitat would be reduced within the project area, and within the proposed Dirty Ike Fire Salvage project, the two projects combined would reduce the amount of habitat available from the 2003 fires by approximately 3%. This represents a relatively small proportion of potential black-backed woodpecker habitat being affected within the analysis area. It is reasonable to assume that a sizable proportion of USFS acres that burned at stand replacement intensity will retain attributes that render them suitable for use by black-backed woodpeckers, due to their occurrence in wilderness areas (e.g., Mineral Primm) and other areas where salvage is activities are unlikely. Thus, the risk of adverse cumulative impacts on black-backed woodpeckers would be low as a result of this proposed action.

4.3.3.2.3 Flammulated Owls

4.3.3.2.3.1 Alternative A: Deferred Harvest (No Action)

No change from the current situation would be expected if this alternative were selected. The recent 36,683 acre Fish Creek Complex Fires removed approximately 457 acres of preferred flammulated owl habitat types from School Trust land through stand replacement fire. Such habitat would not be replaced by natural succession for approximately 50 to 60 years. Thus, there would be low risk of direct and indirect effects to flammulated owls as a result of Alternative A: No Harvest (No Action).

4.3.3.2.3.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

With no action, there would be no change from current conditions. Thus, there would be low risk of cumulative effects to flammulated owls as a result of this alternative.

4.3.3.2.3.3 Alternative B: Harvest

The proposed action would harvest 759 acres, out of a possible 2031 acres of flammulated owl preferred habitat types, of which approximately 291 acres are fire-killed timber that was subjected to a high intensity, stand replacing fire. The remaining 468 acres of flammulated owl preferred habitat types that would be harvested experienced mixed severity fire intensity. Thus, there would be low to moderate risk of direct or indirect effects of the proposed fire salvage to flammulated owls. In addition to the fire salvage, this proposed

action also includes salvage of future insect-killed timber within the project area. Stands that would be most susceptible to insect-related mortality are those stands subjected to ((1) mixed severity fire; (2) stands adjacent to the burned area that may have experienced heat related stress induced by the fire, which would leave them in a weakened state for infestation by bark beetles; and (3) nearby stands previously stressed by drought.) Thus, additional forested acres within the project area, containing preferred flammulated owl habitat types, may be subject to salvage harvest of varying intensity. Subsequent insect-related salvage operations may serve to open up stands, and may increase habitat suitability for the flammulated owl. However, approximately 425 acres of flammulated owl preferred habitat types would be deferred from harvesting for a minimum of 5 years (pursuant to ARM 36.11.438 (1)(b)), and any subsequent harvest operation would retain snags of suitable size for flammulated owls, pursuant to ARM 36.11.411. Thus, there would be low risk of direct and indirect effects to flammulated owls as a result of the proposed action.

4.3.3.2.3.4 Cumulative Effects of Alternative B: Harvest

Cumulative effects of the proposed action relate primarily to long-term impacts from the removal of fire-killed trees and the absence of suitable flammulated owl habitat on adjacent private industrial land. In the short-term, flammulated owls are not likely to utilize the stand replacement areas for nesting or roosting due to the lack of a forest canopy and understory growth, which would provide habitat for their preferred insect prey. However, in the long-term, removal of large diameter snags would reduce the availability of nesting and roosting substrate once suitable vegetative cover and forest structure developed. Within a 1-mile radius of the project area, shelterwood/seed-tree harvests have been the predominant silvicultural system on adjacent private industrial lands over the last 10 years. As a result, suitable forest structure conditions for nesting and roosting are currently lacking on these lands, and will not develop for at least another 40 years. Finally, there is the prospect of harvesting insect-killed timber that is related to the fire (e.g., insect infestations of fire/heat stressed trees), which is part of the proposed action. Under the proposed action, there would be approximately an additional 647 acres of flammulated owl preferred habitat types eligible for bug salvage, while approximately 425 acres of flammulated owl preferred habitat types would be deferred from harvesting for a minimum of 5 years (pursuant to ARM 36.11.438 (1)(b)). Thus, within the proposed action, 759 acres of flammulated owl preferred habitat types would be harvested for fire salvage, and an additional 647 acres would be eligible for bug salvage in the future. As a result, there would be a total of 1,406 acres eligible for harvest, depending upon the extent and intensity of future insect infestations within the project area. Thus there would be a low

to moderate risk of cumulative effects to flammulated owls as result of implementing this proposed Alternative B: Harvest, depending upon the extent of fire-related insect infestations within the project area in the future.

4.3.3.2.4 Fisher

4.3.3.2.4.1 Alternative A: Deferred Harvest (No Action)

With no action, there would be no change from current conditions. Thus, there would be low risk of direct or indirect effects to fisher as a result of this alternative.

4.3.3.2.4.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

With no action, there would be no change from current conditions. Thus, there would be low risk of cumulative effects to fisher as a result of this alternative.

4.3.3.2.4.3 Alternative B: Harvest

Approximately 618 acres of the 888 acres of preferred fisher habitat types to be harvested under the proposed action would be stand replacement-burned timber. The remaining 170 acres would be mixed severity burn. Thus, the amount of potentially suitable fisher habitat to be harvested would amount to approximately 8.5% of the 2,001 acres of preferred fisher habitat types within the project area. Of the remaining 1113 acres of preferred fisher habitat types that were affected by the fire (these acres experienced mixed severity fire intensity), 384 acres would be deferred from harvesting for a minimum of 5 years, and the remaining 729 acres would be subject to salvage, should an insect infestation occur within the next 5 years.

Under current conditions, the 618 acres of stand replacement fire that would be harvested under the proposed action are not currently suitable habitat for fisher. These acres would continue to be unsuitable for approximately 50 years, when the area had become revegetated, displaying late successional forest attributes. The proposed action would, in the long term, remove key fisher habitat attributes (i.e., snags and eventually coarse woody debris) that would be of importance once natural forest succession had occurred. Thus, because much of the affected habitat is currently unsuitable for fisher, and currently suitable fisher habitat would be deferred from harvesting for a minimum of 5 years (pursuant to ARM 36.11.438 (1)(b)), there would be low risk of direct and indirect effects to fisher as a result of the proposed action.

4.3.3.2.4.4 Cumulative Effects of Alternative B: Harvest

The proposed action would harvest approximately 888 acres of stand replacement-burned timber within preferred fisher habitat types. This amounts to approximately 4% of the 24,489 acres of preferred fisher habitat types within a 1-mile radius of the Fish Creek Complex Fires. Cumulative effects for fisher are primarily related to past harvesting on the surrounding private industrial lands, which have largely been harvested under a seed tree/shelterwood silvicultural system in recent years and reduced habitat connectivity for fisher between School Trust lands and habitat on nearby USFS lands. Because of the extent of stand replacement fire in the Deer Creek drainage, current linkages for fisher habitat connectivity are to unburned USFS lands NW (T14N, R25W) and SE (T13N, R24W) of the Fish Creek Complex. Otherwise, there currently is no habitat connectivity between patches of fisher habitat on School Trust land within the analysis area due to habitat fragmentation on adjacent private industrial lands. Thus, the risk of cumulative effects to fisher would vary with the extent of future bug salvage that would be related to the Fish Creek Complex. The proposed fire salvage itself would have low risk of cumulative effects because it is largely harvesting timber in areas that are currently unsuitable habitat to fisher, due to stand replacing fire. However, fire-related salvage of insect-killed timber, depending on the spatial extent, could increase the risk level to moderate for fisher.

4.3.3.3 Other Sensitive Species

4.3.3.3.1 Harlequin Duck

4.3.3.3.1.1 Alternative A: Deferred Harvest (No Action)

With Alternative A: Deferred Harvest (No Action), there would be no change from current conditions. Thus, there would be low risk of direct or indirect effects to harlequin ducks as a result of this alternative.

4.3.3.3.1.2 Cumulative Effects of Alternative A: No Harvest (No Action)

With no action, there would be no change from current conditions. Thus, there would be low risk of cumulative effects to harlequin ducks as a result of this alternative.

4.3.3.3.1.3 Alternative B: Harvest

The proposed action would have a higher likelihood of producing effects to harlequin ducks through increasing sedimentation, which would affect water quality, and subsequently, this species' ability to locate aquatic food. Under undisturbed, post-burn conditions, the highest sedimentation levels would occur during the first 2 years post-

burn, with water clarity returning to approximately 90% by the third year, post-burn (J. Collins, MT DNRC, personal communication, October 2003). As a result of the nutrient influx into the streams, there would likely be an increase in algae and aquatic insects (e.g., harlequin duck food). However, within stand replacement burn areas, terrestrial vegetation would require 5 to 10 years to recover and provide suitable vegetative structure in which harlequin ducks would nest. Thus, the proposed action, would remove fire- and insect-killed timber during this time period, but would not enter riparian zones where harlequin ducks would most likely nest. The proposed action would not prolong or increase sediment input into streams due to location of roads and harvest unit design (see Soils report). Thus, there would be low risk of direct and indirect effects to harlequin ducks as a result of the proposed action.

4.3.3.3.1.4 Cumulative Effects of Alternative B: Harvest

The proposed action would not enter SMZ's, where harlequin ducks are most likely to nest, or increase sedimentation levels above natural background levels (see Soils report). Thus, there would be low risk of cumulative effects to harlequin ducks as a result of the proposed action.

4.3.3.4 Big Game

4.3.3.4.1 White-tail Deer, Elk, and Moose

4.3.3.4.1.1 Alternative A: No Harvest (No Action)

With Alternative A: No Harvest (No Action), there would be no change from current conditions. The Fish Creek Complex removed security cover and thermal cover within Deer Creek and portions of Thompson Creek that experienced stand replacing fire, making white-tailed deer, elk, and moose more vulnerable to overharvest during the hunting season. Without road closures, it is expected that the 2003 hunting season would result in overharvest that would affect hunting recreation opportunities for many years (BAER Team Fish and Wildlife Report 2003). Thus, there would be moderate risk of direct or indirect effects to big game species as a result of this alternative.

4.3.3.4.1.2 Cumulative Effects of Alternative A: Deferred Harvest (No Action)

With no action, effects to white-tailed deer, elk, and moose would have the compounding effect of the loss of thermal and security cover with potential overharvest during the hunting season. Thus, there would be moderate risk of cumulative effects to these big game species as a result of this alternative.

4.3.3.4.1.3 Alternative B: Harvest

Effects of the proposed action on white-tailed deer, elk, and moose relate to the project's handling of thermal cover and open roads for potential overharvest during the hunting season. The proposed action would harvest fire-killed timber, and would not harvest live green trees unless they have been recently infested with *Dendroctonus* beetles. However, the proposed action does contain the possibility of re-entry for harvest of future insect-killed timber within the project area. Under both conditions of harvest, fire-salvage and bug-salvage, the proposed action would not be removing tree canopies that would contribute to winter thermal cover for deer. DNRC considered restricting motorized access on 34 miles of currently open roads between Bear Creek and Cyr Flats for big game security. However DNRC could not gain cooperation from other landowners for implementation of the restriction. As such, all roads that would be constructed under the proposed action and the Fish Creek Roads project would be closed to motorized access upon completion of the projects (i.e., installation of gates, tank traps, etc., where necessary). Thus, on School Trust land, there would be low risk of direct and indirect effects to white-tailed deer, elk, and moose as a result of the proposed action.

4.3.3.4.1.4 Cumulative Effects of Alternative B: Harvest

As discussed under direct and indirect effects, the proposed action there would be low likelihood that the proposed action would contribute to additional loss of thermal cover because the proposed action would focus on salvage of dead timber related to recent fires and potentially subsequent insect infestations (the infestations would themselves create a loss of thermal cover). In development of the proposed action, DNRC attempted to create additional security areas through a proposal to reduce open road density, but could not obtain required cooperation from other landowners within the analysis area. When the proposed action would be completed, all roads that would be newly constructed or reconstructed would either be located behind locked gates or other closure devices would be installed for big game security. Thus, there would be low risk of cumulative effects to white-tailed deer, elk, and moose as a result of implementing the proposed action.

4.3.4 Cumulative Effects Associated with other DNRC Projects

Several other DNRC projects are either ongoing or have undergone scoping in the general area around the Fish Creek Project Area. The following table displays the name of the proposed activity, the year when activity is planned, and the type of activity proposed. Of the projects listed, all are outside of any Analysis Area used

in this assessment and would have no measurable cumulative effects on wildlife considered in this assessment.

Table 4-5: OTHER DNRC MISSOULA UNIT ACTIVITIES

Project Name	Air miles from Fish Creek Salvage	Year of Proposed Activity	Description of proposed Activity
Turah Creek	42	2003	Commercial Thinning
Cramer	36	2003	Shelterwood
Roman/Six Mile	36	2004	Commercial Thinning and PCT
Tyler Creek	60	2004	Shelterwood
Davis Point	35	2005	Overstory removal
Land of Lodgepole	48	2003	Commercial Thinning
St. Regis Beetle	30	2003	Commercial Thinning
St. Regis Cable	30	2003	Commercial Thinning
Flat Pardee	36	2003	Commercial Thinning
Dry Gulch	36	2006	Shelterwood
Dirty Ike Salvage	48	2003	Salvage
Deadman Gulch	24	2004	Commercial Thinning

CHAPTER 5

INDIVIDUALS ASSOCIATED WITH THE PROJECT

5.0 List of Individuals Associated with the Project

Preparers:

Bob Rich	Supervising Forster/Project Leader, Missoula Unit, SWLO, DNRC
Cindy Bertek	Forester, Missoula Unit, SWLO, DNRC
Rich Stocker	Forester, Missoula Unit, SWLO, DNRC
Jonathan Hansen	Unit Manager/Decision Maker, Missoula Unit, SWLO, DNRC
Mike McGrath	Wildlife Biologist, SWLO, DNRC
Renee Hanna	Hydrologist, SWLO, DNRC
Jeff Collins	Soil Scientist, Forest Management Bureau, SWLO, DNRC

CHAPTER 6

AGENCIES AND PERSONS CONSULTED

6.0 List of Agencies and Persons Consulted and/or Provided Copies of this EA

Bob Henderson	Wildlife Biologist, DFWP, Missoula
Pat Rennie	Archeologist, AGMB, DNRC, Helena
Mack Long	Regional Supervisor, MT Fish Wildlife & Parks
Ecology Center	Missoula. MT

CHAPTER 7

REFERENCES

7.0 References

Wildlife Portion:

Bellrose, F. C. 1980. Ducks, geese and swans of North America. Stackpole Books, USA.

Bull, E. L. and J. A. Jackson. 1995. Pileated woodpecker (*Dryocopus pileatus*). Pages The Academy of Natural Sciences; The American Ornithologists' Union, Philadelphia, Pennsylvania.

Bull, E. L., R. S. Holthausen, and M. G. Henjum. 1992. Roost trees used by pileated woodpeckers in northeastern Oregon. Journal of Wildlife Management 56:786-793.

Bull, E. L., S. R. Peterson, and J. W. Thomas. 1986. Resource partitioning among woodpeckers in northeastern Oregon. E. L. Bull, S. R. Peterson, and J. W. Thomas (Resource partitioning among woodpeckers in northeastern Oregon. U. S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. Research Note PNW-444.

Clem, M. K. 1977. Food habits, weight changes and habitat use of fisher *Martes pennanti* during winter. M. S. Thesis, University of Guelph, Guelph, Ontario.

Coulter, M. W. 1966. Ecology and management of fishers in Maine. Dissertation, Syracuse University, Syracuse, New York.

Hewitt, D. G. and C. T. Robbins. 1996. Estimating grizzly bear food habits from fecal analysis. Wildlife Society Bulletin 24:547-550.

Hutto, R. L. 1995. Composition of bird communities following stand-replacement fires in northern Rocky Mountain (U.S.A.) conifer forests. Conservation Biology 9:1041-1058.

Kasworm, W. F. and T. L. Manley. 1990. Road and trail influences on grizzly bears and black bears in northwest Montana. International Conference on Bear Research and Management 8:79-84.

Kelly, G. M. 1977. Fisher (*Martes pennanti*) biology in the White Mountain National Forest and adjacent areas. Dissertation, University of Massachusetts, Amherst, Massachusetts.

Koehler, G. M. 1990. Population and habitat characteristics of lynx and snowshoe hares in north central Washington. Canadian Journal of Zoology 68:845-851.

McCallum, D. A. 1994. Flammulated owl (*Otus flammeolus*). Pages 1-24 *in* The Academy of Natural Sciences; The American Ornithologists' Union, Philadelphia, Pennsylvania.

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

McClelland, B. R., S. S. Frissell, W. C. Fischer, and C. H. Halvorson. 1979. Habitat management for hole-nesting birds in forests of western larch and Douglas-fir. Journal of Forestry 77:480-483.

McTague, J. P. and D. R. Patton. 1989. Stand density index and its application in describing wildlife habitat. Wildlife Society Bulletin 17:58-62.

Mowat, G., G. Poole, and M. O'Donoghue. 2000. Ecology of lynx in northern Canada and Alaska. *Pages* 265-306 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. McKelvey, and J. R. Squires (eds.). Ecology and conservation of lynx in the United States. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ft. Collins, Colorado. General Technical Report RMRS-GTR-30WWW.

Powell, R. A. 1977. Hunting behavior, ecological energetics and predator-prey community stability of the fisher (*Martes pennanti*). Dissertation, University of Chicago, Chicago, Illinois.

_____. 1978. A comparison of fisher and weasel hunting behavior. Carnivore 1:28-34.

Ruediger, B., J. Claar, S. Gniadek, B. Holt, L. Lewis, S. Mighton, B. Naney, G. Patton , T. Rinaldi, J. Trick, A. Vandehey, F. Wahl, N. Warren, D. Wenger, and A. Williamson. 2000. Canada lynx conservation assessment and strategy. U. S. Department of Agriculture, Forest Service, Missoula, Montana. R1-00-53.

Squires, J. R. and T. Laurion. 2000. Lynx home range and movements in Montana and Wyoming: preliminary results. *Pages* 337-349 *in* L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, G. M. Koehler, C. J. Krebs, K. McKelvey, and J. R. Squires (eds.). Ecology and conservation of lynx in the United States. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Ft. Collins, Colorado. General Technical Report RMRS-GTR-30WWW.

Torgersen, T. R. and E. L. Bull. 1995. Down logs as habitat for forest-dwelling ants--the primary prey of pileated woodpeckers in northeastern Oregon. Northwest Science 69:294-303.

Waller, J. S. and R. D. Mace. 1997. Grizzly bear habitat selection in the Swan Mountains, Montana. Journal of Wildlife Management 61:1032-1039.

Water, Soils, and Fisheries Portion:

Amaranthus, M., H. Jubas and D. Arthur, 1988. Stream Shading, Summer Streamflow and Maximum Water Temperature Following Intense Wildfire in Headwater Streams. Proceedings of the Symposium on Fire and Watershed Management, October 26-28, 1988. Sacramento, California, USDA, Forest Service, Pacific Southwest Forest and Range Experiment Station, GTR PSW-109, p75-78.

Beschta, R.L., R.E. Bilby, G.W. Brown, L.B. Holtby and T.D. Hofstra, 1987. Stream Temperature and Aquatic Habitat: Fisheries and Forestry Interactions. In Proceedings of Symposium Streamside Management: Forestry and Fishery Interactions held at the University of Washington, February 12-14, 1986, Seattle, WA. p191-232.

Bragg, D.C., J.L. Kershner and D.W. Roberts, 2000. Modeling large Woody Debris Recruitment for Small Streams of the Central Rocy Mountains. USFS Rocky Mountain Research Station. General Technical Report, RMRS-GTR-55, June 2000. 36pp.

Klock, Glen O. Impact of five postfire salvage logging systems on soils and vegetation. J. of Soil and Water Cons. 1975.

Losensky, John, 1987, An Evalution of Noxious weeds on the Lolo, Bitterroot and Flathead Forests with recommendations for Implementing a Weed Control Program. Lolo National Forest, Forest Service, U.S. Department of Agriculture

McIver, James D. and L. Starr eds. 2000. Environmental effects of post-fire logging: Literature Review and Annotated Bibliography. General Tech. Report PNW-GTR-486. U.S. Forest Service, Pacific Northwest Research Station, Portland, OR. 72p.

Montana Department of Environmental Quality. 1996 & 2002. Draft Montana 303(d) List: Waterbodies in Need of Total Maximum Daily Load Development. Montana DEQ, Helena, MT. 315pp.

Montana Department of Health and Environmental Sciences, 1991. Montana Non-Point Source Management Plan, Helena, MT.

Montana Department of Natural Resources and Conservation, 2002. Environmental Analysis for Moose Fire Mitigation, Salvage and Recovery Project. Stillwater Unit, Olney, MT. November, 2002.

Montana Department of Natural Resources and Conservation, 2000. Sula State Forest Fire Mitigation, Salvage and Recovery Project Environmental Assessment. Southwest Land Office, Missoula, MT.

Department of Natural Resources and Conservation, 2002. Soil Monitoring Report, Sula State Forest Fire Mitigation, Salvage and Recovery Project Environmental Assessment. Forest Management Bureau, Missoula, MT.

Poff, Roger 1989 in Proceedings of the Symposium on fire and Watershed management; Oct 1988, Gen. The. Rep. PSW-109. Berkeley,CA; Pacific Souhwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture.

Robichaud, P.R., J.L. Beyers and D.G. Neary, 2000. Evaluating the Effectiveness of Postfire Rehabilitation Measures. USFS Rocky Mountain Research Station. General Technical Report RMRS-GTR-63. September 2000. 85pp.

Salminen, E.M. and R.L. Beschta, 1991. Phosphorus and Forest Streams: The Effects of Environmental Conditions and Management Activities, Unpublished report. Department of Forest Engineering, Oregon State University, Corvallis, OR. 185pp.

Spencer, C.N. and F.R. Hauer, 1990. Effects of Wildfire on Nutrient and Carbon Dynamic of Streams in Glacier National Park and the Flathead National Forest Associated with the Red Bench Fire. Open File Report 111-90, March 1990, Flathead Lake Biological Station, University of Montana, 54pp.

USDA Forest Service, 2003. Burned Area Emergency Rehabilitation (BEAR) Report: Fish Creek Fire. Lolo National Forest. September 2003.

Williams, John D. 1993. Winter Logging and Erosion in a Ponderosa Pine forest of Northeastern Oregon, Western Journal of Applied Forestry.8(1):19-23

APPENDIX

Figure A-1: Vicinity Map

Fish Creek Harvest Analysis Area

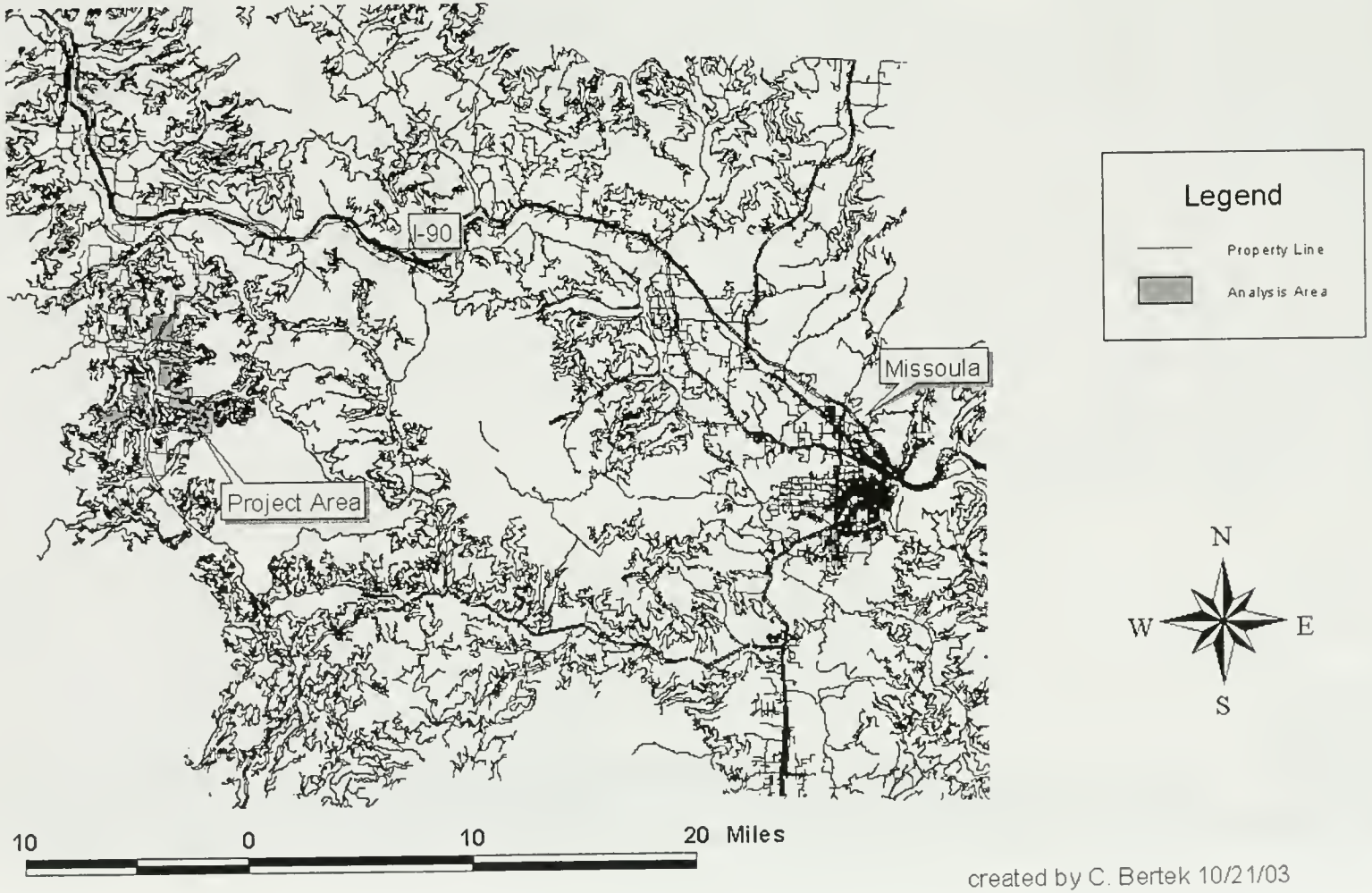
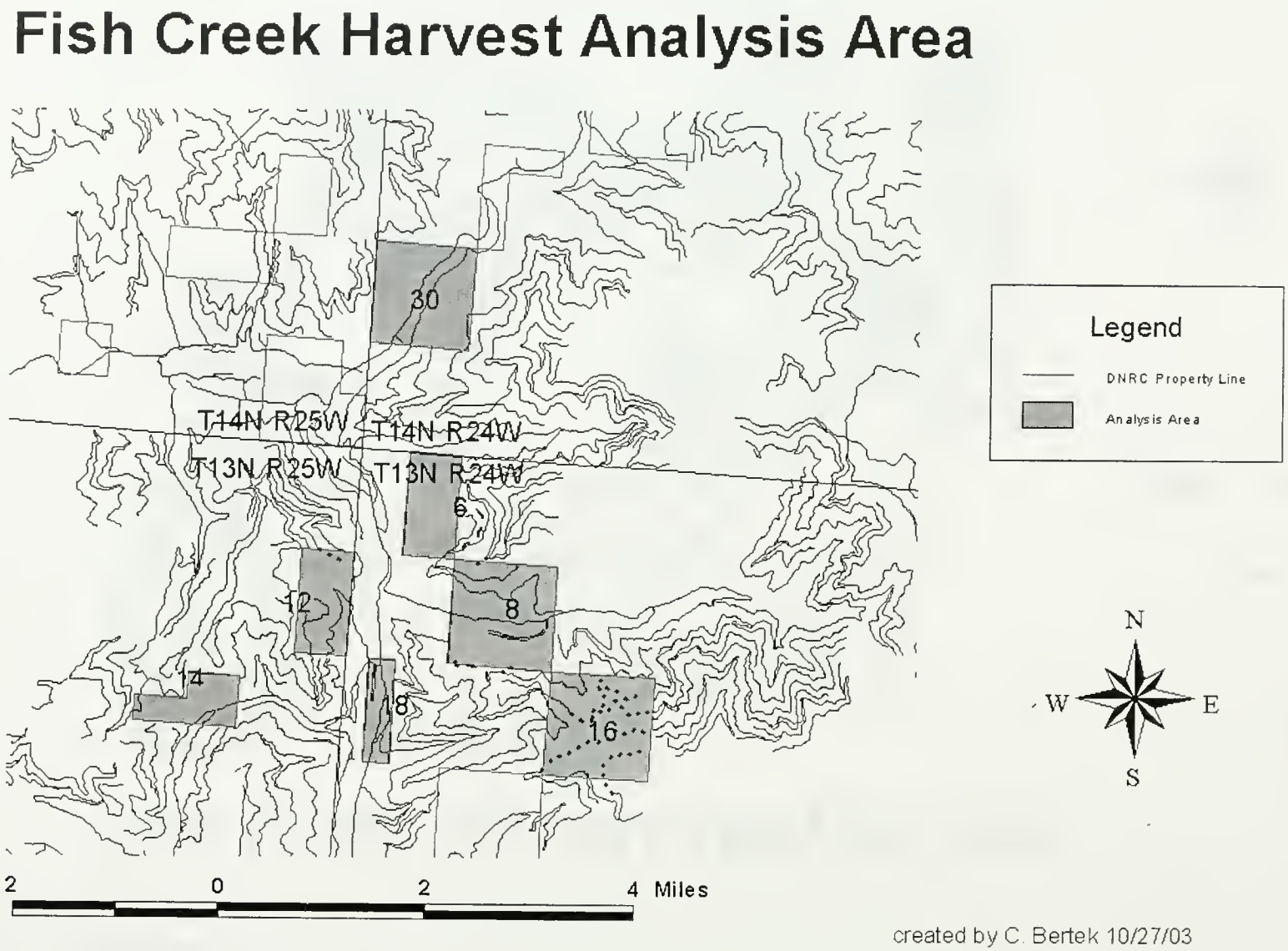


Figure A-2: Harvest Analysis Area



Appendix B: Water, Soils, Fisheries

Figure B-1: Burn Severity Map

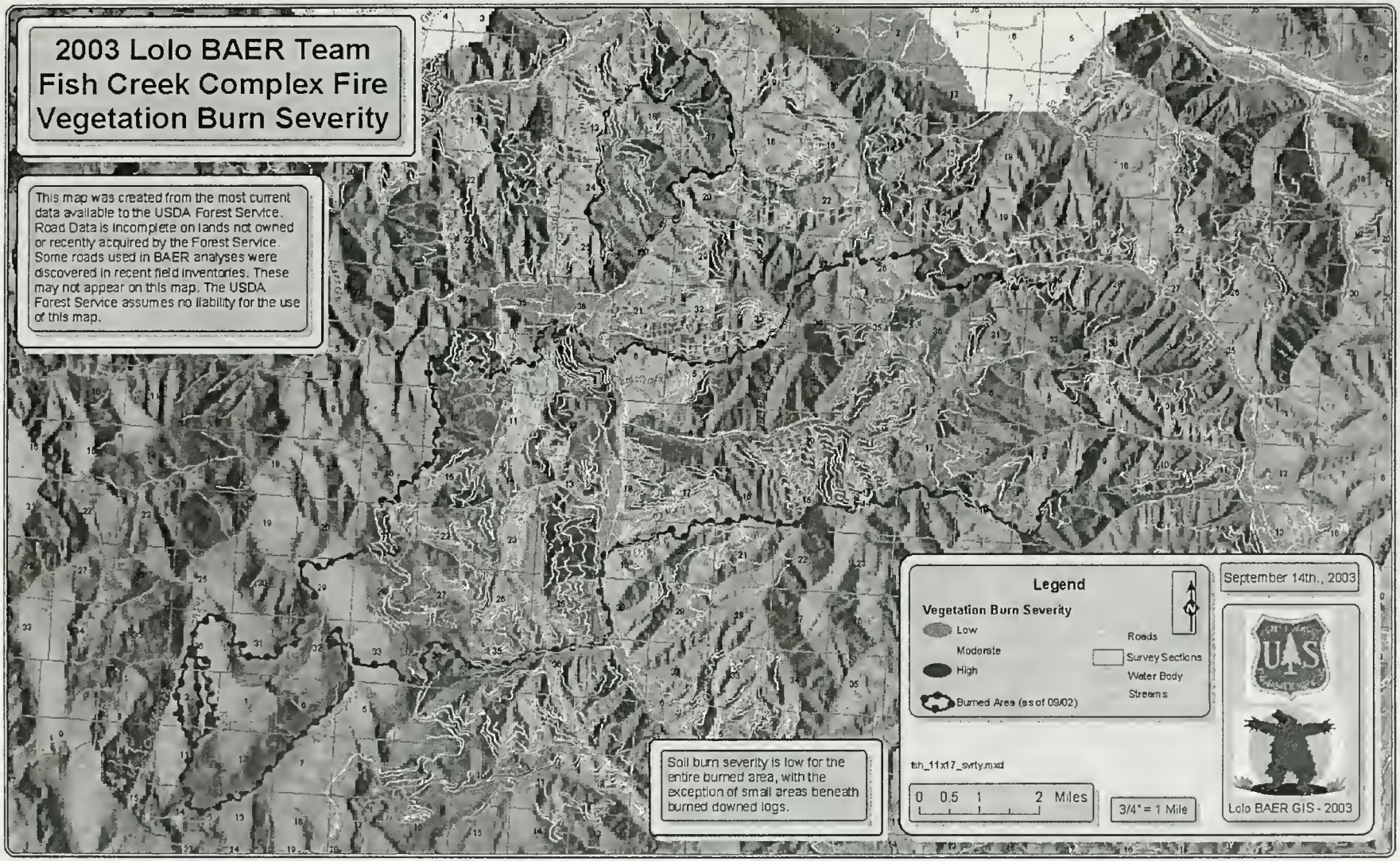
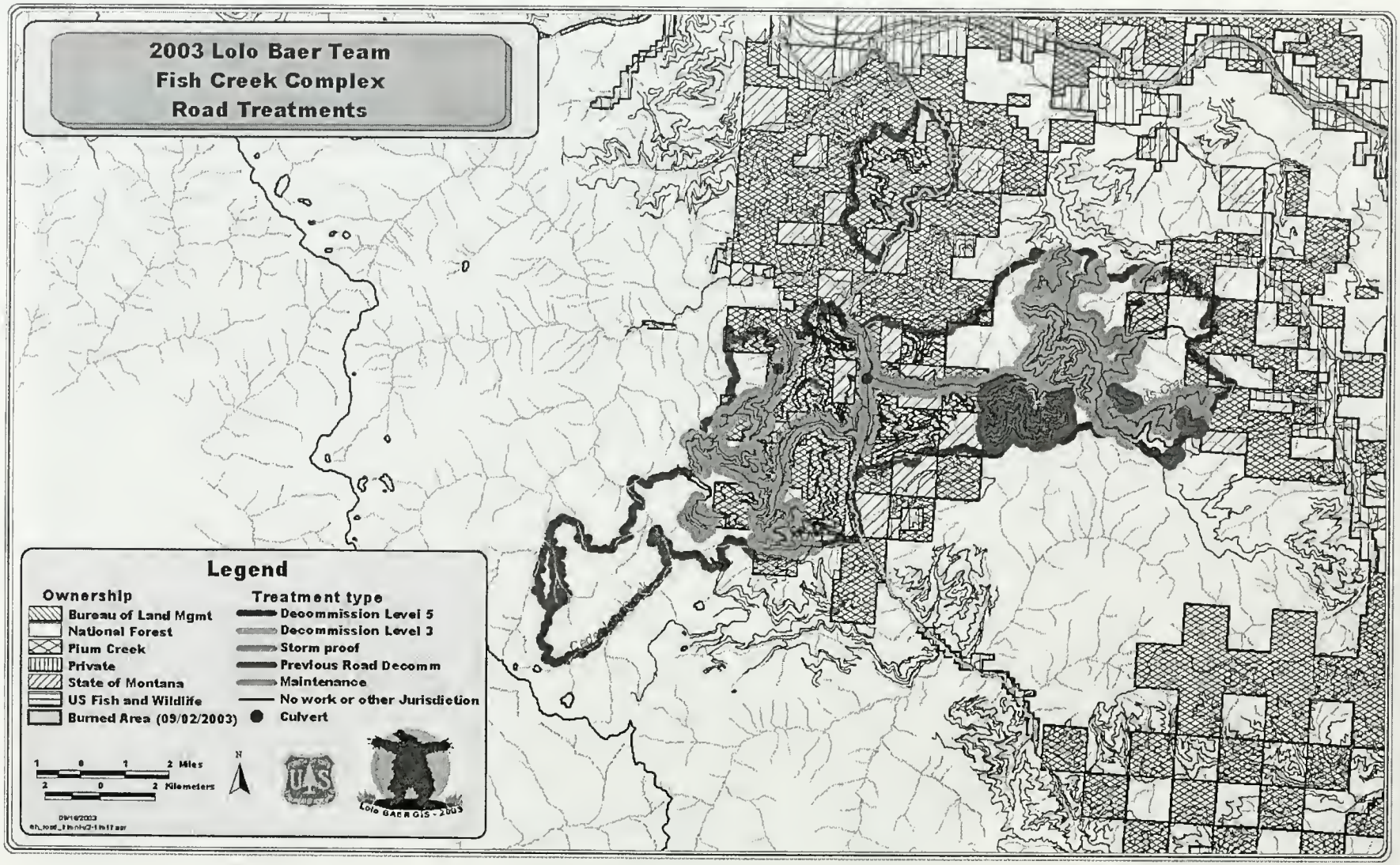
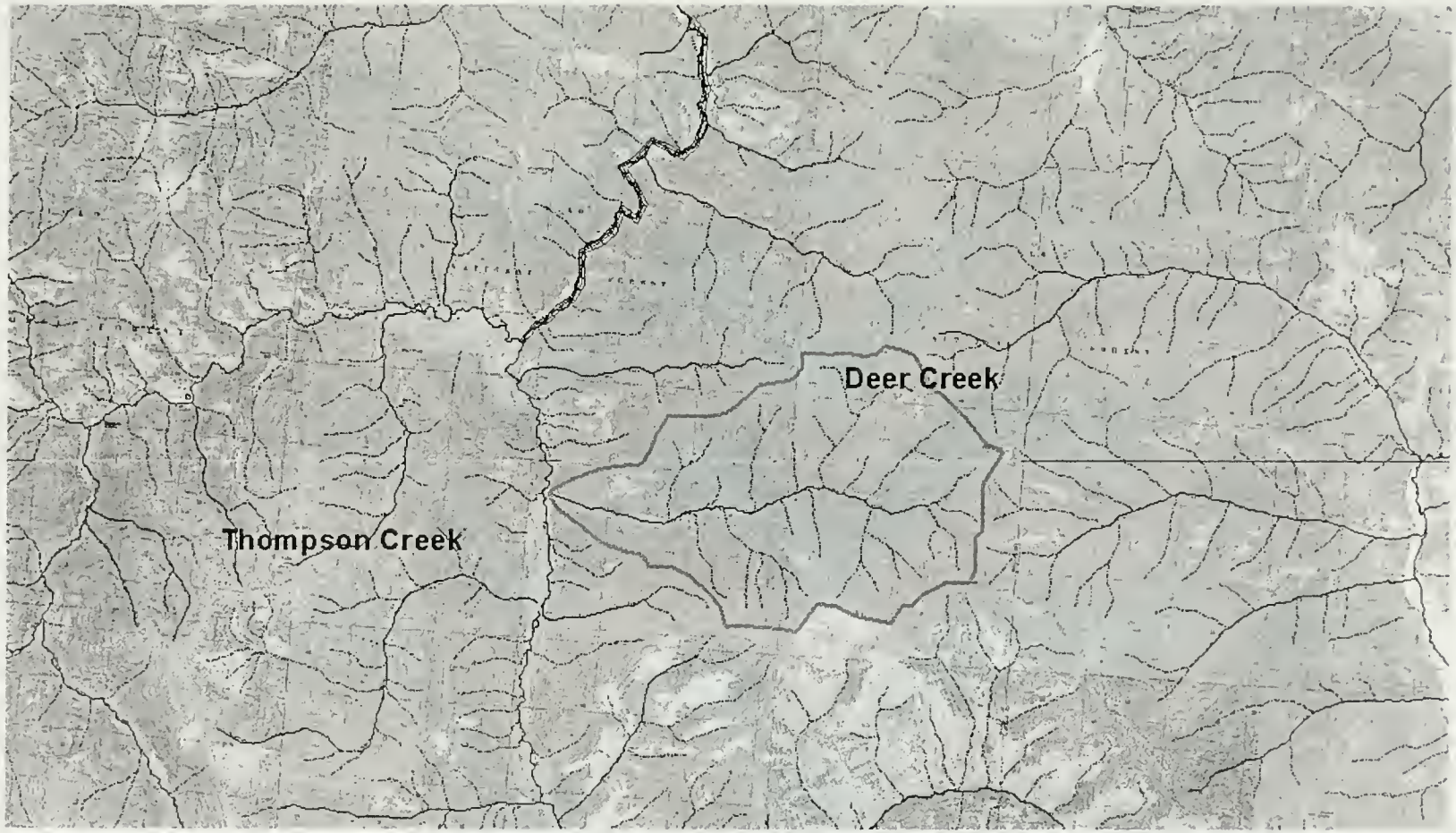


Figure B-2: Road Treatment Map



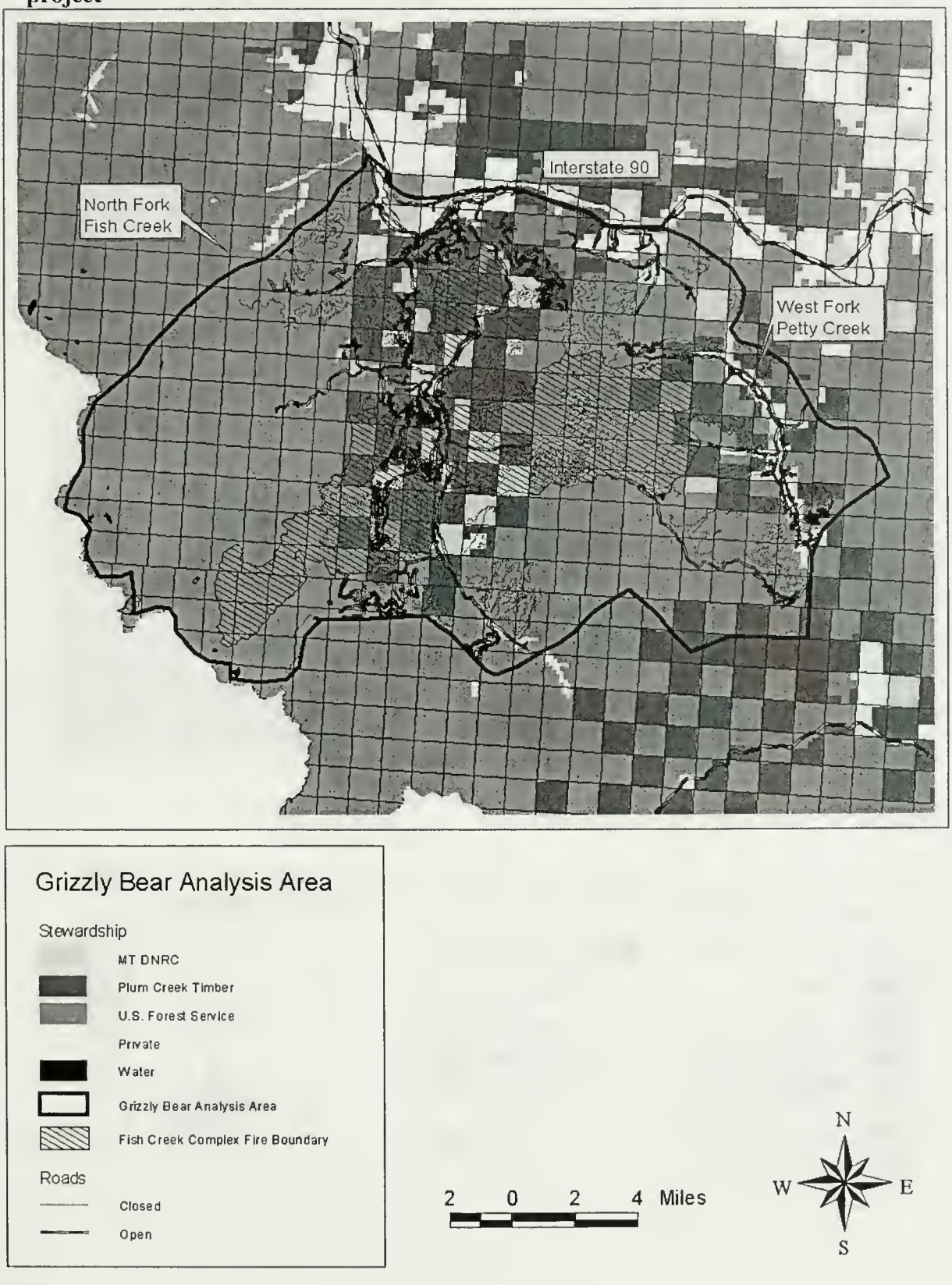
Appendix B: Water, Soils, Fisheries

Figure B-3: Watershed Map



Appendix C: Wildlife

Figure C-1: Grizzly bear analysis area for the proposed Fish Creek Salvage project



Appendix C: Wildlife

Figure C-2: Area fires of 2003 surrounding the Fish Creek Complex

Appendix C: Wildlife

Figure C-3: Proposed Fish Creek Salvage project, with black-backed woodpecker deferment identified

Deferment Areas

Black-backed Woodpecker Deferments

Proposed Harvest Units
- Down hillyard
- Excaline
- Ground Based
- High bank
- Skyline

Existing Roads
- Closed
- Open

Fish Creek Proposed Roads
- New Construction
- Reconstruction
- Temporary Spur

Stewardship
- MT DNRC
- Plum Creek Timber
- U.S. Forest Service
- Private
- Water

0.5 0 0.5 1 Miles

N
W E
S

Department of Natural Resources and Conservation
Missoula Unit
1500 Tower St.
Missoula, MT 59804
(406) 542-4201

Persons with disabilities who need an alternative, accessible format of this document should contact DNRC at the address or phone number shown above.

20 copies of this document were published at an estimated cost of $12 per copy