Organization #
Amount
DNRC Trust Land Management Division
Date

Dry Bear Mouth

Timber Sale
Environmental Assessment

October 2005
Montana Department of Natural Resources and Conservation
Southwestern Land Office
Missoula Unit

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LEGISLATIVE ENVIRONMENTAL
POLICY OFFICE

FINDING

DRY BEAR MOUTH TIMBER SALE

1. **ALTERNATIVE SELECTED**
   Two alternatives were presented and the effects of each alternative were fully analyzed in the environmental Assessment (EA):

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

   For the following reasons, I have selected Alternative B:

   1. This alternative meets the Purpose of Action and Project Objectives as described in chapters 1 and 2 of the EA. Implementation of this alternative would produce an estimated $1,058,370 in revenue to the Common School (CS) grant.

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

   3. 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-** A DNRC Hydrologist analyzed the effects of the proposed Alternative B, as a result of this analysis, it was concluded that there is little risk of adverse impacts to water quality, cold-water fisheries and other beneficial uses occurring as a result of implementing Alternative B.

   b) **Water Yield-** Results of the water yield analysis conducted for the proposed action indicates that the levels of water yield increases anticipated under Alternative B are below those levels normally associated with detrimental impacts to stream channel stability and function, therefore, no significant impacts will occur.

c) **Cumulative Watershed Effects-** The proposed harvest and road construction present a low to moderate risk of cumulative impacts of increased sediment delivery by disturbing soil. The risk of cumulative effects from sediment delivery will be reduced or eliminated by using erosion control measures. There is a low risk of adverse impacts to downstream water quality and beneficial uses occurring as a result of the proposed project.

d) **Soil Resources-** Tractor skidding and cable harvest could cause direct effect to soils that could result in increased erosion. Mitigation measures will maintain soil resources and minimize disturbance. Retention of slash and coarse woody debris will have a long-term beneficial effect to nutrient cycling, maintain long-term soil productivity and reduce on-site erosion.

e) **Cold Water Fisheries-** 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, maintenance, and soil disturbance. Mitigations to control sediment and application of erosion control measures will minimize disturbance. Because no harvest will occur in the Streamside Management Zones there will be little effect on large woody debris recruitment or stream shading.

f) **Noxious Weeds-** Similar or slight increase in noxious weed density and occurrence, due to soil disturbance and decreased tree canopy. Integrated weed management efforts will continue through out the project area. Control efforts will promote revegetation and emphasize treatment of any new noxious weeds. More Forest Improvement dollars would be available for weed control.

g) **Natural Forest Conditions and Old Growth-** Vigor and growth rates of trees will improve within treated stands. Improved vigor and removal of insect infested trees will help prevent further mortality. Regeneration would add to stand structure and potentially improved growth rates. Less dense stand conditions will decrease the risk of stand replacement fire.

h) **Road Dust-** There will be an increase in road dust, if logs are hauled under dry road conditions. Minimal direct and cumulative effect.

i) **Recreational Site Use-** Increased logging traffic may produce dust during the dry summer months. This may be a nuisance to motorists traveling to Garnet Ghost Town via Bear Gulch Road. The potential for a cumulative increase of logging traffic will be problematic with respect to the relative safety of motorists. Dust and safety issues have the potential to directly effect visitors to Garnet Ghost Town. Use of the Road up Deep Creek and The Mulkey Cut-across Road by Log Trucks during the winter season will directly affect snomobilers use of these roads. Impacts to visitors and snowmobilers will be short term. The Timber Sale Contract would stipulate warning signing of roads. Cumulative impacts would be short term, i.e. 1-3 years, the duration of the Timber Sale Contract.

j) **Economic Benefits and Expected Revenues-** The investment into the road infrastructure under this alternative will be approximately $ 3.57/ton. This investment will decrease future management costs. The Forest Improvement collections will be approximately $96,472. This money will be deposited in the Forest Improvement fund to be used for thinning, prescribed burning, planting, weed management, and the management activities on Trust Lands. The projected revenue of this alternative for the School Trust is approximately $1,058,370. The proposed project will provide work for road-building contractors, logging contractors, their subcontractors, and their employees. The logs produced from this timber sale will likely be processed by local mills providing additional employment opportunities.

k) **Historical and Archaeological Sites-** Whereas there is a proposed road adjacent to site 24GN448 (cabin remains and prehistoric chert gathering site), road construction activities are not expected to cause disturbance to the cabin remains. The DNRC archaeologist approved the road location. There is a low risk for direct, indirect or cumulative effects.

l) **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 mitigations for wildlife travel and cover.

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 ENVRONMENTAL 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 Hansen
Missoula Unit Manager-Decision Maker
November 8, 2005

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Jonathan Hansen
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Dry Bear Mouth Timber Sale Environmental Assessment

Cover Sheet

Proposed Action: The Montana Department of Natural Resources and Conservation (DNRC) is proposing to harvest timber on State School Trust Lands. The Timber Sale proposal is to harvest approximately 40,000 tons (5.7 million board feet) of timber. The harvest area is approximately 1,700 acres. The proposed harvest activities are in Section 2, T11 N, R 15 W, Section 36, T12N, R15W, Section 16 and Section 36, T12N, R14W and Section 16, T12N, R13W. The proposed action could be implemented as early as June 2006.

Type of document: Environmental Assessment

Lead agency: Montana Department of Natural Resources and Conservation (DNRC)

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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.

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HOW TO READ THIS ENVIRONMENTAL ASSESSMENT (EA)

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 Dry Bear Mouth Timber Sale 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 a summary. It is the intention that the reader will understand the proposal and the potential environmental, technical, economic, and social consequences; of **taking** or **not taking** action.

- **Chapter 1** introduces the Dry Bear Mouth Timber Sale proposal. It provides a very brief description of the proposed project and goes on to explain the following three aspects:

  (1) The relevant environmental issues.

  (2) The decisions to be made.

  (3) The relevant laws and regulations with which the DNRC must comply.

- **Chapter 2** provides detailed descriptions of Alternative A: No Action and Alternative B: Harvest. It includes a summary comparison of the predicted effects of these two alternatives on the human environment. The intent of this chapter is to provide a basis for choice between the two alternatives.

- **Chapter 3** briefly describes the past and the existing conditions with respect to the relevant resources (*issues*) that would be meaningfully affected. The intention is to establish a baseline, facilitating a comparison of the alternatives with respect to the predicted effects.

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

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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 harvest timber from the Dry Gulch, Secret Gulch, Packer Gulch and Gambler Gulch Sections (Section 2, T11 N, R 15 W, Section 36, T12N, R15W and Section 16 and Section 36, T12N, R14W, and Section 16, T12N, R13W, respectively). The implementation of Alternative B would yield approximately 40,000 tons (5.7 million board feet) of timber from approximately 1700 acres. This would generate revenue for the benefit of the Common School (CS) grants. The proposed action could be implemented as early as June 2006, and could be completed by July 2009 (these dates are approximate). The timber would likely be offered for sale through two different Timber Sale Contracts (each three year terms), sold in consecutive years.

1.2 Location

The location of the proposed project is Section 2, T11 N, R 15 W, Section 36, T12N, R15W, Section 16 and Section 36, T12N, R14W, and Section 16, T12N, R13W. Of the 1,700 acres proposed for harvest there are 210 acres in Powell County; the remainder (1,490 acres) is in Granite County. The proposed timber sale is located approximately 30 miles west of Missoula, Montana, near Bearmouth. The lands in Granite County are in the Bear Gulch and Dry Gulch drainages, part of the Clark Fork River drainage. The lands in Powell County drain into Douglas Creek in the Blackfoot River drainage. See map in 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).

1.4 Objective of the Action

In order to meet the goals of the management philosophy adopted through programmatic review of the State Land Forest Management Plan (SLFMP) DNRC, 1996 and defined in the Administrative Rules for Forest

Management (ARM 33.11.401 through 450), the Department has set the following specific project objectives:

1.4.1 Objectives

- Generate a reasonable and legitimate amount of revenue for the Common School Trust Grant by harvesting approximately 35,000-49,000 tons (5-7 million board feet) of timber.
- Promote forest health and vigor of timber stands and subsequently help prevent and or decrease the incidence of insect and disease infestations.
- Regenerate portions of stands where tree growth is declining.
- Maintain critical elements and habitats of biologically diverse forests with respect to Threatened and Endangered Species, and where not at odds with Trust Mandates and ARM, sensitive wildlife and plant species.

1.5 Decisions to be Made

- Determine if the alternatives meet the project objectives.
- Determine which alternative should be selected.
- Determine if the selected alternative would cause significant impact(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 these Rules.

The proposed action is limited to specific management activities that are needed to implement the Timber Sale and provide resource protection. This Environmental Assessment and site-specific analysis 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 2002, for the Dry Gulch and Secret Gulch Sections (Dry Gulch Timber Sale proposal). A newspaper legal notice was run in the Missoulian for three consecutive weekends starting September 10, 2002 (for the Dry Gulch and Secret Gulch Sections). Comments from the general public, interest groups, and agency specialists were solicited for the Gambler Gulch and Packer Gulch Sections (Gambler\Packer Timber Sale proposal) in June of 2004. A newspaper legal notice was run in the Missoulian (June 27, July 4, 11 and 18 of

2004). Scoping notices were mailed to 55 individuals and or organizations (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.

In order to address the cumulative effects of these proposals it was decided (September of 2004) by the Interdisciplinary Team with the Decision Makers approval to combine the effects analyses for these two projects.

On March 10, 2005 the DNRC decided (with guidance from members of the Forest Management Bureau Staff and as a result of recent research findings, Squires et al. 2003) to maintain critical forest attributes and conditions with respect to Lynx habitat (defined in ARM) within the project area (see discussions with respect to Lynx in Chapter 3).

The following DNRC resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures: Mike McGrath, Wildlife Biologist, Southwest Land Office; Renee Myers, Hydrologist, Southwest Land Office; Patrick Rennie, Archeologist, Agriculture and Grazing Management Bureau, Helena and Richard Stocker, Forester, Missoula Unit.

1.8 Other environmental assessments (EAs) and or Documents related to this project

1.8.1 " Cultural Resources Inventory of the Secret Gulch Timber Sale: Granite County, Montana", Patrick Rennie, October 2002, DNRC, Helena, MT (a copy of the report is in the project file). Other DNRC EAs and Proposals: Ryan Gulch Salvage Timber Sale EA 2000. Dirty Ike Salvage Timber Sale EA 2003. Cramer Creek Timber Sale EA 2002. Turah Creek Timber Sale EA 2002. Proposed Washoe Creek Timber Sale 2007. Elk 36 Timber Sale EA 2002. Proposed Hay Wire Wallace Creek Timber Sale 2006. Proposed Tyler Creek EA (draft) 2005. The Lolo Land Exchange, between DNRC and US Forest Service 2006.

1.9 Permits, Licenses, and Other Authorizations Required

1.9.1 124 Permits

No new stream crossings are proposed at this time, however it is a possibility. An option, in order to make improvements to the road system could be to extended an existing road across a Class 2 stream segment of Dry Gulch in Section 36, T12N, R15W, to connect to an existing road resulting in a more favorable grade and location. A DNRC Hydrologist has conducted field assessments of the project area, in particular proposed and existing roads that might serve as haul routes. Construction, maintenance, and possible improvements to stream crossing sites would be

assessed in detail. Planned activities would be reviewed by a DNRC hydrologist. The Montana Department of Fish Wildlife and Parks (DFWP) is responsible for reviewing proposed activities that may affect the bed or bank of a stream and issuing the corresponding 124 Permits. The review associated with the 124 Permit could take as long as 60 days, the permit would be applied for by February 2006. DFWP would approve (at their discretion) permitted activities and could make further stipulations with respect to conducting proposed activities and issuing the 124 Permit.

1.9.2 Road Use Agreements

A Road Use Permit has been acquired for temporary use of existing Plum Creek Timber Co. (PCTC) system roads, pending final acceptance by all parties of the agreement, and approval by The Land Board of the reciprocal access agreement ("Around Missoula Reciprocal Access Agreement") between DNRC and PCTC.

Refer to Figure A-1, Vicinity and Transportation map in Appendix A, it illustrates Right of Ways acquired and needed as well as Granite County (Public) Roads.

A Temporary Road Use Agreement with Stimson Timber Company would be granted until such time as a reciprocal agreement between Stimson and DNRC is enjoined. The permits with Stimson Lumber are for use of existing roads (Packer Gulch) and the construction of approximately ¼ mile of road and road use in Section 35, T12N, R14W.

Numerous private easements would need to be acquired for the existing road in Packer Gulch. The DNRC is in the process of obtaining necessary easements. Another possible route into the Packer Gulch Section 36, T12N, R14W is across private land in Sections 1 and 12, T11N, R14W. A temporary road use agreement or easement would be obtained, should negotiations for easements in Packer Gulch prove problematic. The two potential routes to DNRC's Packer Gulch Section 36, T12N, R14W (the road up Packer Gulch and the road through Sections 1 and 12, T11N, R14W) were assessed by the Project Leader and DNRC Hydrologist. The location and design of the road through Sections 1 and 12, T11N, R14W is problematic with respect to BMPs (cost and effectiveness of necessary mitigations) and subsequently protecting the creek, an unnamed tributary of the Clark Fork River. The road up Packer Gulch is not along a creek and subsequently would be a better choice with respect to BMP's (see discussion of Water Quality in Chapter 3).

An application for a permanent easement in the East ½ of Section 9, T12N, R14W (Secret Gulch) and road use (Mulkey Cut Across Road) has been submitted to the Bureau of Land Management (BLM). The easement for new construction and permit for road use would be considered (by the BLM) with respect to the effects analysis of this project. A copy of the EA for this project would be provided to the BLM for their review of the

proposal and subsequent approval of the Right of Way and road use request.

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 proposed action on water quality?

1.10.1.1.2 Water Yield

What are the expected effects of the 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 proposed management activities?

1.10.1.1.5 Cold Water Fisheries

Are there sensitive fisheries in the project area?
Would the proposed management activities adversely impact fish habitat?

1.10.1.1.6 Noxious Weeds

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

1.10.1.1.7 Natural Forest Conditions and Old Growth - Vegetation

The Montana Administrative Rules for Forest Management in part directs DNRC Forest Managers to emulate natural disturbance patterns and manage towards the "desired future condition"(as defined in ARM).

Would the proposed action emulate natural disturbances and facilitate the maintenance or development of forest conditions that were indicative of historic conditions and move forests in the project area towards the "desired future condition"?

This timber harvest, in conjunction with other past timber sales, may affect the landscape in a way atypical of anticipated historic conditions.

Old Growth

Old stands occurred and developed naturally and in part as a response to the effects of naturally occurring fire. This is the rational for including discussions for Old Growth within the context of Natural Forest Conditions.

There is concern that the proposed harvest activities may negatively impact Old Growth Stands (as defined by Green et. al. 1992, and adopted in ARM).

1.10.1.2 Human Environment

1.10.1.2.1 Road Dust and Truck Speeds

Road dust caused by increased log truck traffic may be a nuisance near private residences. Traffic safety is a concern on and along the following roads: Cramer Creek Road, Bear Gulch Road, Deep Creek Road, Secret Gulch and Packer Gulch Road.

1.10.1.2.2 Recreational Site Use

What would be the effects to visitors to Garnet Ghost Town? What would be the effects to Snowmobile use on and along the Deep Creek road and Mulkey Cut-across road; both part of the BLM Garnet Winter Recreational Trails System?

1.10.1.2.3 Economic Benefits and Project Revenue

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

1.10.1.2.4 Historical and Archaeological Sites

There is concern that ground-disturbing activities associated with timber harvest may disturb or destroy cultural resources.

1.10.1.3 Wildlife

1.10.1.3.1 Endangered Species

The proposed project, if implemented, may impact bald eagles, grizzly bears, gray wolves, and lynx.

1.10.1.3.2 Sensitive Species

The proposed project, if implemented, may impact sensitive species.

1.10.1.3.3 Big Game

The proposed project, if implemented, may impact elk and bighorn sheep.

1.10.1.3.4 Goshawk

The proposed project, if implemented, may negatively impact northern goshawks.

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

1.10.2.1.1 Wildlife

1.10.2.2 Threatened and Endangered Species

1.10.2.2.1.1 Bald Eagle (Federally threatened)

Bald eagles typically nest and roost in large diameter trees within 1 mile of open water. They are sensitive to a variety of human caused disturbances, ranging from residential activities to resource use and heavy equipment operation, among others (Montana Bald Eagle Working Group 1994). Bald eagle response to such activities may range from spatial and temporal avoidance of disturbance activities to total reproductive failure and abandonment of breeding areas (MBEWG 1994). While there are several bald eagle nests located along Interstate-90 and the Clark Fork River, none are less than 2 miles from the project area. Thus, while trucks hauling logs from the project area would pass by bald eagle nests along I-90, there would be low risk of direct, indirect, or cumulative effects to this species as a result of the proposed action

1.10.2.2.1.2 Gray Wolf (Federally threatened)

There is concern that the proposed timber harvest activities would adversely affect gray wolves. The project area is located approximately 6 miles north of the Willow wolf pack, but is separated by the Interstate-90 corridor. Although wolves have large home ranges, due to the presence of I-90 between the pack and project area, there would be low risk of direct, indirect, or cumulative effects to wolves as a result of the proposed action.

1.10.2.1.2 Sensitive Species

1.10.2.1.2.1 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 21 miles northwest of the project area. Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.10.2.1.3 Other Sensitive Species

1.10.2.1.3.1 Coeur d'Alene Salamander

There is concern that timber harvest activities could affect this species. This species requires waterfall spray zones, talus, or cascading streams. There are no known areas of talus, waterfalls, or splash zones within the

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

1.10.2.1.3.2 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 (approximately 20 air miles). Thus, the proposed action would have low risk of direct, indirect, or cumulative effects to this species.

1.10.2.1.3.3 Common Loon

The common loon is a fish-eating bird that breeds and nests on lakes and ponds. The nearest known observation for common loons is approximately 15 miles northeast of the project area on Brown's Lake (Montana Natural Heritage Database). Thus, this area is not connected through the stream network with the proposed project area. Therefore, low risk of direct, indirect, or cumulative effects would be expected to common loons as a result of the proposed project and this species will not be analyzed further in this document.

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

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

1.10.2.1.3.6 Harlequin Duck

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

1.10.2.1.3.7 Black-backed Woodpecker

There is concern that timber harvest activities would disturb black-backed woodpeckers. This species is most often associated with areas that recently experienced stand-replacing fire (Hutto 1995). The 2003 fire season produced approximately 89,321 acres of burned habitat within a 40-mile radius of the proposed project area that may be suitable for black-backed woodpeckers. Thus, with the abundance of habitat, the proposed

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

1.10.2.1.3.8 Other Sensitive or Rare Plants and Animals

The Montana Natural Heritage Program database was researched for other plant and animal species of concern.

The Montana Natural Heritage Program (MTNHP) lists occurrences for the Keeled Mountainsnail (Oreohelix carinifera) in numerous Sections, within Townships associated with the project. There are no known occurrences for the Keeled Mountainsnail within Sections associated with proposed harvest areas. The nearest occurrence to any Sections within the project area is in Section 32, T12N, R13W, where Wet Mulkey intersects Walker Gulch. This location is approximately one mile to the East of the DNRC Packer Gulch Section 36, T12N, R14W. Based on similar habitat associations, there is potential for this snail to exist within the more open south facing sandy limestone areas, that are open Douglas-fir and juniper associations within Section 36, T12N, R14W (DNRC Packer Gulch Section) and Section 2, T11N, R15W (DNRC Dry Gulch Section). These open areas would not be part of harvest areas generally, as there is little or no timber in these areas. Within harvest areas there would be very little potential habitat for snails and what potential habitat there could be, would be avoided through skid trail planning. There is known Keeled Mountain populations in the DNRC Section 36, T11N, R15W; for additional information with respect to the Keeled Mountain Snail, see effects analysis in the Supplemental Environmental Assessment of Tyler Creek Timber Sale 2005.

There are no known occurrences of Small Yellow Lady Slipper within the project area. The nearest occurrence is in Section 12, T12N, 14W, just North East of the DNRC Secret Gulch Section 16, T12N, R14W. This orchid (*Cypripedium parviflorum)* is associated with fens, damp mossy-forested areas, seeps, and moist forest meadow ecotones (NRIS). These areas and habitats would be excluded from harvest areas as Streamside Management Zones (SMZ's) and Fisher Buffers along the creek of Secret Gulch and equipment restriction would be designed to avoid any other potentially wet areas, within the project harvest areas.

According to MNHP, Garnet Bladderpod (Lesquerella carinata var. languida) occurs along the southern half of the East line of the DNRC Packer Gulch Section 36, T12N, R14W. There are other known occurrences close by in five other Sections in T11N, R13W in the Wet Mulkey and Rattler Gulch vicinity. Garnet Bladderpod is found in open non-forested habitats associated with limestone formations and shallow soils with a high calcium content (personal communication with Lesica, Peter and referenced in the MTNHP). Theses areas would be avoided, for lack of timber (not part of the harvested area) or through skid trail planning for areas not excluded from harvested areas.

In summary there is low potential for direct, long-term or cumulative negative effects associated with the Action Alternative, with respect to the Keeled Mountain Snail, Garnet Bladderpod or Small Yellow Lady Slipper. For other species of concern listed by MTNHP for Townships associated with the project area, there are no known preferred or suitable habitats within Sections associated with the project area.

CHAPTER 2

ALTERNATIVES

2.0 Alternatives Including the Proposed Action

2.1 Introduction

Chapter 2: The purpose of Chapter 2 is to describe the alternatives and compare the alternatives by summarizing the environmental consequences.

Alternatives were developed as a result of identification of relevant issues through the scoping process. Input from Interdisciplinary Team (IDT) specialists, including identification of relevant issues, shaped alternative development. The Action Alternative conforms to the requirements of the Administrative Rules for Forest Management and the Trust Land Mandate. This chapter describes the activities of Alternative A: No Action and Alternative B: Harvest. With respect to relevant resources (as described 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 summarizes the predicted effects of the alternatives. The comparison of the alternatives with respect to the quality of the human environment and project objectives provides a clear basis of choice between alternatives.

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 Alternatives
- 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 August of 2002 and again in August of 2004 a DNRC Interdisciplinary Team (IDT) began analyzing the project area and initiated internal review and public scoping to develop a management plan. Two written responses

were received from external parties (DFWP and The Ecology Center). The issues identified during the scoping process were defined and are summarized in Chapter I. Input from Interdisciplinary Team (IDT) specialists, including identification of relevant issues, shaped alternative development. The Action Alternative was developed in part to address the effects of the Action Alternative with respect to relevant issues. The Action Alternative conforms to the requirements of the Administrative Rules for Forest Management and the Trust Land Mandate.

2.3 Alternative Design, Evaluation, and Selection Criteria

The DNRC IDT identified the following design and evaluation criteria:

- Comply with State of Montana Trust Land Mandates
- Comply with the Montana Environmental Policy Act (MEPA)
- Comply with the Montana Administrative Rules for: Forest Management and Streamside Management Zones.
- Comply with the requirements of the Endangered Species Act (ESA)
- Comply with all other applicable Federal and Sate of Montana Laws and Rules.

2.4 Alternatives Considered But Eliminated from Detailed Study

The Action Alternative evolved as a function of and a response to relevant issues. The proposed Action Alternative B: Harvest fulfilled the project objectives. Consequently no other alternatives were considered.

2.5 Description of Alternatives

2.5.1 Alternative A: No Harvest (No Action)

Activities associated with the Timber Harvest Alternative would not occur on the project area at this time. No revenue would be generated for the Common School Trusts for the specific Lands included within the project area. DNRC permitted and approved activities would continue in the project area.

2.5.2 Alternative B: Harvest

The proposed harvest would yield approximately 40,000 tons of timber from approximately 1,695 acres at this time. Approximately 460 acres would be harvested with cable systems and approximately 1235 acres would be harvested with ground-based equipment. See Appendix A: Harvest Area Maps.

There are approximately 4 miles of new road proposed to access timber stands on the two Dry Gulch Sections (Section 2, T11N, R15W and Section 36, T12N, R15W). A option in order to make improvements to the road system in Dry Gulch Section 36, T12N, R15W could be to extend

an existing road across a Class 2 stream segment of Dry Gulch to connect to an existing road a more favorable grade and location. Approximately 1 mile of new road would be constructed to access timber stands in the Secret Gulch Section 16, T12N, R14W. Approximately 3 miles of new road would be constructed to access timber Stands in the Packer Gulch Section 36, T12N, R14W. Up to 3 miles of existing road would be made un-drivable by constructing earthen berms and by putting coarse woody debris on traveled way of road, on the Gambler Gulch Section 16, T12N, R13W. Timber harvested from the two Dry Gulch sections would be hauled out Cramer Creek Road. Timber harvested from the remaining Sections: Secret Gulch, Packer Gulch, and Gambler Gulch (via Deep Creek) would be hauled out Bear Gulch Road. An alternative route for timber from the Packer Gulch Section would be to use the existing road in Sections 1 and 12, T11N, R14W. Potential purchasers could chose other alternative haul routes (such as the Wet Mulkey route from Gambler Gulch) and they would be responsible for right of way and maintenance costs associated with the alternative routes.

Approximately 1 snag and 1 snag recruit per acre would be retained within harvest areas. Trees selected for snags would be greater than or equal to 21" dbh (diameter breast height), where available. If no snags greater than or equal to 21" dbh are available then the next largest available size tree would be left. Trees with extensive rot would be retained, especially those with cavities visible.

Currently there are three stands comprising 69 acres that are Old Growth as defined by Green et. al. 1992, within the Project area. A minimum of 8 trees per acre greater than or equal to 21" dbh would be left within stands currently meeting this criteria for Old Growth stands (Green et. al. 1992). A minimum of 40% crown closure would be maintained within stands currently classified as Lynx Habitat. It is estimated that the basal area retained within Lynx habitat would range from between 50-80 square feet. Shade intolerant species such as subalpine fir and spruce would be retained within Lynx habitat classified as denning or mature foraging. Approximately 90 square feet of basal area (consisting of mature trees with well developed crowns) would be retained within stands currently containing Goshawk nests.

Shade intolerant tree species such as Ponderosa pine and Western larch, would be retained where available. For the remainder of the harvest area approximately 40-60 square feet of basal area would be left in stands, (with exceptions noted above) consisting of well formed, well developed, insect and disease free trees, exhibiting better than poor vigor. Trees would be retained in groups or as individuals in a non-uniform spatial arrangement. Prescriptions for individual stands are in the Project File.

Logging slash would be retained or returned to within ground-based harvest areas. Treetops and limbs would be left within cable-harvested

areas. Approximately 5-10 tons per acre of coarse woody debris (>3" in diameter) would be retained through out harvest areas. Approximately $1,058,370 would be generated for the Common Schools Grants as the result of harvest and sale of an estimated 40,365 tons or 5.7664MM board feet of timber. Forest Improvement fees collected at the rate of $2.39 per ton for sawlog volume harvested would be deposited in the Forest Improvement Fund. The amount of the Forest Improvement collection would be approximately $96,472.

2.6 Mitigation Measures of Alternative B: Harvest

The Harvest Alternative would incorporate some of the following mitigations by design and some would be incorporated through requirements within the Timber Sale Contract. Some issues and the associated mitigations are implemented programmatically. How the mitigations are incorporated is explained for each.

2.6.1 Water Quality, Soil, Fisheries, Weed Mitigations

Harvest Unit General Design

- The Harvest Alternative would minimize soil impacts by limiting the total soil disturbance area in a unit. This would be accomplished by using existing trails, skid trail planning and design, and maintaining nutrient cycling by retaining woody debris and foliage.

- The Harvest Alternative would limit ground skidding to slopes of 45% or less approximately; except on sensitive soils, where ground skidding would be confined to slopes 35% or less approximately. The objective is to minimize excessive disturbance such as compaction, displacement, rutting, and subsequent erosion.

- The Harvest Alternative would limit ground skidding to periods when soils are in one of the following conditions: frozen, snow covered and or dry (soil moisture less than 20% of oven dry weight). The objective is to minimize excessive disturbance such as compaction, displacement, rutting, and subsequent erosion.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require installation of various surface drainage features on skid trails, landings, and roads in order to conserve soils, protect roads and protect water quality.

- The Harvest Alternative would protect localized sensitive soils, steep slopes, and moist areas by implementing equipment restriction zones.

- The Harvest Alternative would comply with all Streamside Management Zone Laws/Rules and Administrative Forest Management Rules.

Road Design

- The Harvest Alternative would employ forestry Best Management Practices (BMPs) as the minimum standard for all activities associated with the proposed timber sale.

- The IDT analyzed and selected a transportation plan that would facilitate near and long term transportation needs. Practical, economical, and technical elements with respect to roads and road standards were considered to facilitate harvest. Construction and maintenance of necessary roads was considered within the context of potential affected resources. The Harvest Alternative would by design improve existing road systems to meet long-term access needs and to fully comply with current BMPs.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require construction of drain dips, grade rolls and other drainage features where necessary and practical to insure adequate road surface drainage. Timber Sale Contract stipulations would require construction and reconstruction of roads, including installation and maintenance of roads and road surface drainage features prior to hauling. Maintenance of roads would continue as necessary and would be concurrent with harvest activities. At the completion of harvest activities a final blading of road surfaces would be required.

- The Harvest Alternative would, through Timber Sale Contract stipulations require, application of grass seed to newly constructed or reconstructed road cut and fills.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require temporary or abandoned roads to be left in a stable condition that would provide adequate drainage and would not require future maintenance.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require construction of drainage features on approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. The location of these drainage features would minimize the runoff contributing area and provide for effective sediment filtering.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require the cleaning of the inlets and outlets of culverts, including implementation of additional sediment mitigation measures as necessary.

Site-Specific Design

- **Down Woody Material:** The Harvest Alternative would, through Timber Sale Contract stipulations, require the retention of five to ten tons per acre of woody material larger than 3 inches diameter scattered throughout the sale units, where available. On slopes greater than 45%, this would be accomplished through retention of all slash on site by log length skidding or whole tree harvest if tops were left on site. On slopes less than 45% whole tree harvest would be allowed when 90% of all slash is return skidded or left within the harvest unit. It is recommended that slash be returned from the landings back into the harvest unit as it is created. The slash would be well distributed, evenly throughout the unit and would be placed in trails to minimize disturbance to soils. Large amounts of slash would not be allowed to accumulate at the landings before it is returned in the unit.

- **Skyline Yarding:** The Harvest Alternative would, through Timber Sale Contract stipulations, require the retention of five to ten tons per acre of woody material larger than 3 inches diameter scattered throughout the sale units, where available. Slash would be left in place. Where ever possible skyline yarding corridors would be located to avoid locations that concentrate runoff. Leading end of the logs would be carried free of the ground most times except during lateral or downhill yarding.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require installation and maintenance of adequate erosion control in harvest units, skid trails, and cable corridors as needed concurrent with operations. Erosion control would be completed prior to acceptance of skidding operations by the Forest Officer.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require rock armoring of both the inlet and outlet of all corrugated metal pipe (CMP) installations and energy dissipaters at outfall of all wet CMP installations.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require mitigations for activities in and around stream and draw crossings (i.e. installing new CMPs, cleaning inlets and outlets, constructing ditches, excavating material etc.) special care would be taken so as not to cause an excessive amount of disturbance to the stream channel, vegetation or area immediately adjacent to the crossing site. Excess or waste material would be disposed of at a location where it would not erode directly into the stream or draw bottom.

- The Harvest Alternative would, through Timber Sale Contract stipulations, require road use and hauling be limited to dry (relative), frozen and or snow covered conditions. The objective is to prevent rutting of roads and to facilitate function of surface drainage features. Operations would be

suspended when these conditions were not met, prior to rutting of road surfaces.

- The Harvest Alternative would comply with all applicable laws including the SMZ Law. Marking and maintenance of minimum SMZ widths consistent with law would be the minimum standard. Further protection to streams and riparian areas would be accomplished by following the ARM for Forest Management, Watershed Management-SMZ, and Riparian Management Zones (RMZ's). 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.

- The Harvest Alternative would protect all ephemeral draws. Protect springs, and wet areas with marked equipment restriction zones (ERZ).

Integrated Weed Management

To reduce current noxious weed infestations and limit the spread of weeds implementation of the following integrated weed management mitigation measures for prevention and control would be implemented should the Harvest alternative be selected:

- The Harvest Alternative would, through Timber Sale Contract stipulations require, cleaning of all road construction and harvest equipment of plant parts, mud, and weed seed to prevent the introduction of additional noxious weeds. The equipment would be inspected by the Forest Officer prior to moving on site.

- The Harvest Alternative would, through Timber Sale Contract stipulations require, prompt re-vegetation of all newly disturbed soils on road cut and fill slopes with site-adapted grasses (including native species) to reduce weed encroachment and stabilization of roads to prevent erosion.

- On going integrated weed management on Missoula Unit would include establishing bio-control agent sites for knapweed within the project area on larger infestations, where appropriate.

- The Harvest Alternative would, through Timber Sale Contract stipulations require, herbicide applications along portions of roads within the project area and treatment of spot outbreaks of noxious weeds as determined by the ID team.

- On going integrated weed management on Missoula Unit would include monitoring of disturbed sites within the project area for any new noxious

Table 2-1: 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
HARVEST ANALYSIS AREA	0	3,040
Acres currently planned for harvest	0	1,695
Tractor yarding (acres)	0	1,235
Cable yarding (acres)	0	460
Alternative yarding methods (acres)	0	0
Road construction (miles) permanent	0	8
Road construction (miles) temporary	0	1.0
Road reconstruction (miles) temporary	0	1.0
Additional acres that may be harvested due to insect caused mortality	0	Up to 1,345
Road Obstructed	0	3

All roads currently closed in the project area would remain closed to motorized public use after the project is completed. All newly constructed roads would be access restricted for DNRC management, DNRC Administrative use, Easement Holders use, and Lessee (of DNRC Lands) use only.

2.8.2 Summary Comparison of Predicted Achievement of Project Objectives

Table 2-2: SUMMARY COMPARISON OF PREDICTED ACHIEVEMENT OF PROJECT OBJECTIVES

Objective	Indicators	Alt. A	Alt. B
Harvest approximately 40,000 tons of timber to generate revenue for the School (CS) grants.	Stumpage receipts in dollars	0	Generate approximately $1,058,370 For the Common School Grants
Promote forest health and vigor, reduce incidence of insects and disease.	Acres treated	0	Approximately 1,695 acres
Regenerate portions of stands where tree growth is declining.	Acres treated	0	Approximately 200 acres
Maintain critical elements of biologically diverse forests with respect to Threatened and Endangered Species.	Acres of Lynx habitat protected	Approximately 620 acres	Approximately 620 acres

suspended when these conditions were not met, prior to rutting of road surfaces.

- The Harvest Alternative would comply with all applicable laws including the SMZ Law. Marking and maintenance of minimum SMZ widths consistent with law would be the minimum standard. Further protection to streams and riparian areas would be accomplished by following the ARM for Forest Management, Watershed Management-SMZ, and Riparian Management Zones (RMZ's). 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.

- The Harvest Alternative would protect all ephemeral draws. Protect springs, and wet areas with marked equipment restriction zones (ERZ).

Integrated Weed Management

To reduce current noxious weed infestations and limit the spread of weeds implementation of the following integrated weed management mitigation measures for prevention and control would be implemented should the Harvest alternative be selected:

- The Harvest Alternative would, through Timber Sale Contract stipulations require, cleaning of all road construction and harvest equipment of plant parts, mud, and weed seed to prevent the introduction of additional noxious weeds. The equipment would be inspected by the Forest Officer prior to moving on site.

- The Harvest Alternative would, through Timber Sale Contract stipulations require, prompt re-vegetation of all newly disturbed soils on road cut and fill slopes with site-adapted grasses (including native species) to reduce weed encroachment and stabilization of roads to prevent erosion.

- On going integrated weed management on Missoula Unit would include establishing bio-control agent sites for knapweed within the project area on larger infestations, where appropriate.

- The Harvest Alternative would, through Timber Sale Contract stipulations require, herbicide applications along portions of roads within the project area and treatment of spot outbreaks of noxious weeds as determined by the ID team.

- On going integrated weed management on Missoula Unit would include monitoring of disturbed sites within the project area for any 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.

2.6.2 Social and Environmental Mitigations

The DNRC received no comments through scoping landowners along the roads in Packer and Secret Gulch regarding truck speeds or dust.
The DNRC is concerned that as a result of the proposed use of roads up Packer Gulch and Secret Gulch as planned, that speed and dust would be a concern to local residents. Several residences are close to the road and one trailer house is within the usual Right of Way. The DNRC is in the process of contacting landowners along the road in Packer Gulch to enjoin a Right of Way Agreement, part of which could address dust mitigations. The Timber Sale Contract would contain stipulations for signing roads to warn motorists of potential hazards associated with encountering log trucks. The Timber Sale Contract would specify mitigations for road dust such as, wetting or dust abating of road surfaces near residents if dust were an issue. Wetting of the road surface would occur when the road surface is dry or hauling would be limited to frozen or snow packed conditions. A dust abatement agent (e.g. magnesium chloride or mercatum) would be applied to the road surface, as necessary. Timing of hauling activities would mitigate the situation for weekend or summer residents along the Secret Gulch Road. The DNRC would continue to be responsive in a prudent manner to reasonable concerns with respect to the health and safety of local residents and motorists.

2.6.3 Wildlife Mitigations

2.6.3.1 Threatened and Endangered Species

The Harvest Alternative would, through Timber Sale Contract stipulations require, that if active den sites or nest sites of threatened, endangered, and/or sensitive species were located within the Project Area, a cessation of activities would be invoked until such time as a DNRC biologist could review the site and develop species appropriate protective measures.

The Harvest Alternative would, through Timber Sale Contract stipulations require the following:

1. In the event any threatened or endangered species were encountered during the project planning or implementation periods a cessation order would be issued by the Forest Officer to the Purchaser.

2. All project-related activities that would potentially affect that species would cease. The DNRC biologist would be informed immediately and be instrumental in designing additional habitat protection measures where appropriate.

3. Additional mitigations would be consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) and the Endangered Species Act. The implementation of these mitigations would be at the sole discretion of the DNRC.

2.6.3.1.1 Bald Eagles

The Harvest Alternative would, through Timber Sale Contract stipulations require, cessation of all operations if nesting Bald Eagles were encountered. A DNRC Biologist would be consulted and would develop additional mitigation measures to ensure the security of the nest site and specific animals, consistent with the Endangered Species Act.

2.6.3.1.2 Grizzly Bears

The Harvest Alternative would, through Timber Sale Contract stipulations require, implementation of 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.

1. Sanitation in all operations associated with the Harvest Alternative would comply with all applicable State laws, rules and regulations concerning sanitation.

2. Refuse from foodstuffs including it's packaging would be removed daily or secured in an approved bear resistant container.

3. Foodstuffs would be contained in an approved bear resistant container should camps be allowed within the Gross Sale area.

2.6.3.1.3 Canada Lynx

The Harvest Alternative would by design provide that in those portions of the project area where the proposed harvest overlaps suitable lynx habitat (i.e., denning, young foraging, mature foraging, or other habitat), the post-harvest conditions would meet ≥40% crown cover in sapling, pole, mature and old stands to retain Lynx Other habitat characteristics. Densely regenerated seedling and sapling patches would be conserved in designated stands.

The Harvest alternative would, through Timber Sale Contract stipulations require skid trail planning and special operation requirements i.e. protect sub-merchantable trees within the designated stands (classified as Lynx Habitat).

2.6.3.2 Big Game: White-tail deer, Elk, Moose

The Harvest Alternative would, through Timber Sale Contract stipulations require, effective closure devices (e.g., locked gates, tank traps, other

obstructions: rocks, woody debris) at project's completion, for newly constructed or reconstructed roads associated with the proposed action, where motorized access is not currently restricted.

2.6.3.3 Townsend's Big-eared Bat

Monitoring of the caves (Baldy Sink, 40 feet wide by 50 feet deep, and another 25 feet wide and 30 feet deep, approximately) within Dry Gulch Section (Section 2, T11N, R15W) would occur prior to project initiation to determine the type of use and affected bat species.

Proposed mitigation measures (as required for the Harvest alternative would, through Timber Sale Contract stipulations,) for goshawk nests within Section 2 (1/4-mile horizontal radius buffer and no mechanized activity between 1 April and 31 August) would encapsulate both caves and an adequate 500-foot radius buffer around each cave.

2.6.3.4 Northern Goshawk

The Harvest Alternative would by design maintain certain forest attributes for a 23-acre nest stand (Dry Gulch Section 2, T11N, R15W) that contains 2 goshawk nests. Within the 23-acre stand, at least 90 square feet of basal area per acre would be retained post-harvest, using a thinning-from-below (low thinning) harvest technique to retain structural characteristics conducive to goshawk nesting.

The Harvest alternative would, through Timber Sale Contract stipulations require, a ¼-mile horizontal radius buffer (from the mid-point of the 2 nests) where mechanized activity would not occur from April 1 through August 31 to avoid disturbance during the breeding season. The Harvest alternative would by design provide proposed roads to be located to reduce potential disturbance to nesting goshawks (e.g., may make use of vegetation and topography to reduce noise levels or sight distance).

2.6.3.5 Cooper's Hawk

To partially mitigate for microclimatic changes surrounding the nests the affected nest stand would be harvested such that post-harvest conditions would meet ≥40% crown cover.

Additionally, there would be a ¼-mile horizontal radius buffer around the year's current active nest where no mechanized activity would occur from April 1 through August 31 to avoid disturbance during the breeding season. Vehicle travel may be prohibited during this time, depending upon the proximity of proposed roads to the nest trees. However, due to topography, vehicular traffic would be permitted along the lower road within section 36.

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 on State Lands. Walk in and non-motorized vehicle recreational use has been allowed on State Lands as well.

- **Biological control for weeds:** *Larinus minutus* have been released to control knapweed in numerous locations in State owned Sections.

- **Public vehicle access:** Roads that access Sections 36, T12N, R15W and Section 2, T11N, R15W are part of a walk-in hunting area; Public Access is restricted to non-motorized use only. The DNRC has no Public Access to the Packer Gulch Section 36, T12N, R14W; access is across Private and Stimson Lands. Access to the Gambler Gulch Section 16, T12N, R13W is via Public Roads along Deep Creek, Wet Mulkey and Rattler Gulch.

- Ryan Gulch Salvage Timber Sale 2000. Dirty Ike Salvage Timber Sale 2003. Cramer Creek Timber Sale 2002. Turah Creek Timber Sale 2002. Elk 36 Timber Sale 2002. (see Table 4-5)

2.7.2 Present Relevant Actions Not Part of the Proposed Action

- Present actions include those listed under 2.7.1.
- Proposals: The Lolo Land Exchange, between DNRC and US Forest Service 2006. (see Table 4-5)

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.
- Proposed Washoe Creek Timber Sale 2007. Proposed Hay Wire Wallace Creek Timber Sale 2006. Proposed Tyler Creek EA (draft) 2005. (see table 4-5)

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 2-1: 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
HARVEST ANALYSIS AREA	0	3,040
Acres currently planned for harvest	0	1,695
Tractor yarding (acres)	0	1,235
Cable yarding (acres)	0	460
Alternative yarding methods (acres)	0	0
Road construction (miles) permanent	0	8
Road construction (miles) temporary	0	1.0
Road reconstruction (miles) temporary	0	1.0
Additional acres that may be harvested due to insect caused mortality	0	Up to 1,345
Road Obstructed	0	3

All roads currently closed in the project area would remain closed to motorized public use after the project is completed. All newly constructed roads would be access restricted for DNRC management, DNRC Administrative use, Easement Holders use, and Lessee (of DNRC Lands) use only.

2.8.2 Summary Comparison of Predicted Achievement of Project Objectives

Table 2-2: SUMMARY COMPARISON OF PREDICTED ACHIEVEMENT OF PROJECT OBJECTIVES

Objective	Indicators	Alt. A	Alt. B
Harvest approximately 40,000 tons of timber to generate revenue for the School (CS) grants.	Stumpage receipts in dollars	0	Generate approximately $1,058,370 For the Common School Grants
Promote forest health and vigor, reduce incidence of insects and disease.	Acres treated	0	Approximately 1,695 acres
Regenerate portions of stands where tree growth is declining.	Acres treated	0	Approximately 200 acres
Maintain critical elements of biologically diverse forests with respect to Threatened and Endangered Species.	Acres of Lynx habitat protected	Approximately 620 acres	Approximately 620 acres

2.8.3 Summary Comparison of Predicted Environmental Effects

Table 2-3: SUMMARY PREDICTED ENVIRONMENTAL EFFECTS

ISSUE	Alternative A: No Harvest (No Action)	Alternative B: Harvest
WATER QUALITY, SOIL, FISHERIES, WEEDS		
WATER QUALITY	Under Alternative A: No Action direct, indirect and cumulative effects evaluated were those associated with past management activities within the proposed project area. Direct, indirect, and cumulative effects within the project were observed to be minimal.	Proposed harvest activities and road construction have low to moderate risk of minor and temporary increased sediment. 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	Under Alternative A: No Action, there would be no potential for increases in water yield as a result of State activities. Increases in water yield in Dry Gulch as a result of the 2000 Ryan Gulch fire would continue to decrease as more grasses and trees grow on the site.	There is low risk of direct, indirect, or cumulative effects from implementation of this alternative.
CUMULATIVE WATERSHED EFFECTS	Under Alternative A: No Action would maintain measurable cumulative affects from past management activities of poorly located roads with inadequate drainage on other ownerships (refer to existing conditions discussion). Cumulative effects are expected to decline as hydrologic recovery continues to occur.	The proposed harvest and road construction would present a low to moderate risk of cumulative impacts of increased sediment delivery by disturbing soil. The risk of cumulative effects from sediment delivery would be reduced or eliminated by using erosion control measures. 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	Under Alternative A: No Action would have some direct and indirect effects on soil resources, as road surface drainage within the project area would not be improved.	Tractor skidding and cable harvest could cause direct effect to soils that could result in increased erosion. Mitigation measures would maintain soil resources and minimize disturbance. Retention of slash and coarse woody debris would have a long-term beneficial effect to nutrient cycling, maintain long-term soil productivity and reduce on-site erosion.
COLD WATER FISHERIES	Under Alternative A: No Action, there would be no risk of direct, indirect or cumulative impacts to fisheries.	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, maintenance, and soil disturbance. Mitigations to control sediment and application of erosion control measures would minimize disturbance. Because no harvest would occur in the SMZ's there would be little effect on large woody debris recruitment or stream shading.
NOXIOUS WEEDS	Under Alternative A: No Action, there would be a gradual increase over time. Integrated weed management efforts would continue on these lands, but with less funding than would be provided for as a result of the Harvest Alternative B.	Similar or slight increase in noxious weed density and occurrence, due to soil disturbance and decreased tree canopy. Integrated weed management efforts would continue through out the project area. Control efforts would promote revegetation and emphasize treatment of any new noxious weeds. More Forest Improvement dollars would be available for weed control.
NATURAL FOREST CONDITIONS AND OLD GROWTH	Under Alternative A: No Action, slow growth rates and mortality would continue in timber stands including those classed as Old Growth (Green et al 1992).	Vigor and growth rates of trees would improve within treated stands. Improved vigor and removal of insect infested trees would help prevent further mortality. Regeneration would add to stand structure and potentially improved growth rates. Less dense stand conditions would decrease the risk of stand replacement fire.

HUMAN ENVIRONMENT		
ROAD DUST	Under Alternative A: No Action, road dust is prevalent from hauling timber from private lands.	There would be an increase in road dust, if logs were hauled under dry road conditions. Minimal direct and cumulative effect.
RECREATIONAL SITE USE	Under Alternative A: No Action, visitation to Garnet Ghost town would continue. Snowmobilers would continue to use winter trails through out the area. There would be no, direct, indirect or cumulative impacts associated with the No-action Alternative..	In creased logging traffic would produce dust during the dry summer months. This would be a nuisance to motorists traveling to Garnet Ghost Town via Bear Gulch Road. The potential for a cumulative increase of logging traffic would be problematic with respect to the relative safety of motorists. Dust and safety issues have the potential to directly effect visitors to Garnet Ghost Town. Use of the Road up Deep Creek and The Mulkey Cut-across Road by Log Trucks during the winter season would directly affect snomobilers use of these roads. Impacts to visitors and snowmobilers would be short term. The Timber Sale Contract would stipulate warning signing of roads. Cumulative impacts would be short term, i.e. 1-3 years, the duration of the Timber Sale Contract.

ECONOMIC BENEFITS AND EXPECTED REVENUES	Under Alternative A: No Action, no economic contribution or benefits to the School Trusts would occur within the foreseeable future. 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 $ 3.57/ton. This investment would decrease future management costs. The forest improvement collections would be approximately $96,472. This money would be deposited in the forest improvement fund to be used for thinning, prescribed burning, planting, weed management, and the management activities on Trust Lands. The projected revenue of this alternative for the School Trust is approximately $1,058,370. The proposed project would provide work for road-building contractors, logging contractors, their subcontractors, and their employees. The logs would likely be processed by local mills providing additional employment opportunities.
Historical and Archaeological Sites	Under Alternative A: No Action, there would be no effects, as there would be no timber sale activities.	Whereas there is a proposed road adjacent to site 24GN448 (cabin remains and prehistoric chert gathering site), road construction activities are not expected to cause disturbance to the cabin remains. The DNRC archaeologist approved the road location. There is a low risk for direct, indirect or cumulative effects.

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 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	No change from current conditions.	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.
TOWNSEND'S BIG - EARED BAT	No Change from the current condition.	Low risk of direct, indirect and cumulative effects.
BIG GAME		
BIG GAME	No change from current conditions would be expected under the No Action Alternative.	There would be a short term decrease in forest canopy closure and a short term impact to snow intercept cover. Hiding cover would be reduced in the short term, however through encouraging regeneration, hiding cover may be improved in the near future. Low to moderate risk of short-term direct and indirect effects. Low risk of cumulative effects.
NORTHERN GOSHAWK	No change from the current conditions.	Low to moderate risk of direct, indirect and cumulative effects.
COOPER'S HAWK	No change from the current conditions.	Given the mitigations surrounding the nest trees, there would still be temporary (approximately 10 to 15 years) low to moderate risk of direct and indirect effects to a pair of Cooper's hawks as a result of the alterations to stand structures in the surrounding landscape, as proposed in the Action Alternative. The Action Alternative would have a low to moderate risk of cumulative effects for Cooper's hawks, with the moderate risk level being associated with individual birds.

CHAPTER 3

AFFECTED ENVIRONMENT

3.0 Affected Environment

3.1 Introduction

Chapter 3: Affected Environment succinctly describes the existing condition of environmental resources that would affect or that would be affected by the alternatives if either 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.

This description of the existing environment in Chapter 3 establishes a baseline of comparison from which the activities of Alternative A: No Action (in Chapter 2), and the predicted effects of Alternative A: No Action (in Chapter 4), can be contrasted against the potential effects of Alternative B: Harvest (in Chapter 4).

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 Analysis Area

The analysis area is located in 5 different sections of State land including Sections 16, T12N R14W, Section 2 T11N R15W, section 36 T12N R15W, Section 36 T12N R 14W and Section 16 T12N R 13W. There are four drainages located within the project area; Dry Gulch, Secret Gulch, Packer Gulch and Gambler Creek. (See Appendix A: Maps)

Dry Gulch is an intermittent tributary to the Clark Fork River. The Dry Gulch watershed drains approximately 5259 acres. Dry Gulch is drained by Class-2 and Class-3 stream channels, as well as dry draws with no discernable stream channel. There is no evidence of return surface flow to the Clark Fork River. Any discernable channel or gulch disappears approximately 1 mile before the Clark Fork River. A large portion of this drainage has been harvested by the State and private industry, but is in the process of vegetative recovery and thus hydrologic recovery. Most reaches of Dry Gulch within the project area are dry.

Secret Gulch is a Class 1 tributary to Bear Creek, a Clark Fork River tributary. Secret Gulch is drained by Class 2 and Class 3 stream channels as well as draws with no discernable stream channel. There are springs in the upper portion of Secret Gulch that provide perennial flow for a short distance, but are not located on State land. A majority of the Secret Gulch drainage has been harvested by the State and private industry, but is in the process of hydrologic recovery. Sections of Secret Gulch located within the project area are perennial reaches.

Gambler Creek is a tributary to Deep Creek, a tributary to Bear Creek. Gambler Creek was not observed to have return surface flow to Deep Creek. Gambler Creek is drained by ephemeral draws and draws with no discernable stream channel. The lower portions of the Gambler Creek watershed have been heavily harvested by private industry. There is no defined channel or water located in Gambler Creek within the project area.

There are two tributaries to Douglas Creek located in the Gambler Gulch Section. These draws are both dry and have no defined channel. Douglas Creek is listed as a 303 (d) impaired water body. The number of acres in the Douglas Creek watershed located on the State section is approximately 160 acres.

Packer Gulch is also a tributary to Bear Creek, a tributary to the Clark Fork River. Packer Gulch is drained by ephemeral draws and draws with no discernable stream channel. Packer Gulch was not observed to have return flow to Bear Gulch. Harvest has occurred throughout the drainage by State, Plum Creek, and Private ownership. There is no water located in the reaches of Packer Gulch located in the project area.

The Bear Creek watershed drains approximately 27076 acres. Bear Creek is a tributary to the Clark Fork River, but no return surface flow was observed.

3.2.1.1.1 Analysis Method

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

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

The existing cumulative effects of past timber harvest activity and road construction on water yield and watershed conditions were analyzed using the Equivalent Clearcut Area (ECA) methodology. This methodology estimates existing water yield increases (WYI) and predicts water yield increases of proposed harvest activities. The ECA model calculates WYI using total treated acres, percent crown cover removal, precipitation, hydrologic recovery, habitat type, and road miles (Forest Hydrology II). Increases in water yield and equivalent clearcut acres are based on the assumption that the entire watershed was once 100% forested. It does not take into consideration natural fire regime or portions of the watershed that may be grassland and not forested. These numbers are just an approximation, not exact. A water yield increase factor of 15% was

established for both Dry Gulch and Bear Gulch watersheds. Because Packer Gulch, Gambler Gulch, and Secret gulch are located in the Bear Creek watershed, a water yield analysis was conducted for Bear Creek and not small individual watersheds.

Because there is a limited amount of acres treated in Douglas Creek, a water yield analysis was not completed for this watershed.

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

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

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

3.2.1.1.2 Water Regulatory Framework

Montana Surface Water Quality Standards
According to MCA 17.30.608 (1), this portion of the Clark Fork River basin (HUC 1701024) and its tributaries in the project area are all classified as B-1.
Dry Gulch, Packer Gulch, Gambler Gulch, and Secret Gulch are B-1 Classified Streams in the Montana Surface Water Quality Standards. The B-1 classification is for waters that are considered suitable for domestic use after conventional treatment, as well as recreation, swimming and bathing. They are also suitable for growth and propagation of salmonid fish and other associated aquatic life, waterfowl, furbearers, agricultural and industrial water supplies. Another criteria for a B-1 classification is; no increases are allowed above naturally occurring concentrations of sediment, settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.
Downstream Beneficial uses include irrigation and livestock water.

3.2.1.1.3 Water Quality

Not all roads within the project area currently meet Best Management Practices (BMP) standards. There are many sections of road that have steep gradients and lack sufficient drainage features, resulting in erosion and rutting of the road surface.

Some sections of road in the Dry Gulch project area have potholes and sensitive soils that have caused major depressions in the road surface. Some sections of road have steep grades that lack sufficient drainage features to properly divert water off the road surface.

There are also portions of road along Secret Gulch, Packer Gulch, and Gambler Gulch that do not meet BMP standards. Sections of these roads are also directly adjacent to the stream channel. Direct sediment delivery is occurring at site-specific locations along these three drainages. Some sections of road have less than a 10-foot buffer between the road and the stream channel.

There are some stream crossings where direct sediment delivery is occurring along an unnamed tributary to the Clark Fork River in Section 12, T11N, R14W (private), South of the Packer Gulch Section 36, T12N, R14W (DNRC). These crossing sites do no meet BMP standards. There is no armoring and the cut and fill slopes have been trampled by cattle, causing direct sediment delivery at these sites.

The Packer, Gambler, Secret, and Dry Gulch DNRC Sections all have grazing leases. Grazing has impacted the riparian areas in along an unnamed tributary to the Clark Fork River in Section 12, T11N, R14W (private). Bank trampling and sloughing has occurred. Areas that have had heavy livestock use were observed to have increased sediment delivery and lack adequate riparian vegetation.

Deep Creek has been impacted by activities associated with mining. Large sections of the lower stream channel have been impacted by placer mining, which occurred in the early 20th century. Stream form and function have been severely altered from excavation during mining activities. The lower portion of the steam channel along the main road in Bear Gulch has been impacted from mining activities as well. Mining tailings are present along the road where streambed excavation has occurred.

The 2000 Ryan Gulch fire burned approximately 16,660 acres in the face drainages of the Clark Fork River, north of Interstate 90. Approximately 1517 acres in the Dry Gulch watershed was burned in a mixed severity fire. The vegetation is recovering along the hillsides and is revegetated with mostly grasses and some shrubs. The fire, mostly located in the middle to lower portions of the drainage was a mixed severity fire, but no major gullies or rilling in the draws which could be attributed to an after effect of the fire was observed on State land or the private land below it in the Dry Gulch drainage.

Beneficial Uses

Dry Gulch, Packer Gulch, Gambler Gulch and Secret Gulch are B-1 Classified Streams in the Montana Surface Water Quality Standards. The B-1 classification is for waters that are considered suitable for domestic use after conventional treatment, as well as recreation, swimming and bathing. They are also suitable for growth and propagation of salmonid fish and other associated aquatic life, waterfowl, furbearers, agricultural and industrial water supplies. Another criteria for a B-1 classification is; no increases are allowed above naturally occurring concentrations of sediment, settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

Downstream Beneficial uses include irrigation and livestock water.

3.2.1.1.4 Water Yield

Table 3-1w Existing Water Yield

Stream	Existing WYI%	Existing ECA Acres
Dry Gulch	5.9%	1065 acres
Bear Creek	1.9%	1806 acres

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

* % Water yield increase (%WYI) is the predicted increases in average water yield due to timber harvest and road construction. The amount of existing ECA acres in a watershed, determines the WYI %.

The existing water yield increases in Dry Gulch are relatively low at 5.9%. The existing water yield in Dry Gulch prior to the 2000 Ryan Gulch fire was 1%. The fire increased the ECA acres by approximately 852 acres and water yield by approximately 4.9%. Vegetation, including grasses and shrubs are revegetating the area and water yield is starting to recover or decrease from the mixed severity fire. No gullies or major rills were observed in the project area or below as a result of the increased water yields from the Ryan Gulch fire. Although these increases are quite significant, they are still below the established 15% WYI threshold.

The existing water yield increases in Bear Creek are low at approximately 1.9%, with approximately 1806 acres of the watershed in ECA.

No impacts were observed in Bear Creek as a result of these low water yield increases.

3.2.1.1.5 Existing Conditions of Geology/ Soil Resources

Geology in the project area is a combination of Cu- Cambrian undifferentiated sedimentary rock, Tv- Tertiary volcanic extrusive rock,

Du- Devonian undifferentiated sedimentary rock, and Mu- Mississippian undifferentiated sedimentary rock.

Table 3-1s: Project Area Soils (Please see notes for specific soil restrictions. Maps in Appendix A)

Map unit	Parent material	Topsoil	Subsoil	WHC	Erosion Hazard	Displacement Hazard	Compaction Hazard	Notes
84E Helmville cobblt loam, cool, 15-35% slopes	Colluvium from Limestone	0-8 inches Cobbly Loam	>40 inches	5.5 inches	Low	Low	Low	
84F Helmville cobbly loam, cool, 35-60% slopes	Colluvium from Limestone	0-8 inches Cobbly Loam	>40 inches	5.3 inches	Moderate	Moderate	Low	
85D Loberg gravelly loam 4-15% slopes	Material weathered from extrusive igneous rock	0-8 inches Gravelly Loam	>40 inches	5.0 inches	Low	Low	Low	
85E Loberg gravelly loam, 15-35% slopes	Material weathered from extrusive igneous rock	0-8 inches Gravelly Loam	>40 inches	5.0 inches	Moderate	Moderate	Low	
88E Whitecow gravelly loam 15-35% slopes	Colluvium derived from Limestone	0-4 inches Gravelly Loam	>40 inches	4.6 inches	Moderate	High	Moderate	
88F Whitecow gravelly loam 35-60% slopes	Colluvium derived from Limestone	0-4 inches Gravelly Loam	>40 inches	4.6 inches	High	High	Low	
92E Whitemore gravelly loam, 15-35% slopes	Colluvium derived from Limestone	0-2 inches Gravelly Loam	>40 inches	4.6 inches	Moderate	Low	Moderate	

92F Whitemore gravelly loam 35-60% slopes	Colluvium derived from Limestone	0-2 inches Gravelly Loam	>40 inches	4.6 inches	Moderate	Moderate	Moderate	
95F Yreka gravelly loam, 35-60% slopes	Material weathered from igneous rock	0-3 inches Gravelly Loam	>40 inches	5.3 inches	High	High	Moderate	
96D Worock gravelly loam, cool 8-15% slopes	Material weathered from igneous rock	0-6 inches Gravelly Loam	>40 inches	5.3 inches	Low	Low	Low	
96E Worock gravelly loam, cool, 15-35% slopes	Material weathered from igneous rock	0-6 inches Gravelly Loam	>40 inches	5.3 inches	Low	Low	Low	
96F Worock gravelly loam, cool, 35-60% slopes	Material weathered from igneous rock	0-6 inches Gravelly Loam	>40 inches	5.3 inches	Moderate	Moderate	Low	
98E Trapps gravelly loam, 15-35% slopes	Colluvium derived from Limestone	0-8 inches Gravelly Loam	>40 inches	5.0 inches	Low	Low	Low	
98F Trapps gravelly loam 35-60% slopes	Colluvium derived from Limestone	0-8 inches Gravelly Loam	>40 inches	5.0 inches	Moderate	Moderate	Low	
185E Relyea-helmville complex, 15-35% slopes	Limestone Colluvium	Relyes 0-5 inches Gravelly Loam Helmville 0-8 inches Cobbly Loam	>40 inches	5.5 inches	Low Low	Low Low	Moderate	

192E Whitmore gravelly clay loam, 15-35% slopes	Limestone Colluvium	0-2 inches Gravelly Clay Loam	>40 inches	4.2 inches	Low	Moderate	Moderate	*Check soil moisture before harvest activity
195F Yreka gravelly, loam, cool, 35-60% slopes	Limestone Colluvium	0-3 inches Gravelly Loam	>40 inches	4.2 inches	High	High	Moderate	* Check soil moisture before harvest activity
196E Worock-loberg, moist complex, 15-35% slopes	Material weathered from igneous rock	Worock 0-6 inches Gravelly Loam Loberg 0-8 inches Clay Loam	>40 inches	5.1 inches	Low Moderate	Low Moderate	Low Moderate	*
299E Bignell, dry-yreka, cool, complex 15-35% slopes	Colluvium derived from fine grained igneous extrusive rock	Bignell 0-8 inches Gravelly Loam Yreka 0-3 inches Cobbly Loam	>40 inches	5.3 inches 5.3 inches	Low Moderate	Low Moderate	Low Moderate	* Check soil moisture before harvest activity
299F Bignell-yreka gravelly loams, 35-60% slopes	Material weathered from igneous rock	Bignell 0-8 inches Gravelly Loam Yreka 0-3 inches Gravelly Loam	>40 inches	5.3 inches 5.3 inches	Moderate High	Low High	Low Moderate	* Check soil moisture before harvest activity/ Avoid ground based activities on slopes over 40%

399F Bignell-yreka complex, cool, 35-60% slopes	Material weathered from extrusive igneous rock	Bignell 0-8 inches Gravelly Clay Loam Yreka 0-3 inches Gravelly Loam	>40 inches	5.2 inches 5.3 inches	Moderate High	Low High	Low Moderate	* Check soil moisture before harvest activity/ Avoid ground based activities on slopes over 40%
485E Relyea-Helmville, complex, moist, 15-35% slopes	Limestone Colluvium	Relyea 0-5 inches Gravelly Loam Helmville 0-2 inches Cobbly Loam	>40 inches	5.6 inches 5.6 inches	Low Moderate	Low Moderate	Low Moderate	* Avoid Slopes over 40%
488F Whitecow gravelly loam, cool, 35-60% slopes	Limestone Colluvium	0-4 inches Gravelly Loam	>40 inches	4.6 inches	Moderate	Moderate	Moderate	
499E Bignell yreka complex, 15-35% slopes	Material weathered from extrusive igneous rock	Bignell 0-8 inches Gravelly Clay Loam Yreka 0-3 inches Gravelly Loam	>40 inches	5.2 inches 5.3 inches	Low Moderate	Low Moderate	Low Moderate	* Check soil moisture before harvest activity
596E Worock-loberg, complex, 15-35% slopes	Material weathered from extrusive igneous rock	Worock 0-6 inches Gravelly Loam Loberg 0-8 inches Clay Loam	>40 inches	5.3 inches 5.1 inches	Low Low	Low Low	Low Low	*
988F Whitecow-rock outcrop complex, 35-60% slopes	Limestone Colluvium	0-4 inches Gravelly Loam	>40 inches	4.6 inches	Moderate	High	Moderate	Avoid ground based activities on slopes over 40%

There are soils located in the project area that are more susceptible to erosion and displacement as a result of shallow surface layers in combination with steeper slopes. The following soils are sensitive to erosion and displacement on slopes steeper than 35%; 195F Yreka Gravely Loam, Cool, 35-60% slopes, 299 F Bignell-Yreka Gravelly Loam 35-60% slopes, 399F Bignell-Yreka Complex, cool 35-60% slopes, 988F Whitecow-Rock Outcrop Complex 15-35% slopes, 988G Whitecow Rock outcrop Complex 60-80% slopes (see appendix A: Soils Maps).

3.2.1.1.5.1 Cumulative Existing Soils Conditions:

There are old skid trails that go up the bottom of the draw in Packer Gulch as well as a few skid trails spread throughout the proposed project area. These trails are vegetated and are in stable condition. Total impacts to the project area in this section are estimated to be 5% or less of the total area. There are existing trails and old roads located in Section 16 (Gambler Gulch), which cross two dry tributaries to Douglas Creek. These old roads are stable, well vegetated, and not observed to be contributing sediment to the draw, which is dry with no defined channel. Overall existing cumulative effects to the project area in Section 16 (Gambler Gulch) are less than 5% of the total area.

Effects of past harvest activities within the Secret Gulch Section were not observed. The only effects to soils in this portion of the project area are associated with old roads. Some are currently part of the main road system and others are old roadbeds that are vegetated and stable.

Within the Dry Gulch Section there are old skid trails and roadbeds. These features are stable and well vegetated. It is assumed that there is some compaction on these trails, although displacement and erosion were observed to be limited. The overall cumulative effects to soils in the Dry Gulch project area were observed to be less than 5%.

3.2.1.1.6 Cold Water Fisheries

There are no known existing fisheries populations in Gambler Creek, Packer Gulch, Dry Gulch, Secret Gulch, or Bear Creek. The closest known fisheries population is the Clark Fork River. The stream in Secret Gulch is perennial and does have return flow to Bear Gulch. It is assumed for this analysis that Secret Gulch does have a resident cutthroat trout population. The other drainages would not be considered fish bearing for this analysis, but efforts would be taken to protect the riparian areas for aquatic values.

The riparian area in Secret Gulch is in fair to good condition. The road runs parallel to the stream in the lower portion of the drainage and adequate large woody debris and thermal protection is lacking in this reach along the road. Some sections of road are delivering sediment to the stream channel in areas where the road is directly adjacent to the channel.

The upper portion of the watershed is in good condition. Adequate riparian vegetation, large woody debris and canopy cover for bank stability, habitat complexity and thermal protection are present.

There are no fisheries associated with the two tributaries to Douglas Creek within Section 16 (Packer Gulch Section). These segments have no defined channel and are dry.

3.2.1.1.6.1 Cumulative Existing Effects

Cumulative existing effects to fisheries in the project area are moderate. Road locations in the lower portion of Secret Gulch have altered channel migration zones, increased sediment delivery, reduced riparian habitat and complexity as well as the amount of large woody debris potential.

3.2.1.1.7 Noxious Weeds

Noxious weeds occurring in the project areas are mostly knapweed (Centaurea maculosa), houndstongue (Cynoglossum officinale L) and spot infestations of thistle (Cirsium arvense). Historic cattle grazing, timber harvest activities and residential areas are most likely the reason for the existing rate of spread of noxious weeds and the potential future spread and introduction of noxious weeds.

Knapweed (Centaurea maculosa) was found along roadsides as well as in some forested portions of the project area. Houndstongue was found mostly along roadsides, with isolated spot infestations found within the forested area. Thistle was mostly found along roadsides with a few spot infestations within the forested areas.

3.2.1.1.7.1 Existing Cumulative Impacts

Impacts of noxious weeds within the project areas are moderate. Weeds have spread over time with administrative use and adjacent landowner use. Timber harvest throughout these drainages has increased the risk for noxious weeds to spread though ground disturbance. Overall cumulative existing impacts as a result of weed infestations are moderate.

3.2.2 Natural Forest Conditions and Old Growth

Through the emulation of natural processes the DNRC endeavors to manage for biologically diverse forests (ARM 36.11.405).

Prior to effective fire suppression, fire was one of the most dynamic forces shaping and maintaining forested landscapes. Natural disturbances such as fire occurred and Native Americans used fire intentionally and inadvertently to shape their environment.

The following assessment will use the assumption that forest conditions prior to Euro-American settlement, were "natural". On Missoula Unit and within the project area forest stand conditions are to

some extent dissimilar to what was typical Historically (pre-settlement, generally prior to 1900). Pre-settlement or Historic conditions will be used herein as a baseline of comparison to the forest conditions currently. Current conditions will be compared to Historic conditions with respect to cover types, age class distributions, and Fire Groups (the corresponding effects of fire on forests within various Habitat Types under various disturbance regimes).

Effective fire suppression has led to the establishment of dense regeneration, with a higher proportion of the more shade tolerant species such as Douglas-fir and subalpine fir.

With the absence of fire, forests can become overstocked and stagnated. Fuel accumulations increase as trees die from competition and environmental stresses. Overstocking and the associated stress due to competition between the trees for moisture and nutrients can lead to increased attack by insects such as the mountain pine beetle, pine engraver beetle and Douglas-fir beetle. The development of an understory of Douglas-fir and or subalpine fir forms a very effective fuel ladder that enables a surface fire to climb into the crowns of the larger overstory trees and kill them. High fuel loadings and dense stand conditions have led to high intensity, stand replacing wildfire in stands where they were uncommon in the past (Arno and Brown 1991).

A forest's response to fire is dependant on various forest attributes (stand age, structure, size class, stocking, and species composition), within the context of various environmental conditions. When a fire starts, it is fuels, weather and topography (including but not limited to: temperature, humidity, fuel load, fuel moisture, wind, elevation, slope, aspect etc), that determines how a particular forest condition is affected. Figure 1 shows the relative resistance of conifers to fire. Seral (shade intolerant species) are generally more resistant to fire effects.

Figure 1: Relative Degree of Resistance to Fire

Most resistant	Very resistant	Medium	Low	Very low
Western larch	Ponderosa pine Douglas-fir	Grand fir Lodgepole pine Western white pine Western redcedar	Spruce Hemlock	Subalpine fir

The Habitat Types (h.t.) in the project area for the most part belong to Fire Groups 4, 6 and 9 as defined by Fischer and Bradley (1987), (7%, 72% and 14% of the project area, respectively). Fire groups 4 and 6 are similar in that Douglas-fir is the indicated climax species for both groups.

The following descriptions of Fire Groups are those of Fisher and Bradley (1987).

Group Four forested stands may exist as fire-maintained ponderosa pine stands that develop Douglas-fir regeneration beneath the pine in the absence of disturbance. Douglas-fir is usually present in seral stands, but

ponderosa pine often dominates. Frequent fires in seral stands maintained a ponderosa pine "fire climax" condition by killing fire-susceptible Douglas-fir seedlings. Historic fire frequencies according to numerous studies conducted in ponderosa pine forest types throughout the Western States, showed fire to be a frequent event, occurring at intervals from 5-25 years (Fisher and Bradley 1987). Forests in fire group 4 prior to effective fire suppression (Euro-American settlement) in Western Montana were frequently open park-like stands, composed of large diameter ponderosa pine and Douglas-fir. This condition was maintained by frequent low intensity surface fires. In the absence of fire the theoretical climax condition for Group four is an all aged or multistoried Douglas-fir stand, although a fire-maintained open forest condition was the normal situation during the pre-settlement period. Frequent low to moderate severity fires that occur in the climax conditions on these sites, will create a more open, park-like stand of Douglas-fir, whereas a severe fire returns the stand to the grass, shrub and forbs stage.

For forests in fire group 6, Douglas-fir is both the indicated climax species and a vigorous member of the seral (shade intolerant species) component. It is not uncommon for Douglas-fir to dominate all stages of succession. Ponderosa pine, western larch, and lodgepole pine, where they occur are seral components whose abundance varies by phase. Fire history studies conducted within the PSME/CARU h.t. of Southwestern Montana indicate a mean fire interval of 42 years, for pre-settlement stands. Fire was an important agent in controlling density and species composition. Low to moderate severity fire converted dense stands of pole-sized or larger tress to a more open condition, and subsequent light burning maintained stands in open conditions. Frequent low intensity or moderate fires favored western larch and ponderosa pine over Douglas-fir where these species occurred. Severe fires probably occurred on sites with ladder fuels (seedlings and saplings that allow surface fires to move up into the overstory canopy), dense stand conditions, and heavy fuel loads that resulted in stand replacement. Stand replacement fires favored lodgepole pine on sites where this species was present. Fire's role as a stand replacement agent becomes more pronounced when the natural fire-free interval is increased through fire suppression (unless corresponding fuel reduction occurs). The theoretical climax condition for Group Six is a multistoried Douglas-fir stand, although a fire-maintained open forest condition was the normal situation during the pre-settlement period. Frequent low to moderate severity fires that occur in the climax conditions on these sites, will create a more open, park-like stand of Douglas-fir, whereas a severe fire returns the stand to the grass, shrub and forbs stage (Fischer and Bradly 1987).

Table 3-2 shows that within the Project Area (2,986 acres), currently 63% of the area (1,877 acres) is the Douglas-fir cover type. Within this type there are 13 stands, accounting for 442 acres that have a trace (less than < 10%) of ponderosa pine.

The general pattern of forest succession for fire groups 8 and 9 (6% and 14% of the project area respectively) is quite similar. Douglas-fir, lodgepole pine, and western larch are seral components, whereas subalpine fir, spruce and to a lesser extent mountain hemlock are the climax species (shade tolerant) associated with these fire groups. The mean fire return intervals for fire group 8 were approximately 50 years and approximately 90-130 years for fire group 9 (Fischer and Bradly 1987). Forested stands experienced mixed severity fire effects, where some or all trees were killed by fire. As a result a variety of stand conditions were likely to occur throughout the range of these fire types. Multi-storied mixed conifer forests, and western larch/ Douglas-fir forests, and fire maintained lodgepole pine stands are common for these fire groups. Reoccurring stand replacement fires favored lodgepole pine on sites where this species was present. Multi-storied mixed conifer stands are vulnerable to severe fire effects because of the potential high fuel loading and the increased presence of shade tolerant ladder fuels. Climax stands within these fire groups 8 and 9 are very susceptible to stand replacement fire.

Fire's role as a stand replacement agent becomes more pronounced when the natural fire-free interval is increased through fire suppression, unless corresponding fuel reduction occurs. High fuel loadings and dense stand conditions have led to high intensity, stand replacing wildfire in stands where they were uncommon in the past (Arno and Brown 1991).

Table 3-1 shows that on Missoula Unit there are 5425 acres of the WL/DF cover type and 655 acres of the DF cover type that currently are not in an "appropriate" condition (defined in ARM 36.11.405) (as the Stand Level Inventory (DNRC) model suggests would be appropriate). Additionally the upper portion of Table 3-1 shows that for these stand that are in an inappropriate condition, that 1065 acre are currently Classed in the subalpine fir cover type (AF) and that 2569 acres are in the mixed conifer (MC) cover type class. Essentially what this suggests is that within these stands there is a disproportionate number of shade tolerant species (currently) than shade intolerant species. This may suggest that there has been a cover type shift as a result of lack of disturbance, such as fire. Fire suppression and lack of disturbance has allowed these stand to move towards a climax condition where shade tolerant species perpetuate the site. Stands such as these are at risk to stand replacement fire and insect attack as mentioned above. Left alone (as a result of fire suppression and a lack of disturbance) these stands would move towards a climax condition where the shade intolerant, fire dependant species (western larch, ponderosa pine, lodgepole pine) would be replaced. Table 3-6 shows that within the project area there are 433 acres of the Douglas-fir cover type and 147 acres in the Western larch/Douglas-fir cover type that are currently in a cover type condition that is not appropriate. Essentially what this suggests is that within these stands there is a disproportionate number of shade tolerant species (currently) than

shade intolerant species. This acreage (580 acres) when compared to the total acres in the project area (2987 acres) represents 19 percent of the project area. This 19 percent represents a cover type shift (species composition shift) that is a result of lack of disturbance, such as fire. For stands that are not currently in an appropriate condition within the project area 433 acres are in the 0-39 year age class (sapling stands). The estimates for these sapling stands indicated a greater proportion of lodgepole pine to Douglas-fir and Western Larch saplings, than the Stand Level Inventory (DNRC) model suggests would be appropriate. However it is not uncommon for stands in these forest types to initially have a high proportion of Lodgepole pine. For the remaining acres that currently are not in an appropriate condition, they have a subalpine fir component. This may be a result of fire suppression, however this condition (5% of the project area) is not out side the range of natural variability when compared to estimates from the 1993 Losensky study of historic forest conditions.

***The source of Data for the following tables is Stand Level Inventory (SLI) 9/24/04**

Table 3-1: Missoula Unit Cover Types that are not in Appropriate Cover Types*		
Cover Current	Number of Stands	ACRES
Sub-alpine fir	35	1065
Douglas fir	16	372
Lodgepole pine	46	1647
Mixed Conifer	120	2569
Non Stocked	24	662
Cover Appropriate	Number of Stands	ACRES
Douglas fir	21	655
Lodgepole pine	10	159
Mixed Conifer	0	0
Ponderosa pine	31	1518
W.Larch/Douglas fir	211	5425

Table 3-2: Current Cover Types within the Project Area*			
Cover Type	Count	Acres	Percent of acres
Douglas-fir	53	1,877	62.8%
Lodgepole pine	12	502	16.8%
Western larch/Douglas-fir	1	18	0.6%
Subalpine fir	8	169	5.7%
Ponderosa pine	7	317	10.6%
Non Forest	3	104	3.5%
Total	84	2,986	100%

Table 3-3: Missoula Unit Age Class Distribution*			
AGE CLASS	COUNT	ACRE	PERCENT
000-039	138	3,582	5.2%
040-099	641	19,827	28.8%
100-OLD STAND	821	23,829	34.6%
OLD STAND	510	16,998	24.7%
Non Forest	123	4,647	6.7%

Table 3-4: Age Class Distributions*					
Project Area			Proposed Harvest		
AGE CLASS	Percent	ACRE	AGE CLASS	Percent	ACRE +- 2
000-039	14.5 %	433	000-039		
040-099	15.8%	473	040-099	5%	84
100-OLD STAND	27.3%	814	100-OLD STAND	36%	613
OLD STAND	38.9%	1,162	OLD STAND	59%	1,000
Non Forest	3.5%	104			

Table 3-5: Age Class distributions for Missoula Unit* and Climatic Section 11 Bitterroot/Blackfoot (Losensky, 1993) by Percent of area			
Missoula Unit	Age Class		Bitterroot/Blackfoot
6.7 %	Non Stocked or Non Forest		9.1 %
5.2 %	0-39 SLI	Losensky 1-40	22.7 %
28.8 %	40-99	41-100	27.9 %
34.6 %	100-Old	101-Var.Yrs	18.4 %
24.7 %	Old	141+	21.9 %

Losensky's report: "Historical Vegetation in Region One by Climatic Section" 1993, summarized United States Forest Service (USFS) inventory data dating back to the 1930's. From this data some extrapolations were made so as to quantify historic forest conditions by back dating to 1900, which generally would reflect stand conditions at the time of Euro-American arrival (Losensky 1993).

Table 3-5A: Garnet Analysis Area Age Class Distribution 2005 SLI			
AGE CLASS	COUNT	SUM_NET_ACRES	Percent Area
000-039	47	1460.0000	7.0%
040-099	149	6383.6000	30.6%
100-OLD STAND	207	6074.0000	29.1%
OLD STAND	166	6111.1000	29.2%
Non-forest	21	865.7000	4.1%
Total	590	20894.4000	100.0%

Table 3-6: Project Area Cover Types where the Current Cover is Not Equal to the Appropriate Cover Type*			
Cover Type	Appropriately Acres	Currently Acres	Difference Acres
Douglas-fir	2310	1877	-433
Lodgepole pine	49	502	+453
Sub-alpine fir	42	169	+128
Western larch/Douglas-fir	164	18	-147

Losensky reported that for Climatic Section 11(Bitterroot-Blackfoot), that on average, 9.1% of the area was in a non-stocked forest type and that 22.7% of the area was comprised of stands in the 1-40 year old age class (seedling, saplings). Pole size to Mature stands (41-140 years old) comprised, on average, 46% of the area, with approximately 22% of the area potential Old Growth (141+ years), refer to Table 3-5. Although for Douglas-fir stands Losensky found: non-stocked 3.6%, 1-40 years 19.7%, Poles to Mature 69% and Potential Old Growth 7.4%. Table 3-5 illustrates that on Missoula Unit there is more mature (100-old and Old) forest than what Losensky found to be the condition historically. Additionally, Table 3-5 shows much less 0-39 year old stands on Missoula Unit than Losensky found. This suggests that there may have been a shift in age class distributions as a result of fire suppression (lack of disturbance), when compared to what was the age class distribution was historically. Table 3-4 shows a disproportionate amount of stands in the 100-old and old age classes within the project area as compared to historic conditions reported by Losensky (table 3-5).

The Garnet Analysis Area (GAA) is that portion of Missoula Unit (DNRC Trust Lands) East of the confluence of the Blackfoot River and the Clark Fork River including the area between these two rivers. Table 3-5A shows the age class distribution for DNRC/Missoula Unit within the Garnet Analysis Area. When a comparison is made between the Project Area and the Garnet Analysis Area, there is a greater amount of Old Stands within the Project Area (approximately 39%) compared to 29% in the Garnet Analysis Area. Additionally, there is approximately twice the proportion in area (14.5% compared to 7% respectively) of 0-39 year old stands within the Project area compared to the Garnet Analysis Area. Losensky reported three times the area of young stands (1-40 years) as there are currently within the Garnet Analysis area and less area occupied by 100-Old and Old Stands. The comparison of the Garnet Analysis Area to what Losensky reported would suggest a change in age class distributions that could be attributed to a lack of disturbance, such as fire or other agents.

Even aged stands comprise 45% and multi storied structures 49% (Table 3-7), within the project area.

Table 3-7: Project Area Forest Structure*			
Structure Type	# of Stands	Net acres	% project area
Single Storied	35	1340	45
Two Storied	2	35	1
Multi-Storied	42	1460	49
Heterogeneous	2	48	2
Un-even aged	3	104	3
Total	84	2987	100

Table 3-4 shows that within the project area there are 1,162 acres of old stands (Stand Level inventory (SLI) definition of old stands, are stands greater than or equal to 150 years old). The proposed harvest would enter approximately 87% of those stands (approximately 1010 acres). The DNRC has adopted the Green et al 1992 definition of Old Growth (ARM 36.11.403). For the habitat types and cover types in the project area, the minimum Old Growth (Green et al 1992) criteria are as follows: for ponderosa pine, western larch and Douglas-fir there needs to be a minimum of 8 trees per acre (tpa) greater than or equal to 21" inches in diameter at breast height (dbh) and these trees must be greater than or equal to 170 years old; for the lodgepole pine cover type there needs to be a minimum of 10 tpa greater than or equal to 13" dbh that are greater than or equal to 140 years old. Stands classified as Old (SLI) in the project area were sampled as per SLI protocol. The field data collected indicates that there are three stands (totaling approximately 69 acres) in Section 36,T12N, R14W (Packer Gulch) that meet the Green et al definition for Old Growth. These stands are all Douglas-fir stands currently and appropriately and represent approximately 2% of the project area.

SLI estimates of the total crown cover density for timber stands within the project area are 31% Medium stocked and 52% well stocked. SLI protocol assigns stands having 40-69% crown cover as Medium stocked and stands with 70-100% crown cover density as Well Stocked. The remaining forested stands in the project area are estimated to be in a Poor and Low crown cover classes, comprising approximately 13% of the project area for both classes combined.

3.2.3 Human Environment

3.2.3.1 Road Dust

There has historically been log truck and mining activity related traffic on roads within the project area (Cramer Creek Road, Bear Gulch Road, Deep Creek Road, Packer Gulch Road, and Secret Gulch Road). Traffic associated with activities on private timberlands, Bureau of Land Management ownership, DNRC Lands; all contribute to generate dust. Dust is presently produced by log trucks and passenger vehicle traffic along roads that would be used for log hauling purposes associated with

this project. Cramer Creek Road and Bear Gulch Road are both main roads and tributary to large areas, and thus the greatest volumes of traffic and potential traffic accumulate on these two roads. Bear Gulch road is used by visitors to the Garnet Ghost Town, and its proximity to Interstate 90, attracts many visitors, some of which are traveling to and through Montana. The Garnet Range Road is the preferred route (and is noted that way in the promotional guide to this area) in that the road is of a higher standard (two lane gravel road) and the first 3 miles (approximately) are paved as of years end 2004. The Bureau of Land Management (BLM) is planning on Chip Sealing this paved segment during July 6-8, 2005. The BLM manages Garnet Ghost Town and the Garnet Range Road, which is closed to all but snowmobile use from December 1 to May 1, each year.

3.2.3.2 Recreational Use

Visitors to Garnet Ghost Town, travel the road up Bear Gulch and the Garnet Range Road (paved the first 3 miles and closed to passenger vehicles from December 1 to May 1, each year). Bear Gulch road is used by visitors to the Garnet Ghost Town, and its proximity to Interstate 90, attracts many visitors, some of which are traveling to and through Montana.

Snowmobile use is common on and along the Deep Creek Road, Mulkey Cut-across Road, Garnet Range Road, and Bear Gulch Road all of which are part of the Bureau of Land Management's Garnet Winter Recreational Trails System. Winter logging activities associated with harvest of timber from the Packer Gulch Section and the Gambler Gulch Section would have the potential to impact snowmobile users.

3.2.3.3 Economics

There is no current revenue being generated from the sale of timber within the Project Area.

The costs related to the administration and management of the timber sale program are tracked at the Land Office level and State wide. 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 3-8: Revenue/ Cost Ratios

	FY98	FY99	FY00	FY01	FY02	FY03	FY04
SWLO	1.8	1.44	2.36	2.69	2.57	1.61	2.74
State	1.7	1.36	2.78	1.62	1.75	1.75	1.82

Table 3-9 shows the FY 2004 annual summary of revenue and costs for the Forest Management Program. This years report methodology differs from the reports of prior years. As in the past the Summary is based on fiscal year-end costs and revenues. This year the report is based on

information contained in the Return on Assets report for FY 2004 rather than on an income and expense allocation method that was developed several years ago that looked at expenses in isolation and did not integrate the activities of the different bureau's in the expense allocation process. A comparison of the two methods, based on the last three fiscal years, indicated that the difference in the final outcomes of the two reports was small. Since the Return on Assets report can be tied to the Annual Report and the old method could not, it was felt that the using the Return on Assets report would provide consistency in the numbers used in reporting on the annual financial status of the Division.

Table 3-9
Forest Management Program
Timber Program Revenue and Cost Summary: FY 2004

Land Office	Revenue		Total Revenue	Total Cost	Net Revenue	Net Return/ Total Rev.	Revenue/ Cost ratio
	Stumpage	FI*					
Northwest	$3,731,407	$1,158,246	$4,889,653	$3,728,150	$1,161,503	0.24	1.31
Southwest	4,305,083	395,965	4,701,048	1,713,884	2,987,164	0.64	2.74
Central	605,148	23,572	628,720	181,600	447,120	0.71	3.46
Southern	7,995	929	8,924	4,826	4,098	0.46	1.85
Northeast	113,827	390	114,217	56,896	57,321	0.50	2.01
Eastern	250,440	417	250,857	124,741	126,116	0.50	2.01
Total	$9,013,900	$1,579,519	$10,593,419	$5,810,097	$4,783,322	0.45	1.82

* FI revenue does not include $450,106 in collected revenue that was not spent on projects and is not available for distribution to the trust beneficiaries.

The tables of costs and revenues produced in prior reports are not needed for this analysis since the summary and distribution of the values is done in the Return on Assets report. Table 3-9 presents total costs and revenues by land office and for the program in total.

The overall revenue-cost ratio has increased to 1.82 from last year's ratio of 1.75. Several factors combined to bring about the increase. Total revenue increased by $2.3 million in FY2004 due to increases in both stumpage and FI revenue. FI accounted for nearly about $300,000 of the increase the rest $2,000,000 was the result of increased stumpage revenue. The increase in stumpage revenue was caused by both a larger harvest and an increase in stumpage prices. All land offices demonstrated an increase in revenue in FY 2004. The largest increase, in the Southwestern Land Office, was in excess of $2 million.

Overall costs increased in FY 2004, but the increase was proportionately less than in increase in revenue. The single most important factor that

contributed to the increase in costs was the FI program which accounted for nearly $300,000 of the additional $1.1 million increase in costs. The rest of the cost increases were spread between increases in salary expense and other program items. A relatively small portion of the increase was the result of revised allocation methods used to distribute expenses between trust land bureaus.

A comparison of the revenue-cost ratios for the various land offices indicates that the ratio increased in the Southwest and Northeast land offices; the Northwest, Central, Southern, and Eastern land offices all experienced declines in the ratio. The most significant decline was in the Northwest Land Office where the ratio decreased from 1.61 in FY 2003 to 1.31 in FY 2004. This decrease has a large impact on the overall program since the Northwest Land Office accounted for 46% of the total program revenue in FY 2004. The large increase in revenue in the Southwestern Land Office was the primary reason the revenue-cost ratio showed an increase in FY 2004. All of the area offices, except the Northwestern and the Southern Land Offices, had a revenue-cost ratio in excess of 2.0. The Central Land Office revenue-cost ratio of 3.46 was the highest of all land offices.

This is a cash flow analysis not an economic one. Many of the costs experienced in the current year would be expensed against future sales in an economic analysis. Long-term program health depends on the sales developed with today's costs being less than the revenue earned on future sales.

3.2.3.4 Historical and Archaeological Sites

Patrick Rennie, DNRC Archeologist, inspected the DNRC's sites/site leads database, land use records, General Land Office maps, and control cards for potential cultural resources in the proposed project area. A search of the Montana State Historic Preservation Office's Cultural Recourse Inventory System (CRIS) and Cultural Resource Annotated Bibliography System (CRABS) databases was also carried out, as well as a search of the Department of Environmental Quality's – Abandoned Mine Reclamation Bureau's Hard Rock Mine files. That series of searches indicated that cultural resource sites 24GN443 and 24GN448 are largely situated in Section 16, T12N, R14W (Secret Gulch) and that only one cultural resource inventory (Passman 1988) had occurred in that parcel. On both sites are the remains of historic log cabins. In addition Site 24GN448 as evidenced is a prehistoric chert/quarry reduction site. Part of this site was logged previously by the DNRC, Dry-Secret Timber Sale circa 1988.

On August 28-29, 2002 Patrick Rennie conducted a field cultural resources inventory, his findings are detailed in the subsequent report, " Cultural resources Inventory of the Secret Gulch Timber Sale: Granite Count, Montana", October 2002, DNRC, Helena, MT (a copy of the report is in the project file, as well). Site 24GN443, whereas it is adjacent to an existing road, which will be used to transport logs, it will not be impacted as it is out side the harvest area. A road would be constructed in conjunction with the proposed Timber Sale, adjacent to site 24GN448, however impacts to this site should be avoided. It is planned that the new road be located and constructed in a manner to avoid disturbing this site. If impacts cannot be avoided, then the report recommends a further detailed evaluation of this site.

3.2.4 Wildlife Issues, Existing Conditions

3.2.4.1 Threatened and Endangered Species Existing Conditions

3.2.4.1.1 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 by open roads (Kasworm and Manley 1990). Such impacts are manifested through habitat avoidance, poaching, and vehicle collisions.

The project area is approximately 20 miles southwest of the Northern Continental Divide Ecosystem grizzly bear recovery area, and immediately adjacent to occupied grizzly bear habitat (Wittinger et al. 2002). The nearby Anderson Hill has had repeated grizzly bear activity in recent years (J. Jonkel, MT FWP, personal communication, 2003). Thus, the proposed project area may be part of one or more grizzly bear home ranges. Therefore, the cumulative effects analysis area for grizzly bears encompasses 525 square miles (335,768 acres), including the BLM roadless area and portions of the Blackfoot River corridor.

Grizzly bears are known to be more vulnerable to human interaction in areas with high open road densities or ineffective road closures. Currently there are 1.36 miles of open road per square mile (simple linear calculation; 711 miles of open road), and 3.59 total miles of road per square mile (1,884 miles of road), within the 525 square mile analysis area. Within the project area, there are approximately 1.49 miles of open road per square mile (project area is approximately 4.8 square miles), and approximately 3.59 miles of total road per square mile (simple linear calculation). Currently, all of the project area's open roads are located within the Gambler Gulch parcel.

3.2.4.1.2 Lynx (Federally threatened)

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

Elevations in the project area range from 4,840 to 6,320 feet, and habitat types (Pfister et al. 1977) suitable for potential foraging occur in the area. Snowshoe hares are associated with dense young stands in subalpine fir habitat types, as well as mature stands with subalpine fir understories. Recent research (Squires et al. 2003) indicates that the only known lynx population in the Garnet Mtn. Range is located on the northern fringes of the project area. In Montana, the annual average home range for male lynx is 42 square miles and 35 square miles for female lynx (Squires and Laurion 2000). Unpublished results of the Squires et al. (2003) research suggests that wintering lynx tend to rely most heavily on pole to mature stands with high levels of vegetative structure at snow level in order to

survive the winter. Further, snowshoe hare densities tend to be greatest in these habitats, and lynx seek out hares in these habitats (J. Squires, U. S. Forest Service, personal communication, February 2005). Table 3-11 displays the quantity of potential lynx habitat within the project area. Table 3-12 describes the land ownership within the 525 sq. mile cumulative effects analysis area (335,768 ac.). Over one-third of the analysis area is managed by Plum Creek Timber Company, and approximately 9% is managed by DNRC. Table 3-13 breaks down the type of lynx habitat within the project area and on School Trust lands within the cumulative effects analysis area. Temporary non-lynx habitat denotes: seedling stands; sapling to old age class stands with <40% canopy closure; non-stocked clearcuts; and stand-replacement burns which are likely to develop future habitat characteristics through forest succession that are important to lynx. Lynx Other habitat means forest lands in lynx habitat that do not meet the habitat definitions for denning, mature foraging, young foraging, or temporary non-lynx habitat, but serve to provide cover to facilitate movement and acquisition of alternative prey species, such as red squirrels.

Table 3-10 Potential lynx habitat within the project area.

Lynx Habitat	Acres
Temporary Non-lynx Habitat	62
Other	932
Young Foraging	0
Mature Foraging	181
Denning	0
Total	**1,175**

Table 3-11 Land ownership within the 525 square mile lynx cumulative effects analysis area.

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

Table 3-12 Distribution of lynx habitats on School Trust lands within the project area and cumulative effects analysis area. Data are from DNRC Stand Level Inventory database (after accounting for habitat changes due to 2003 "Dirty Ike fire salvage", "Elk 36" and "Lost Bear" timber sales).

Lynx Habitat	Project Area (ac.)	Analysis Area (ac.)
Temporary Non-lynx Habitat	62	1,084
Other	932	1,563
Young Foraging	0	52
Mature Foraging	181	742
Denning	0	22
Total	**1,175**	**3,463**

3.2.4.2 Sensitive Species

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

The most abundant habitat types (Pfister et al. 1977) within the affected area are the Douglas-fir/ninebark and Douglas-fir/pinegrass types (Stand Level Inventory database). Within the project area, there are approximately 640 acres that are predominately ponderosa pine or Douglas-fir/ponderosa pine, with average stand diameter ≥ 15 inches dbh that would be considered suitable pileated woodpecker habitat (SLI database). The cumulative effects analysis area will encompass the project area and a 1-mile radius surrounding the affected School Trust parcels. Pileated woodpeckers have been seen and/or heard throughout the project area during several field visits (M. McGrath, Wildlife

Biologist, personal observations). Potential nesting or roosting cavities were identified in ponderosa pine snags in the Packer Gulch parcel.

3.2.4.2.2 Flammulated Owl

The flammulated owl is a tiny forest owl that inhabits warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and is a secondary cavity nester. Nest trees in 2 Oregon studies were 22-28 inches dbh (McCallum 1994). Habitats used have open to moderate canopy closure (30 to 50%) with at least 2 canopy layers, and are often adjacent to small clearings. It subsists primarily on insects and is considered a sensitive species in Montana. Periodic underburns may contribute to increasing habitat suitability for flammulated owls because low intensity fires would reduce understory density of seedlings and saplings, while periodically stimulating shrub growth. Within the project area there are approximately 2,390 acres of flammulated owl preferred habitat types.

3.2.4.2.3 Fisher

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

Within a 1-mile radius of the project area, there are approximately 3,758 acres of fisher preferred habitat types. Of these acres, approximately 1,533 acres occur within the project area.

3.2.4.2.4 Townsend's Big-eared Bat

Townsend's big-eared bats occur in a wide variety of habitats, yet its distribution tends to be strongly correlated with the availability of caves and old mines for roosting habitat. Population concentrations occur in areas with substantial surface exposures of cavity forming rock, and in old mining districts (Pierson et al. 1999). This bat is primarily a cave dwelling species that also roosts in old mine workings. It is a relatively non-migratory bat, for which no long-distance migrations have been reported. The Townsend's big-eared bat does not generally associate with other species in its roosts, particularly at maternity and hibernating sites. For maternity sites, characteristics that are important include: roost temperature, roost dimensions, light quality, and air flow. Of these, roost temperature is most important. The maternity roost is generally spacious, with the room at least 100 ft long, and 6.5 ft high. For hibernacula, the Townsend's big-eared bat selects roosts with stable, cold temperatures and moderate airflow. Individuals roost on walls or ceilings, often near

entrances. Temperatures within hibernacula typically range from 28.4° F to 55.4° F, with temperatures below 50° F preferred (Pierson et al. 1999).

There are at least 2 known caves that occur within the project area (Dry Gulch Section 2) that could potentially be used by this species. Both caves occur in the southern half of the northeast ¼ of Section 2. The larger cave is a limestone sinkhole that has side rooms radiating below the surface. One such side room has been described as being at least 100 feet in length and 10 feet in height, however, the opening periodically ices over (Mark Hannah, local spelunker, personal communication, 14 December 2004). As such, this side room may have the characteristics of a maternity roost, although bats have not been encountered within the cave. The second, smaller cave has an opening that is 10 to 15 feet wide, and then plunges vertically for approximately 60 feet, with no side-rooms present. The bottom of this cave has much forest litter present (Mark Hannah, local spelunker, personal communication, 14 December 2004). Thus, the smaller cave may be more likely used as an occasional night roost, rather than a maternity site or hibernaculum. Additionally, this species has been observed approximately 3.5 miles NW of Dry Gulch (Section 2), near the Linton Mine along Cramer Creek (Natural Heritage Program Database 2004). Thus, use of these caves by Townsend's big-eared bats is likely, but the extent and specificity (i.e., occasional night roost, maternity roost, hibernacula, etc.) of which is unknown.

3.2.4.3 Big Game

3.2.4.3.1 Elk

Elk generally avoid open roads, but become more tolerant of closed roads in the area over time (Lyon 1998). Densely stocked thickets of conifer regeneration and overstocked mature stands provide thermal protection and hiding cover for 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.

Within the project area, there are currently approximately 2.1 miles of closed road per square mile (see explanation in 3.2.4.1.1 under grizzly bears; simple linear calculation), and 2,030 acres of forest cover that could be used for snow-intercept cover. There are approximately 913 acres of forest cover within the project area (except in Secret and Gambler Gulch

parcels) that could currently be used for security cover during the hunting season.

The cumulative effects analysis area encompasses approximately 525 square miles, and corresponds to the forested area within Hunting District 292, and contains portions of the Chamberlain and Lindbergh elk herds' seasonal home ranges (Burcham et al. 1998). Within the analysis area, there are approximately 711 miles of open road, for a total of 1.36 miles of open road per square mile (simple linear calculation), and at least 1,884 miles of total road, for a total of at least 3.59 miles of total road per square mile (simple linear calculation). There are 101,407 acres of forest cover that could be used for snow-intercept cover, and approximately 51,307 acres (15.3% of cumulative effects analysis area) of forest cover that could be used for security cover during the hunting season.

3.2.4.3.2 Bighorn Sheep

Bighorn sheep are primarily grassland animals that require proximity to escape cover, which is typically characterized by steep, rugged terrain. Winter range habitat is typically forested habitat with well-developed grasses in the understory. The Dry Gulch portion of the project area is inhabited by an unnamed bighorn sheep herd that is known to use the lower portions of Dry Gulch in winter and for lambing. However, the herd is considered to be a dispersing group from the Lower Rock Creek herd, and it encounters a variety of human and disease vectors that may jeopardize the herd (M. Thompson, FWP, personal communication, December 2004). The Dry Gulch portion of the project area is a mixture of heavily forested land, grassland ridges, and burned forestland (Ryan Gulch Fire, 2000). The SW portions of Dry Gulch contain rocky cliffs, which may be good escape cover for the bighorn herd.

3.2.4.4 Other Issues

3.2.4.4.1 Northern Goshawk

The northern goshawk (hereafter goshawk) is a forest habitat generalist with specific nesting habitat requirements (McGrath et al. 2003, Squires and Reynolds 1997, Reynolds et al. 1992). The goshawk forages on a wide range of species, with the most predominant prey being snowshoe hare, Columbian ground squirrels, red squirrels, blue and ruffed grouse, northern flickers, American robins, gray jays, and Clark's nutcrackers (Squires 2000, Clough 2000, Watson et al. 1998, Cutler et al. 1996, Boal and Mannan 1996, Reynolds et al. 1992). Thus, given the diverse array of prey species, goshawks forage from a diverse array of habitats. However, Beier and Drennan (1997) found goshawks to forage in areas based primarily on habitat characteristics rather than prey abundance. Beier and Drennan (1997) found goshawks to forage selectively in forests with a high density of large trees, greater canopy closure, high basal area, and

relatively open understories. For nest stands, goshawks will nest in pine, fir, and aspen stands on north-facing slopes that are typically in the stem exclusion or understory reinitiation stages of stand development, with higher canopy closure and basal area than available in the surrounding landscape (McGrath et al. 2003, Finn et al. 2002, Clough 2000, Squires and Reynolds 1997, Reynolds et al. 1992). Nests are typically surrounded by stem exclusion and understory reinitiation stands (with canopy closure $\geq$ 50%) within the 74 acres surrounding the nest; higher habitat heterogeneity than the surrounding landscape, and an avoidance of stands in the stand initiation stage of stand development typify habitat in the 205 acres surrounding goshawk nests (McGrath et al. 2003). Goshawk home ranges vary in area from 1,200 to 12,000 acres depending on forest type, prey availability, and intraspecific competition (Squires and Reynolds 1997).

Within the 4,700-acre analysis area for goshawks, approximately 2,393 acres have recently been harvested on Plum Creek land; approximately 400 acres were burned by the Ryan Gulch Fire in 2000. The analysis area was established using topographic features, forest composition, and accounted for the Ryan Gulch Fire. Thus, approximately 2,800 acres of the analysis area (approximately 40%) have forested stands with canopy closure >50% (using orthophotos from 1995 at a scale of 1:45,000). Much of the forested area within the project area could be used by goshawks for either foraging or nesting habitat, although the habitat within Dry Gulch (Section 2) is likely the best potential nesting habitat. Two goshawk nests were located in the NE ¼ of Dry Gulch's Section 2. One pair of goshawks used these nests in 2002 and 2003. However, no sign of nesting in 2004 was observed (M. McGrath, SWLO Wildlife Biologist, personal observation).

3.2.4.4.2 Cooper's Hawk

The Cooper's hawk is a forest-dwelling raptor that possesses short, rounded wings, a long tail, and is highly maneuverable in a forested environment. This medium-sized *Accipiter* hawk preys on rabbits, red squirrels, chipmunks, jays, common flickers, robins, and other song birds. Based upon its prey base, the Cooper's hawk is more of a foraging habitat generalist, however, their nesting habitat requirements tend to be more specialized (Reynolds 1988, Reynolds 1988). Cooper's hawk nest stands tend to be in 30 to 70 year old, even-aged, and overstocked conifer stands (Reynolds 1988). Oftentimes, Cooper's hawks will construct multiple nests within 0.25 mile of each other, using a nest for $\geq$1 year and then utilizing an alternate nest (Siders and Kennedy 1996, Johnsgard 1990, Reynolds 1988, Kennedy 1988, Reynolds et al. 1982). Two Cooper's hawk nests have been located approximately 160 feet from each other, within section 36 of T12N R15W (Dry Gulch) of the project area. The species has been seen during a field visit on 20 May 2005. The

cumulative effects analysis area for this species will be the same as that for the goshawk.

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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 2-3 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

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 40,000 tons of timber to generate revenue for the Common School (CS) trust grant. Silvicultural methods to accomplish the other objectives and the predicted effects are discussed within Natural Forest Conditions (4.3.2).

4.2.1.1 Alternative A: No Action

Under this alternative, no trees would be harvested. No economic contribution to the School Trust would occur. DNRC's obligation to generate revenue for the School Trusts through management of these lands would not be met, at this time.

4.2.1.2 Alternative B: Harvest

Under this alternative, approximately 40,000 tons of timber would be harvested. This timber sale would generate an estimated $1,058,370 for the Common Schools (CS) trust grant.

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

4.3.1.1.1 Alternative A: No Action, Direct, Indirect and Cumulative Effects on Water Quality

Under the No Action Alternative, direct, indirect and cumulative effects evaluated were those associated with past management activities within the proposed project area. Direct, indirect, and cumulative effects within the project were observed to be minimal. Cumulative effects within the project area are expected to be minimal.

4.3.1.1.2 Alternative B: Harvest, Direct and Indirect Effects on Water Quality

A watershed effects analysis was completed for the proposed sale area to determine the potential direct, indirect, and cumulative impacts to water quality. Under the action alternative minimal direct, indirect and cumulative effects are expected as a result of the proposed action. Mitigation measures implemented during the proposed activities are expected to minimize potential impacts. The SMZ Law and Rules would be applied to all riparian areas in the project area. The units located along Secret Gulch would have additional buffers as a result of wildlife mitigations, which would be approximately 100 ft. All roads within the project area would be improved to meet BMP standards. There are roads within the project area that are steep and lack adequate drainage for road surface runoff. Portions of roads which are directly adjacent to stream channels would require additional drainage and sediment mitigation measures such as slash filter windrows or straw wattles where necessary. A option in order to make improvements to the road system in Dry Gulch Section 36, T12N, R15W could be to extended an existing road across a Class 2 stream segment of Dry Gulch to connect to an existing road a more favorable grade and location. By avoiding steeper grades and some wet areas along an existing road there would be a long-term benefit with respect to utility and a reduction in road maintenance long term. There are two crossing sites associated with an unnamed tributary to the Clark Fork River in Section 12, T11N, R14W (private) that if used would need to be improved to meet BMP standards. The inlets and outlets would be cleaned and straightened as necessary and rock armored to add additional stability and filtration. A drain dip would be installed above the crossing to divert road surface runoff before reaching the crossing.

Although Douglas Creek is a 303 (d) listed stream, the two tributaries located in the project area are dry with no defined channel and the risk of any impacts to downstream sections of the stream is minimal.

As a result of implementation of recommended mitigation measures, direct and indirect impacts are expected to be minimal.

4.3.1.1.3 Alternative B: Harvest, Cumulative Effects on Water Quality

Cumulative effects as a result of the proposed activities are expected to be minimal. It is anticipated that downstream beneficial uses, including irrigation and stock water would not be adversely affected.

4.3.1.2 Water Quantity

4.3.1.2.1 Alternative A: No Action, Direct and Indirect Effects on Water Yield

Under Alternative A, there would be no potential for increases in water yield as a result of State activities. Increases in water yield in Dry Gulch as a result of the 2000 Ryan Gulch fire would continue to decrease as more grasses, shrubs and trees grow on the site.

4.3.1.2.2 Alternative A: No Action, Cumulative Effects on Water Yield

There would be no potential for increases in water yield associated with this alternative.

4.3.1.2.3 Alternative B: Harvest, Direct and Indirect Effects on Water Yield

High water yield increases can increase peak flows. Peak flows may change in magnitude and duration, but are dependant on intensity and duration of rainstorms as well as snow pack conditions, making it difficult to predict and calculate increases. Stream channel reactions to these flows vary, depending on geomorphology and stream channel stability. A water yield increase threshold of approximately 15% was set for both Dry Gulch and Bear Creek watersheds. This threshold was determined by assessing acceptable risk level, watershed sensitivity, resource value, stream channel condition, and riparian habitat conditions.

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

Stream	Existing WYI%	Proposed WYI %	Established WYI factor	Existing ECA Acres	Proposed ECA Acres
Dry Gulch	5.5%	6.9%	15%	1065 acres	1337
Bear Gulch	1.9%	2.4%	15%	1806 acres	2307

Proposed activities are expected to increase water yield in Dry Gulch from approximately 5.5% to approximately 6.9%. However, water yield increases are still below the established WYI threshold factor of 15%. In addition, any impacts are expected to be minimal, because the only channel feature located below the project area is a gulch, which was not observed to have any defined bed and banks and only has ephemeral flow. The gulch (Dry Gulch) stops approximately 1 mile before the Clark Fork River resulting in no return flow to any body of water. Peak flows may change in magnitude and duration, depending on intensity and duration of rainstorms as well as snow pack conditions. However, the chances of these water yield increases effecting channel stability are minimal due to the geomorphology and existing conditions of Dry Gulch.

Water yield increases in Bear Creek are expected to increase approximately 0.5%. This is well below the threshold set for Bear creek and is not considered to be at all significant. These increases are not expected to cause any channel changes or effect stability.

As a result of the proposed activities, direct and indirect impacts are expected to be minimal in both Dry Gulch and Bear Creek.

4.3.1.2.4 Alternative B: Harvest, Cumulative Effects on Water Yield

Cumulative effects as a result of the proposed activities are expected to be minimal. Downstream beneficial uses, including irrigation and stock water are not anticipated to be affected. Minimal signs of water yield impacts as a result of the fire were observed in Dry Gulch and increases in water yield as a result of fire conditions are expected to continue to decrease.

4.3.1.3 Geology and Soil Resources

4.3.1.3.1 Alternative A: No Action, Direct and Indirect Effects on Soils

Under Alternative A, there are no anticipated impacts to soils with respect to displacement, compaction, or erosion.

4.3.1.3.2 Alternative A: No Action, Cumulative Effects on Soils

There are no anticipated cumulative impacts to soils with respect to displacement, compaction, or erosion. Maintenance and repair of roads within the project area would not take place. Weed spraying along roads within the project area would not occur. Obstruction and stabilization (slash obstruction and seeding) of roads not needed in the near term would not occur. Under the No Action alternative there is potential for erosion on roads to continue at current levels or increase unabated.

4.3.1.3.2 Alternative B: Harvest, Direct and Indirect Effects on Soils

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

displacement, and erosion. Potential effects are a reduction in long-term soil productivity, and regeneration potential as well as impacts to woody debris distribution and nutrient cycling.

Cumulative effects could occur from repeated entries into a harvest area. Under the Action Alternative, the risk of direct and indirect impacts is expected to be minimal as a result of implementation of recommended mitigation measures. Many harvest units located within the proposed project area are ground-based operations. In order to limit cumulative impacts, existing skid trail would be used where available if they are properly located and adequately spaced. Utilizing existing skid trails and mitigating direct and indirect effects with soil moisture restrictions, season of use and method of harvest, the risk of unacceptable long-term impacts to soil productivity would be low.

Season of operation would be winter, summer or fall. The total area in trails and landings would be restricted to 15%, with a maximum of 20% of the total area of the unit. Winter harvest operations would be restricted to frozen or snow covered conditions with a minimum snow pack of 12-18 inches. Harvest operations during summer and fall conditions would be restricted to periods of 20% or less soil moisture at 6 inches below the soil surface.

Ground based skidding would be restricted to slopes of approximately 45% or less to reduce potential erosion and displacement. Soil moisture content on sensitive soils would be checked and approved by the Forest Officer before the start of harvest operations.

As a result of recommended mitigation measures, direct and indirect impacts are expected to be minimal.

Roads

Alternative B: Harvest would provide considerable improvement to the road systems through the installation of additional drainage in roads and providing road maintenance. On access routes, existing road conditions and drainage would be inventoried to prioritize site-specific improvements that control erosion. DNRC would improve road drainage on existing roads. 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 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). Improved road drainage would

reduce maintenance needs and levels of anticipated erosion compared to the Alternative A: No Harvest (No Action).

4.3.1.3.3 Alternative B: Harvest, Cumulative Effects on Soils

Cumulative impacts are expected to be minimal by limiting the area of total adverse soil impacts to 15% or less of the total area of each harvest unit. 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. 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 mitigated by limiting the area of detrimental soil impacts, by slope limitations for ground skidding, cable harvest on slopes greater than 45% and installing adequate drainage where needed.

Large woody debris would be maintained on the site at approximately 5-10 tons/acre. An acceptable risk of cumulative effects is expected if implementation of BMP's, proper skid trail planning and design and limiting operations to dry and frozen conditions occurs.

4.3.1.3 Cold Water Fisheries

4.3.1.3.1 Alternative A: No Action, Direct, Indirect and Cumulative Effects on Fisheries

Under Alternative A, there would be no risk of direct, indirect, or cumulative impacts to fisheries.

4.3.1.3.3 Alternative B: Harvest, Direct and Indirect Effects on Fisheries

The only assumed fish populations are in Secret Gulch. There would be a 100-foot wide no cut buffer along the channel as mitigation for fisher (a mammal, see wildlife section). These buffers are expected to provide sufficient thermal protection as well as maintain habitat complexity for fish. The proposed harvest units along Secret Gulch would be skidded using a cable system, which would reduce the potential for sediment to reach the stream channel. Beyond the 100 ft buffer, approximately 40% of the canopy cover would be retained. Implementation of riparian buffers is expected to result in minimal direct and indirect effects to fisheries.

4.3.1.3.4 Alternative B: Harvest, Cumulative Effects on Fisheries

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 instability; increases in water yield and increased sediment yield, stream temperature, nutrients.

Recommended riparian buffers along the stream in Secret Gulch in conjunction with the 40% canopy cover retention outside of the buffers is expected to result in minimal cumulative effects to fisheries. Sediment production is anticipated to be minimal and short and long-term habitat complexity would be maintained.

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 LCWD essential for fish habitat and stream complexity.

4.3.1.4 Noxious Weeds

4.3.1.4.1 Alternative A: No Action, Direct, Indirect and Cumulative Effects on Weeds

It is expected that noxious weed infestations would increase over time. 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 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 (Ryan Gulch Fire 2000). DNRC would monitor the area for new weeds, and treat as a priority. Heavy tree canopies would continue to compete with weeds, however weeds would continue to spread across the analysis area.

4.3.1.4.2 Alternative B: Harvest, Direct and Indirect Effects on Weeds

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

For this project an Integrated Weed Management (IWM) approach would be implemented that would include: prevention, revegetation and weed control measures for spot outbreaks, which are considered the most effective weed management treatments. Short-term goals would be to reduce existing noxious weed populations and increase native plants and seeded grasses. Where weeds are replaced with grasses, erosion would be reduced due to the improved plant cover. Localized herbicide applications would be used, primarily along disturbed roadside edges and spot treatments of small infestations. An herbicide treatment targeting the more prevalent noxious weeds along the roadsides would take place once prior to proposed activities and once following completion of activities.

To protect water quality, herbicide would not be applied where runoff could enter surface waters or riparian features. Existing biological control efforts for knapweed would be monitored and supplemented as necessary. 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, the 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 would 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.

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.

Integrated Weed Management Mitigation's:

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

1. All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds.

2. Equipment would be subject to inspection by the *F*orest *O*fficer prior to moving on site.

3. All newly disturbed soils on road cuts and fills *would be promptly seeded* 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.

4.3.1.4.3 Alternative B: Harvest, Cumulative Effects on Weeds

Weeds are expected to increase within the project area, but mitigations would be implemented to minimize the spread and possible reduce some of the current infestations. Implementation of recommended weed mitigation measures is expected to result in minimal cumulative effects.

4.3.2 Natural Forest Conditions and Old Growth

4.3.2.1 Alternative A: No Action, Direct and Indirect Effects on Natural Forest Conditions and Old Growth

Under the No Action Alternative no harvesting of timber would take place. Mature Douglas-fir stands would remain much as they are now for the foreseeable future, with slow growth rates. Pole size Douglas-fir and lodgepole pine stands would continue to increase in relative density as a result of increasing in size. Growth rates in these stands would be low as the trees continue to compete with each other for moisture and growing space. Tree mortality would continue as a result of competition (and possible continued drought) stress and subsequent insect attacks.

4.3.2.2 Alternative A- No Action, Cumulative Effects on Natural Forest Conditions and Old Growth

Slow growth rates and mortality within some stands would continue. Fuel loads would increase, as would the potential for increased risk to stand replacement fire. The potential for effects as a result of activities on lands other than DNRC exists and would likely continue into the foreseeable future. DNRC lands account for approximately three percent of the land area within Townships associated with Sections included in the project area. The potential for cumulative impacts associated with the no action alternative with respect to vegetation and Natural Forest conditions are predicted to be negligible, relative to the aforementioned area.

4.3.2.3 Alternative B: Harvest, Direct and Indirect Effects on Natural Forest Conditions and Old Growth

Through the emulation of natural processes the DNRC endeavors to manage for biologically diverse forests (ARM 36.11.405). Prior to organized fire suppression, naturally occurring fire shaped and maintained forested landscapes. With respect to the proposed timber harvest project, trees would be harvested and stocking and species composition would be controlled as naturally recurring fire would, were it allowed. In the absence of fire (or harvest), insects, disease, and stem exclusion provide

on going changes to forests. These types of disturbances occurred to some extent prior to effective fire suppression. Increased fuel loads have the potential to put forests at greater risk to stand replacement fire.

Through emulation of natural processes managers chose those silvicultural prescriptions that facilitate control of: stocking (through harvest), species composition, age class distributions, maintain desirable seed sources for future age classes, control fuel loads, and potentially prepare seed beds. Emulation of natural processes provides the rational for silvicultural treatments as well as overall management objectives.

The project objectives with respect to vegetation are to promote forest health and vigor of timber stands and subsequently help prevent and or decrease the incidence of insect and disease infestations. An additional objective is to regenerate portions of stands where tree growth is declining. Project design would incorporate methods that maintain site productivity and favor the retention and regeneration of appropriate tree species and attainment of the "desired future condition" [ARM 36.11.405]). The timber sale design should promote a healthy and vigorous forest, emulate natural fire effects, and improve stocking, age class distributions, and species composition to levels and types that were present prior to Euro-American settlement.

Under the Action Alternative approximately 1695 acres are proposed for harvest. Of this, approximately 1,437 acres of primarily Douglas-fir stands would be reduced from on average approximately 160 square feet of basal area per acre to 40-90 sq. ft. of basal area. The remainder, approximately 258 acres are of the Ponderosa pine type located in the Packer Gulch Section. These 258 acres would be reduced to approximately 50 sq. ft. from on average approximately 160 sq. ft.

Where harvest areas coincide with "Lynx Habitat" (approximately 620 acres, Table 4-1 below), sufficient tree canopy would be left so as to provide a minimum of 40% crown closure (percent area of tree crowns compared to a given area). Crown closure would be provided by retaining dominant seral tree species; pole size trees and saplings would provide cover as well, especially in areas classed as Mature Foraging Lynx Habitat. Within the Mature Foraging areas advanced regeneration of shade tolerant species (sub-alpine fir and spruce saplings) would be retained along with intolerant species. It is not un-common on these Northern more mesic aspects for non-lethal fires to occur, within Fire Group 8 (as defined by Fischer and Bradley), thus encouraging shade tolerant species to perpetuate, that is, stands to develop towards climax conditions. Encouraging shade tolerant species is a departure from Desired Future Conditions as prescribed in ARM for Forest Management. However, the fine filter analysis directed management goals to favor critical attributes associated with this Mature Foraging Lynx Habitat. SLI estimates of the total crown cover density for timber stands within the project area are 31% Medium stocked and 52% well stocked. Medium crown cover is 40-69% crown cover and Well is 70-100% crown cover

(CC) density. The remaining forested stands in the project area are estimated to be in a Poor and Low crown cover classes, comprising approximately 13% of the project area for both classes combined. The proposed harvest areas are in a Medium or Well-stocked condition. For Harvest areas that are currently Well stocked (70-100% CC) and within Lynx habitat potentially 30-60% of the cover would be available for harvest. If the stand had 160 square feet of basal area then approximately 64 sq. ft. of basal area would need to be left to provide cover for Lynx.

Table 4-1 Proposed Harvest within Lynx Habitat (SLI 9/24/2004)		
Section	Approximate acres	Lynx Habitat
Dry Gulch-2	79	Other
Dry Gulch-36	52 132 184	Mature Foraging Other Total
Secret Gulch-16	40 18 59	Mature Foraging Other and Temp-non Total
Packer-36	23	Temp-non
Gambler-16	63 212 275	Mature foraging Other Total
Total	620	

The median range of diameters for leave trees within the project area that are merchantable ranges from 8-16" dbh approximately. Given a stand with 64 sq ft of basal area and a corresponding average diameter for leave trees of 11" dbh (0.660 sq ft per 11' diameter tree), then there would be 97 trees per acre (tpa) (64/0.660 = 96.969) left on a 22' square foot spacing. Basal area is equal to the dbh of a given tree squared times 0.005454. If the average diameter for leave tree was 16" dbh (1.396 sq ft per 16" diameter tree) and there was 64 sq ft of basal area left, then there would be approximately 46 tpa left on a 30' square foot spacing for leave trees approximately.

Leave tree selection would favor dominant and codominant trees of best available health, vigor, and form including full crowns. Generally trees with well-developed crowns typically represent the largest diameter trees, for a given age class. It is estimated that the resultant basal area retained within Lynx Habitat harvested would range from 60-90 sq.ft. of basal area.

There are formulas available that estimate that for Douglas-fir stands with 40 % CC that the basal area would range from 50-60 sq.ft. Dealy's research suggests basal areas as low as 25 sq. ft. may provide canopy closures of 40%. His work also suggests that BA's of 50 sq. ft. provide canopy closures of between 55 and 65% (Dealy, J.E. 1985). However, given his caution regarding thinned stands, it is recommended that basal

areas of 50 to 60 sq. ft., be retained to provide 40% canopy cover. There is however a poor correlation between Crown Closure and Basal Area (McLeod, Scott 2005, DNRC draft memo).
As a result of maintaining 40% crown closure, these primarily Douglas-fir stands would resemble a portion of the potential natural variability for fire maintained open, park like stands that were typical prior to Euro-American settlement. That is, stocking levels within stands occurred above and below this stocking level within this fire type (Six as defined by Fischer and Bradley 1987). Maintaining this stocking level (60-90 sq. ft. basal area) may not optimize growth potential. For Douglas-fir stands stocking levels of 50-70 sq. ft. per acre of basal area is widely accepted as optimal for growth and yield, and health, especially with respect to resistance to insect attack (Douglas-fir Beetle). There may be a slight risk for increased mortality associated with maintaining these stocking levels and the subsequent susceptibility to attack from Douglas-fir Beetle. Negron, J.F and others (1999) found that for Western Montana and Northern Idaho, in Douglas-fir stands of high-hazard conditions (age over 100 years, average diameter over 16" d.b.h, and high percentage of Douglas-fir in the stand), that mortality in Douglas-fir stands with a basal area of 115 sq. ft. per acre or less averaged 37 sq. ft. beetle-caused mortality, and could be defined as "low" risk (Negron et. al. 1999).

The DNRC has adopted the Green et al definition of Old Growth (ARM 36.11.403). For the habitat types and cover types in the project area, the minimum Old Growth (Green et al 1992) criteria are as follows: for Ponderosa pine, western larch and Douglas-fir there needs to be a minimum of 8 trees per acre (tpa) greater than or equal to 21" inches in diameter (dbh, at breast height) and these trees must be greater than or equal to 170 years old; for the lodgepole pine cover type there needs to be a minimum of 10 tpa greater than or equal to 13" dbh that are greater than or equal to 140 years old. These minimums will be incorporated into the harvest design where they exist.

There are three stands that currently are classed as Old Growth (as defined by Green et.al 1992). They are present in the Northern part of the Packer Gulch Section (Section 36, T12N, R14W), and are approximately 69 acres in size (total of all three stands). They are Douglas-fir stands, within these stands, there would be left a minimum of 8 tress per acres greater than or equal to 21"dbh (diameter breast height). These trees would account for approximately (minimum) 20 square feet of basal area (basal area for a 21' dbh tree is approximately 2.4 sq. ft.). Dominant trees of best available health, vigor, and form would be retained where available. 40-60 square foot of basal area would be retained within these stand areas, as individuals or in groups. Currently there is Douglas-fir beetle mortality occurring in theses stands. A minimum of 1 snag (dead tree) per acre greater than or equal to 21"dbh would be left. Openings created within the stands would encourage regeneration within these stands and a new age class of trees to be developed. The harvest would

emulate the effects of a mixed severity fire that were common within Fire Group 4 (as defined by Fischer and Bradley) or the effects of continued Douglas-fir beetle mortality.

There is an area (approximately 23 acres) associated with the Goshawk habitat (nesting site) in the Dry Gulch Section 2, where 90 sq. ft. of basal area would be left, so as to favor retention of critical attributes associated with this nest site. Leaving areas with canopy cover of more than 40% that were composed of large trees at fairly high densities would give the appearance of having burned with less intensity when compared to treatments in adjacent stands (areas) that would emulate a mixed severity burn. This would emulate the variable effects of fire to produce differing stand structures.

The predominant treatment in the Douglas-fir type stands would employ a shelterwood system. Individuals of other intolerant species such as Western Larch and Ponderosa pine would be maintained where they occur. These stands are predominantly evenaged (some with two age classes). These stands would be left in a stocked condition favoring growth (approximately 60 sq. ft. where mitigations for wildlife are not indicated). Intermediate cuttings would be a combination of improvement, thinning, sanitation-salvage type treatments. There would be flexibility to create some small openings (1-5 acres) where stocking levels for leave trees would be 40 sq.ft. of basal area, this would encourage regeneration. These openings would be responsive to areas where the trees are of low or declining vigor and or areas of Douglas-fir beetle activity (sanitation-salvage treatments). Good quality advanced regeneration would be maintained and protected in some areas of limited extent, where it occurs.

The Ponderosa pine stands have two age classes. These would be managed with improvement-selection cutting, managing for retention of growing stock as well as maintaining and recruiting larger diameter seed-trees for future entries. Some openings may be created in response to pine beetle (sanitation-salvage), and these openings would encourage regeneration of a new age class. Openings are predicted to be a small percentage of the area at this time. Stocking levels would vary (plus or minus 20 sq. ft.) through out these pine stands and on average a minimum of 50 sq. ft of basal area would be retained, approximately.

Table 3-4 shows that of the Harvest area: 5% of the area is stands 40-99 years old, 36% 100-Old and 59% Old (150 years or greater, except for Lodgepole pine 130 years or greater, SLI protocol).
The proposed intermediate (and partial) cuttings (improvement, low thinning, thinning, sanitation-salvage, selection and shelterwood harvests), within the project area would not change the age class for these stands that are currently even aged. Even aged stands would remain so. Un-evenaged stands would remains so, as well. Cutting within the multi-storied structures, if they were low thinned would increase the average stand age (however this may not necessarily change the age class). The

age class for multistoried or heterogeneous structures would not likely change if individuals of all ages were harvested, although the average stand age could increase. In all cases the proposed harvest would likely not change the age class distribution but rather trend age classes to what was typical historically.

There are very few opportunities to shift the cover type representation within the Project area and subsequently on Missoula Unit (see chap. 3). That is for the most part the current cover type is the same as the appropriate cover type (desired future condition, ARM). For areas which this is not the condition, wildlife and riparian considerations would take precedence over potential vegetative shifts.

The proposed harvest is approximately two percent of the total acreage comprising Missoula Unit. The proposed harvest for the majority of the harvest area would emulate a fire-maintained open forest condition that was typical prior to the Euro-American settlement period. Not withstanding the aforementioned exceptions (cutting within Lynx Habitats) the proposed harvest would trend stands within the project towards the desired future condition.

Mitigations that would be expected in part to maintain site productivity are nutrient cycling through retention of slash (needles, branches and larger coarse woody debris generated from harvest) on site (see mitigations for soils, Chap. 2.6.1).

4.3.2.4 Alternative B: Harvest, Cumulative Effects on Natural Forest Conditions and Old Growth

Reducing stand densities in part would move stands within the project area towards a condition that was more prevalent historically, typified by more open, park-like stands.

The proposed harvest is approximately two percent of the total acreage comprising Missoula Unit.

The Garnet Analysis Area (GAA) is the portion of Missoula Unit (DNRC Trust Lands) East of the confluence of the Blackfoot River and the Clark Fork River including the area between these two rivers.

The Ryan Gulch Fire of 2000 burned approximately 17,000 acres, which is 8% of the GAA. The Ryan Gulch Fire burned approximately 17% of the Township T11N, R15W (Dry Gulch). This is approximately 4 % of the area included in Townships that include Sections that are included in the project area. See Ryan Gulch Fire Salvage EA 2001 for fire effects on DNRC lands.

DNRC lands account for approximately 10% of the land area within the Garnet Analysis Area, Table 4-2 below: Federal Lands (BLM and Forest Service) approximately 12 %, Private lands approximately 68% (corporate 42%).

Table 4-2: Land Ownership within the Garnet Analysis Area (SLI 4/2001)			
OWNER NAME	COUNT	SUM_ACRE	Percent Area
BLM	42	25,336.7220	12.35%
Forest Service	5	45.9710	0.02%
Corporate	47	85,585.1010	41.73%
Private	63	54,065.5500	26.36%
State Parks and Recreation Are	1	55.1530	0.03%
State of Montana (DNRC)	43	21,437.3710	10.45%
State of Montana (Other)	6	6,143.8330	3.00%
Unknown	12	12,310.5040	6.00%
Water	11	93.5810	0.05%
Total	230	205,073.7860	100.00%

Losensky reported that for Climatic Section 11(Bitterroot-Blackfoot), that on average, 9.1% of the area was in a non-stocked forest type and that 22.7% of the area was comprised of stands in the 1-40 year old age class (seedling, saplings). Pole size to Mature stands (41-140 years old) comprised, on average, 46% of the area, with approximately 22% of the area potential Old Growth (141+ years), refer to Table 3-5. Although for Douglas-fir stands (most prevalent within the project area) Losensky found: non-stocked 3.6%, 1-40 years 19.7%, Poles to Mature 69% and Potential Old Growth 7.4%. Table 3-5 shows most notably much less 0-39 year old stands and more 100-Old stands on Missoula Unit, compared to what Losensky found. This proposed timber sale would not alter the age class distribution on Missoula Unit or within the GAA. It would modify forest cover by reducing stand density to what was more typical of historic conditions. This project would have a low potential to reduce mature forest cover below what Losensky reported when compared to forest cover on Missoula Unit or within the GAA.

Implementing either alternative considered in this Environmental Assessment would have negligible cumulative effects when consider together with actions taken on other adjacent forested landowner's property. DNRC lands account for approximately three percent of the land area within Townships associated with Sections included in the project area: Federal Lands (BLM and Forest Service) approximately 38 %, Private lands approximately 60% (corporate 27%). Within this analysis area and the GAA, adjacent, primarily private landowners have reduced cover to the extent that there is probably less mature forest cover on their lands than occurred historically. The cumulative effect of harvest activities across all ownerships within the Garnet Analysis Area has the potential to reduce mature forest cover, below what Losensky reported. The Harvest Alternative would move harvested stands towards a condition that was more typical of Historic Conditions, more open, park-like forests. The potential to reduce mature forest cover would be very low. Harvest within Old Growth Stands within the project area would maintain a

2) The DNRC proposed Haywire Wallace timber sale.

3) The DNRC proposed Headquarters timber sale.

4) The DNRC proposed Washoe Creek timber sale adjacent to (1).

4.3.4.2.3 Fisher

4.3.4.2.3.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Fisher

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

4.3.4.2.3.2 Alternative B: Harvest, Direct and Indirect Effects on Fisher

The existence of fishers in the Garnet Mountain range has been verified since 1989 (Vinkey 2003). The proposed action would harvest timber within approximately 968 acres of the approximately 1,533 acres of potential fisher habitat within the project area. Thus, canopy cover would not be reduced on approximately 565 acres of potential fisher habitat within the project area. However, probably only 946 acres of the "potential fisher habitat" (1,533 acres) would be suitable for fishers due to canopy closure and vegetative structure. Of these 946 acres, the proposed action would manipulate approximately 707 acres (75%), thereby reducing canopy closure, and vertical structure. To partially mitigate the effects of this harvest, the proposed action would work on retaining the advanced regeneration within 19 acres of the Gambler Gulch parcel, and defer harvesting within 9 acres. Such action would work to retain foraging habitat and coarse woody debris for foraging, denning, and loafing sites. These areas were identified as a priority for conservation efforts due to repeated observation of marten tracks within the affected area (Mike McGrath, SWLO Wildlife Biologist, personal observations). Retention of advanced regeneration in these areas would be ensured through skid trail planning, careful contract administration, and special operation requirements for the particular units. Within the Secret Gulch parcel, several acres of fisher habitat along the riparian areas would be retained for a travel corridor. Thus, the proposed action would likely reduce the amount of fisher habitat available within the project area; however, efforts would be made to maintain the best available fisher habitat within the project area.

4.3.4.2.3.3 Alternative B: Harvest, Cumulative Effects on Fisher

The moister, more suitable habitats for fisher within the analysis area are typically located near the Secret Gulch and Gambler Gulch parcels. Most of the analysis area is relatively evenly split between heavily harvested private industrial timberlands and forested public lands. Thus, due to the

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Forest Service	5	45.9710	0.02%
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State Parks and Recreation Are	1	55.1530	0.03%
State of Montana (DNRC)	43	21,437.3710	10.45%
State of Montana (Other)	6	6,143.8330	3.00%
Unknown	12	12,310.5040	6.00%
Water	11	93.5810	0.05%
Total	230	205,073.7860	100.00%

Losensky reported that for Climatic Section 11(Bitterroot-Blackfoot), that on average, 9.1% of the area was in a non-stocked forest type and that 22.7% of the area was comprised of stands in the 1-40 year old age class (seedling, saplings). Pole size to Mature stands (41-140 years old) comprised, on average, 46% of the area, with approximately 22% of the area potential Old Growth (141+ years), refer to Table 3-5. Although for Douglas-fir stands (most prevalent within the project area) Losensky found: non-stocked 3.6%, 1-40 years 19.7%, Poles to Mature 69% and Potential Old Growth 7.4%. Table 3-5 shows most notably much less 0-39 year old stands and more 100-Old stands on Missoula Unit, compared to what Losensky found. This proposed timber sale would not alter the age class distribution on Missoula Unit or within the GAA. It would modify forest cover by reducing stand density to what was more typical of historic conditions. This project would have a low potential to reduce mature forest cover below what Losensky reported when compared to forest cover on Missoula Unit or within the GAA.

Implementing either alternative considered in this Environmental Assessment would have negligible cumulative effects when consider together with actions taken on other adjacent forested landowner's property. DNRC lands account for approximately three percent of the land area within Townships associated with Sections included in the project area: Federal Lands (BLM and Forest Service) approximately 38 %. Private lands approximately 60% (corporate 27%). Within this analysis area and the GAA, adjacent, primarily private landowners have reduced cover to the extent that there is probably less mature forest cover on their lands than occurred historically. The cumulative effect of harvest activities across all ownerships within the Garnet Analysis Area has the potential to reduce mature forest cover, below what Losensky reported. The Harvest Alternative would move harvested stands towards a condition that was more typical of Historic Conditions, more open, park-like forests. The potential to reduce mature forest cover would be very low. Harvest within Old Growth Stands within the project area would maintain a

minimum of quantifiable Old Growth attributes (large old trees; see 4.3.2.2 Green Old Growth Criteria) that would maintain their status as Old Growth as defined in ARM. Consequently there is a low risk that the Harvest Alternative would reduce the amount of Old Growth, because these stands would retain the minimum amounts of Green et al Old Growth attributes, as required in ARM. Cumulatively there is a low to moderate risk of effects to mature forest cover including Old Growth, should the Harvest Alternative be selected.

Some other effects of altering forest cover are discussed within the Hydrological and Wildlife portions of this document.

4.3.3 Human Environment

4.3.3.1 Road Dust and Truck Speeds

4.3.3.1.1 Alternative A: No Action, Direct and Indirect Effects on Road Dust and Truck Speeds

Road dust would likely continue to be generated as a result of activities associated with logging of timber on lands other than those managed by DNRC.

4.3.3.1.2 Alternative B: Harvest, Direct and Indirect Effects on Road Dust and Truck Speeds

Log hauling and activities associated with road maintenance and construction on native and gravel road surfaces can produce a large amount of dust. If hauling were to be done at times when the road surfaces are dry, treatments such as watering, magnesium chloride or similar dust abatement product would be applied, should dust be an issue. This application of dust abatement would reduce dust produced by truck traffic as well as private vehicle traffic adjacent to residential areas. Log trucks hauling timber products of State Lands origin would be required to comply with contract stipulations with respect to speed limits and signing logging activity on road segments adjacent to residences and at points along the haul route. Therefore, risk to persons (and property) from truck traffic would be low (mitigated).

4.3.3.1.3 Alternative B: Harvest, Cumulative Effects on Road Dust and Truck Speeds

The potential for DNRC activities to increase the amount of dust created and risk to motorists when combined with traffic resulting from other activities would exist, should DNRC's proposed activities occur. Planned mitigations would minimize dust and risk to motorists and would be reasonable and prudent.

4.3.3.2 Recreational Site Use

4.3.3.2.1 Alternative A: No Action, Direct and Indirect Effects on Recreational Site Use

There would be continued use of the roads up Bear Gulch and Deep Creek. Continued activities associated with timber harvest on Private and BLM lands could continue. Activities associated with mining could continue as well. Use of the road up Bear Gulch to Garnet Ghost Town would continue, although there is potential for an increased portion of the volume of traffic to use the Garnet Range Road, especially if it were to be continually improved (paved). Snowmobile use would continue on trails (roads) designated for use within the Garnet Winter Recreation Trail System.

4.3.3.2.2 Alternative B: Harvest, Direct and Indirect Effects on Recreational Site Use

Increased log truck traffic on the Bear Gulch road could impact visitors traveling to Garnet Ghost Town. However, there is potential for an increased portion of the volume of traffic to use the Garnet Range Road, as it is continually improved (paved). Winter logging activities associated with harvest of timber from the Packer Gulch Section and the Gambler Gulch Section would have the potential to impact snowmobile users. That is, if hauling of forest products occurred in the winter months on the Deep Creek and Mulkey Cut-across road, potential conflicts with snowmobile users could occur. Warning signs would be posted to warn snowmobilers and potential motorists of the potential hazard of encountering a log truck. There is potential for Snowmobilers to be forced off the road at times along segments of road, to avoid log trucks, however except for short segments there is opportunity to parallel the road, with an off road trail. There are potentially approximately 90 truckloads to be hauled from the Packer Gulch Section along the Mulkey Cut-across Road. This amount of volume could be hauled in a two week to a month long period, thus potential impacts would be for a relatively short duration. Where it is possible that the forest products in the Gambler Gulch Section could be logged and hauled in three consecutive winters, it is unlikely. It is possible to move the potential volume harvested from Gambler Gulch Section in one winter season, if ground conditions proved favorable (dry, frozen or sufficiently snow covered as specified in the DNRC Timber Sale contract).

4.3.3.2.3 Alternative B: Harvest, Cumulative Effects on Recreational Site Use

The potential for DNRC activities to increase the risk to motorists when combined with traffic resulting from other activities would exist, should

DNRC's proposed activities occur. Planned Mitigations would help minimize risk and would be reasonable and prudent.

4.3.3.3 Economics

4.3.3.3.1 Alternative A: No Action, Direct, Indirect and Cumulative Effects on Economics

Under Alternative A no timber harvesting would take place on DNRC lands within the project area and no revenue would be generated for the Trust Beneficiaries.

4.3.3.3.2 Alternative B: Harvest, Direct, Indirect and Cumulative Effects on Economics

Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The harvest volume was based on estimates from the Stand level Inventory and sample cruise plots. The estimated volume will change with the final cruise information, but the relative difference between alternatives will remain the same. The estimated stumpage equals the delivered log prices, minus costs and an amount for profit and risk. (Flowers, Pat 1999, DNRC Memorandum)

Approximately $1,058,370 would be generated for the Common Schools Grants as the result of harvest and sale of an estimated 40,365 tons or 5.7664MM bd.ft. of timber.

Stumpage value is estimated to be $26.22/ton. Costs to deliver wood products from stump to mill were deducted from the current delivered to mill price. For these estimates ($1,058,370 and $26.22/ton) Forest Improvement was considered a cost to the potential purchaser and was deducted from the current Delivered to Mill Value, which was assumed to be $57.14/ton or $400/M bd.ft. Timber Sale Development costs were estimated at $25/M bd.ft or $3.57/ton. Other estimates for costs and the economic analysis are available in the Project File.

Forest Improvement collected at the rate of $2.39 per ton for sawlog volume harvested would be deposited in the forest improvement fund. The amount of the Forest Improvement collection would be approximately $96,472. Theses monies would be spent on improvements to and management of Trust Lands, for projects such as thinning, prescribed burning, planting, and weed management.

If this proposed project was implemented, it would provide work for various contractors and their respective subcontractors and their employees. The forest products would most likely be processed in local mills promoting this type of employment.

4.3.4 Wildlife

4.3.4.1 Endangered Species

4.3.4.1.1 Grizzly Bears

4.3.4.1.1.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Grizzly Bears

No change from current conditions would be expected under the no action alternative. Thus, approximately 2.9 miles of road would remain open within the Gambler Gulch parcel. Therefore, no direct, indirect, or cumulative effects to grizzly bears would be expected under the no action alternative.

4.3.4.1.1.2 Alternative B: Harvest, Direct and Indirect Effects on Grizzly Bears

Under the proposed action, approximately 15.1 miles of new road may be constructed, all of which would be considered "closed" roads, and approximately 2.9 miles of currently open road would obstructed to restrict motorized access. As a result, total road density would increase from 3.54 miles of total road per square mile to approximately 6.69 miles of total road per square mile, and the amount of open road would decrease from 1.49 miles of open road per square mile to approximately 0.88 miles of open road per square mile within the project area. Many of the open road reductions would occur within the Gambler Gulch parcel.

In addition to the proposed road changes, the proposed action may also silviculturally treat (primarily commercial thinning and shelterwood regeneration) up to approximately 1,754 acres. Such action may reduce the amount of hiding cover present within the project area. However, the accompanying proposed reductions in open road densities may reduce grizzly bear susceptibility to poaching within the project area. As a result, the proposed action would likely have a low risk of direct and indirect effects to grizzly bears.

4.3.4.1.1.3 Alternative B: Harvest, Cumulative Effects on Grizzly Bears

As described above, the proposed road alterations would result in a total road density increase from 3.59 miles of total road per square mile to approximately 3.62 miles of total road per square mile, and a reduction in open road densities from 1.36 miles of open road per square mile to 1.35 miles of open road per square mile. There are currently several State actions that are completed, on going, or proposed for portions of this analysis area. These include:

1) Timber harvest and road construction on the Lubrecht State Experimental Forest's Washoe Creek parcel.

2) The DNRC proposed Haywire Wallace timber sale.

3) The DNRC proposed Headquarters timber sale.

4) The DNRC proposed Washoe Creek timber sale, adjacent to (1) above.

5) The on-going DNRC Lost Bear timber sale.

6) The recently completed Dirty Ike Salvage timber sale, located near Clinton, MT.

Each of these actions, or proposed actions, would regulate open road density through installation of locked gates to restrict motorized access on new road construction, or restrict existing open roads within the respective project areas. However, all but the proposed Headquarters sale would construct new road. All totaled (including this proposed action), the proposed actions may construct up to approximately 37 miles of new road, all of which would be restricted to motorized access. As a result, there would be a cumulative increase in total road density within the analysis area from approximately 3.59 miles of total road per square mile to approximately 3.66 miles of total road per square mile. While the analysis area would have numerous overlapping State actions for several years, the proposed Dry Bear Mouth Timber Sale would likely have low risk of cumulative effects to grizzly bears because it, and other similar proposed actions, would actively work to reduce open road density. However, to ensure the new road construction would not increase risk for grizzly bears, the effectiveness of road closures should be monitored over time. Should road closures be effective at restricting motorized access, there would be lower risk of potentially detrimental human-grizzly bear interactions as a result of the proposed action.

4.3.4.1.2 Lynx

4.3.4.1.2.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Lynx

No change from current conditions would be expected under the No Action Alternative.

4.3.4.1.2.2 Alternative B: Harvest, Direct and Indirect Effects on Lynx

The proposed action would harvest within approximately 524 acres (45%) of suitable lynx habitat (i.e., other, young, and mature foraging habitat) within the project area (Table 4-2). Where harvest units and lynx habitat overlap, and the normal prescription would typically convert suitable lynx habitat to non-habitat, the silvicultural prescription would require 40%

retention of crown closure in any combination of sapling, pole or mature trees to ensure that post-harvest conditions would remain suitable as lynx "other" habitat. Thus, the proposed action would likely reduce the amount of lynx mature foraging habitat available within the project area by approximately 156 acres (Table 4-2); however, efforts would be made to maintain suitable lynx habitat, albeit in a different category (i.e., in this case "other"). To partially mitigate the effects of this harvest, the proposed action would work on retaining the advanced regeneration within several proposed harvest units within the Gambler Gulch parcel. Retention of advanced regeneration in these areas would be ensured through skid trail planning, careful contract administration, and special operation requirements for the particular units. As a result, there would likely be low risk of direct and indirect effects to lynx as a result of the proposed action.

Table 4-2. Potential effects of proposed harvest to lynx habitat within the project area.

Lynx Habitat	Acres Present	Proposed Acres (%)	Post-harvest Acres
Temporary Non-lynx	62	28 (45)	62
Other	932	368 (40)	1,088
Young Foraging	0	0 (0)	0
Mature Foraging	181	156 (86)	25
Total	**1,175**	**552 (47)**	**1,175**

4.3.4.1.2.3 Alternative B: Harvest, Cumulative Effects on Lynx

Within the 335,782-acre analysis area, DNRC manages 29,838 acres (approximately 8.9% of analysis area), of which DNRC has, or has proposed to, silviculturally treat approximately 3,960 acres (approximately 13% of DNRC ownership within the analysis area, and approximately 1.2% of the analysis area) within a 10-year time frame. Table 4-3 describes the amount of lynx habitat acres, by proposed action, that are proposed for treatment or have recently been treated. Additionally, a large proportion of the 120,657 acres (approximately 35.9% of analysis area) of private industrial timberlands have been intensively managed during the last decade. Approximately 17,400 acres were burned by the Ryan Gulch Fire in 2000 and 776 acres were burned by the Dirty Ike fire in 2003 (approximately 5.4% of the analysis area has burned in the last 5 years). Thus, this portion of the Garnet Range has experienced much habitat alteration in recent years.

Individually, this proposed action, as well as the proposed Haywire Wallace and Washoe timber sales would implement project-level mitigations to reduce potential impacts to lynx (see discussion in Direct and Indirect Effects). Such measures would include minimizing the risk of converting currently suitable lynx habitat to temporary non-lynx

habitat. Thus, many of the acres currently classed as mature foraging that are proposed for timber harvesting would likely be converted to conditions typical of "other" lynx habitat. When proposed DNRC actions are put in the context of the analysis area, the scale at which lynx use habitat, and examined in conjunction with past actions on private industrial timber lands, DNRC's mitigative efforts to retain affected lynx habitat in suitable conditions post-harvest would likely pose low risk of cumulative effects to lynx.

Table 4-3. Acres of lynx habitat proposed for treatment (or recently treated) by DNRC within the 525 square mile analysis area in the Garnet Mountain Range.

Habitat	Haywire Wallace	Lost Bear (Section 36)*	Elk 36 *	Washoe[1]	Dry Bearmouth	Total
Temporary Non-lynx	3	1	0	222	28	**254**
Other	45	134	203	33	368	**783**
Young Foraging	0	0	0	0	0	**0**
Mature Foraging	10	50	21	268	156	**505**
Denning	0	0	0	0	0	**0**
Total	**58**	**185**	**224**	**523**	**552**	**1,542**

*These projects have been completed.

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

4.3.4.2 Sensitive Species

4.3.4.2.1 Pileated Woodpeckers

4.3.4.2.1.1 Alternative A: No Action, Direct, Indirect and Cumulative Effects on Pileated Woodpeckers

No change from current conditions would be expected under the No Action Alternative.

4.3.4.2.1.2 Alternative B: Harvest, Direct and Indirect Effects on Pileated Woodpeckers

The proposed action would commercially thin approximately 530 acres of the approximately 640 acres of potential pileated woodpecker habitat within the project area. This species has been seen or heard throughout the project area (M. McGrath, SWLO Wildlife Biologist, personal observations), and potential nesting and roosting snags have been identified. While the proposed action would retain at least 1 snag and 1 snag recruit per acre, as required per ARM 36.11.411, the proposed harvest would also reduce canopy closure and vertical structure within the project area. Such habitat attributes are characteristic of this species'

habitat. Thus, the proposed action is likely to have low to moderate risk of temporary (approximately 40 years) direct and indirect effects on one to several pileated woodpeckers that reside within the project area. These effects would likely be temporary until the vegetation has sufficiently responded to the treatment and again provides the desired canopy closure and vertical structure characteristic of pileated woodpecker nesting and roosting habitat.

4.3.4.2.1.3 Alternative B: Harvest Cumulative Effects on Pileated Woodpeckers

The majority of the pileated woodpecker habitat that would be affected by the proposed action occurs in Dry Gulch Section 2 and Packer Gulch. The majority of the land surrounding these parcels is heavily harvested private industrial timberlands. Additionally, one-third to one-half of the habitat surrounding the Dry Gulch Section 2 parcel was burned by the Ryan Gulch Fire in 2000. Thus, there has been substantial habitat alteration within the analysis area recently. As a result, the proposed action would likely have low to moderate risk of cumulative effects for several pairs of pileated woodpeckers within the analysis area.

4.3.4.2.2 Flammulated Owls

4.3.4.2.2.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Flammulated Owls

No change from current conditions would be expected under the No Action Alternative.

4.3.4.2.2.2 Alternative B: Harvest, Direct, Indirect, and Cumulative Effects on Flammulated Owls

The proposed action would harvest timber within approximately 1,442 acres of the 2,390 acres of flammulated owl preferred habitat types within the project area (also the cumulative effects analysis area). Many of the affected acres are of the dry Douglas-fir habitat types (e.g., Douglas-fir/pinegrass, Douglas-fir/snowberry). Thus, many of the silvicultural prescriptions that would reduce the presence of lodgepole pine and Douglas-fir while retaining ponderosa pine and western larch would likely improve habitat conditions for flammulated owls, while retaining large diameter snags and snag recruits for nesting. Thus, there would be low risk of direct, indirect, and cumulative effects to flammulated owls as a result of the proposed action.

4.3.4.2.3 Fisher

4.3.4.2.3.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Fisher

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

4.3.4.2.3.2 Alternative B: Harvest, Direct and Indirect Effects on Fisher

The existence of fishers in the Garnet Mountain range has been verified since 1989 (Vinkey 2003). The proposed action would harvest timber within approximately 968 acres of the approximately 1,533 acres of potential fisher habitat within the project area. Thus, canopy cover would not be reduced on approximately 565 acres of potential fisher habitat within the project area. However, probably only 946 acres of the "potential fisher habitat" (1,533 acres) would be suitable for fishers due to canopy closure and vegetative structure. Of these 946 acres, the proposed action would manipulate approximately 707 acres (75%), thereby reducing canopy closure, and vertical structure. To partially mitigate the effects of this harvest, the proposed action would work on retaining the advanced regeneration within 19 acres of the Gambler Gulch parcel, and defer harvesting within 9 acres. Such action would work to retain foraging habitat and coarse woody debris for foraging, denning, and loafing sites. These areas were identified as a priority for conservation efforts due to repeated observation of marten tracks within the affected area (Mike McGrath, SWLO Wildlife Biologist, personal observations). Retention of advanced regeneration in these areas would be ensured through skid trail planning, careful contract administration, and special operation requirements for the particular units. Within the Secret Gulch parcel, several acres of fisher habitat along the riparian areas would be retained for a travel corridor. Thus, the proposed action would likely reduce the amount of fisher habitat available within the project area; however, efforts would be made to maintain the best available fisher habitat within the project area.

4.3.4.2.3.3 Alternative B: Harvest, Cumulative Effects on Fisher

The moister, more suitable habitats for fisher within the analysis area are typically located near the Secret Gulch and Gambler Gulch parcels. Most of the analysis area is relatively evenly split between heavily harvested private industrial timberlands and forested public lands. Thus, due to the ownership pattern between Dry Gulch and Secret Gulch, habitat connectivity is essentially absent for fisher. However, the opposite is true for habitat connectivity between Secret Gulch and Gambler Gulch, due to the presence of forested public lands. Because of mitigations that would be implemented under the proposed action, the proposed harvest would likely pose low risk of further reducing this habitat connectivity. Thus,

there would likely be low risk of cumulative effects to fisher as a result of the proposed action alternative.

4.3.4.2.4 Townsend's Big-eared Bat

4.3.4.2.4.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Townsend's Big-eared Bat

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

4.3.4.2.4.2 Alternative B: Action, Direct and Indirect Effects on Townsend's Big-eared Bat

The proposed action would harvest timber and construct new roads in close proximity to two caves in Dry Gulch Section 2, T11N, R15W. A regional conservation strategy for this species (Pierson et al. 1999) recommends implementation of a minimum 500-foot horizontal radius buffer be maintained around roost entrances, with seasonal restrictions depending upon the type of roost (maternal or hibernacula). However, after discussing the caves with a local bat expert (Paul Hendricks, Montana Natural Heritage Program, 20 December 2004) who had prior knowledge of the caves from reports of other spelunkers, the affected caves likely would not be maternal or hibernacula roost sites. However, these caves likely do receive some degree of use by several potential bat species, and Mr. Hendricks did recommend monitoring the sites prior to the proposed action to determine the type of use and affected bat species. Proposed mitigation measures for goshawk nests within the same parcel (0.25 mile horizontal radius buffer for no mechanized activity between 1 April and 31 August) would also encapsulate both caves and their respective 500-foot radius buffers. Thus, proposed mitigation measures could be adapted pending the results of monitoring in calendar year 2005. As a result, there would be low risk of direct and indirect effects to Townsend's big-eared bats as a result of the proposed action.

4.3.4.2.4.3 Alternative B: Action, Cumulative Effects on Townsend's Big-eared Bat

Townsend's big-eared bats utilize very specific resources on the landscape (i.e., caves, mine shafts, etc.). As such, the nearest known observations of this species are near the Linton Mine, 3.5 miles NW of the project area, and unknown use of the project area caves. This species is also very adaptable to many biomes and habitats (Pierson et al. 1999). Given the protective measures proposed for the goshawk and adaptive management strategy to be developed from proposed monitoring of the project area caves, there would likely be minimal risk of cumulative effects to this species as a result of the proposed action.

4.3.4.3 Big Game

4.3.4.3.1 Elk

4.3.4.3.1.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Elk

No change from current conditions would be expected under the No Action Alternative.

4.3.4.3.1.2 Alternative B: Harvest, Direct and Indirect Effects on Elk

The proposed action would reduce the amount of snow intercept cover within the project area from approximately 2,030 acres to approximately 462 acres through commercial thinning that would retain approximately 40 to 60 square feet of basal area per acre post-harvest, and remove all security cover (as defined by (Hillis et al. 1991) as a forest stand ≥250 acres) from the project area. While approximately 246 acres of hiding cover would be retained within the project area, it would not be of contiguous, or of sufficient area (≥250 acres) to be considered "security cover" following the "Hillis paradigm". However, the proposed action would reduce the amount of open road by 2.9 miles, for an open road reduction from 1.49 miles of open road per square mile to approximately 0.88 miles of open road per square mile within the project area. The open road reductions would occur within the Gambler Gulch parcel, but would not create additional security cover through the road closures. Despite these losses or reductions in security cover and snow intercept cover, the proposed action: (1) would be losing the security cover in an area that is walk-in access only, and would not be subject to the same intensive hunting pressure as an area that has no motorized access restrictions; and (2) would not be reducing snow intercept cover within an area classified as elk winter range by Montana Fish, Wildlife & Parks. As a result, the proposed action would likely have low to moderate risk of direct and indirect effects to elk.

4.3.4.3.1.3 Alternative B: Harvest, Cumulative Effects on Elk

The proposed harvest would reduce the amount of snow intercept and hiding cover in the 335,768-acre analysis area by approximately 1,568 acres, or a reduction of approximately 0.5% from current conditions (30.2% down to 29.7%). Additionally, the proposed harvest would reduce the amount of security cover in the analysis area from approximately 51,307 acres (15.3% of analysis area) to 50,640acres (15.1% of analysis area). However, the proposed action is adjacent to recent timber harvests on Plum Creek lands. Therefore, there may be a cumulative localized reduction in such cover as a result of the proposed action. As a result of the proposed action, there would likely be a low risk of cumulative effects to elk within the entire analysis area.

4.3.4.3.2 Bighorn Sheep

4.3.4.3.2.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Bighorn Sheep

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

4.3.4.3.2.2 Alterative B: Action, Direct and Indirect Effects on Bighorn Sheep

Under the proposed action, timber harvesting would occur that would stimulate the growth of additional forage for bighorn sheep along the lower reaches of Dry Gulch. The resident herd of bighorn sheep does use the Dry Gulch area for wintering and lambing purposes. However, due to a variety of local circumstances, the current herd location is not a preferred bighorn sheep location (M. Thompson, Montana Fish, Wildlife & Parks, personal communication, December 2004). Given the extent of this herd's range (approximately 21,700 acres), the proposed action would be concentrated in a specific location that would enable the herd to avoid disturbance at critical times of the year. Thus, there would be low to moderate risk of direct and indirect effects to a single bighorn sheep herd as a result of the proposed action.

4.3.4.3.2.3 Alternative B: Harvest, Cumulative Effects on Bighorn Sheep

The affected bighorn sheep herd is believed to consist of approximately a dozen sheep that are dispersing individuals from the nearby Lower Rock Creek herd (M. Thompson, Montana Fish, Wildlife & Parks, personal communication, December 2004). With the affected herd's close proximity to the Lower Rock Creek and Bonner herds, there would likely be ready exchange of individuals among the herds to ensure adequate propagation of the affected herd over time. Given the connectedness of these three herds, the proposed action is likely to have minimal to low risk of cumulative effects to bighorn sheep.

4.3.4.4 Other Issues

4.3.4.4.1 Northern Goshawk

4.3.4.4.1.1 Alternative A: No Action, Direct, Indirect, and Cumulative Effects on Northern Goshawk

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

4.3.4.4.1.2 Alternative B: Harvest, Direct and Indirect Effects on Northern Goshawk

The proposed action would commercially thin approximately 310 acres within the same parcel that the goshawk nests are located (Dry Gulch Section 2, T11N, R15W). The thinning would generally retain approximately 40 to 60 square feet of basal area per acre post-harvest, with the exception of the 23 acre nest stand where the 2 nests are located (Dry Gulch Section 2, T11N, R15W). Within the 23-acre nest stand, the proposed action would retain at least 90 square feet of basal area per acre post-harvest, using a thinning-from-below harvest technique. Such conditions are similar to nesting area conditions described for goshawk nests in Oregon and Washington (McGrath et al. 2003). To partially mitigate the effects of the proposed action, in addition to the nest stand post-harvest basal area, there would be a ¼-mile horizontal radius buffer (from the mid-point of the 2 nests) where no mechanized activity (i.e., all activities associated with: chainsaw operation and timber felling, skidding and ground-based yarding operations, aerial yarding, mechanized road construction and maintenance, log loading, log processing, and log hauling) from April 1 through August 31 to avoid disturbance during the breeding season. Vehicle travel may be prohibited during this time, depending upon the proximity of proposed roads to the nest trees. Additionally, proposed roads would be located to reduce potential disturbance to nesting goshawks (e.g., may make use of vegetation and topography to reduce noise levels or sight distance).

Given the goshawk's ability to forage for a diverse array of prey species (Clough 2000), the proposed timber harvest would likely retain sufficient cover near the nests to facilitate breeding, but may switch the goshawk's prey base from small mammals and potentially grouse, to moderately sized birds, such as woodpeckers and jays. As a result, the proposed action may have low to moderate risk of direct and indirect effects to a pair of goshawks.

4.3.4.4.1.3 Alternative B: Harvest, Cumulative Effects on Northern Goshawk

The proposed action would commercially thin approximately 608 acres within the two affected Dry Gulch parcels (Sections 2 and 36), adding to previous regeneration harvests in Section 36, and the approximately 400 acres that were burned by the Ryan Gulch Fire within the analysis area. The proposed harvest would utilize varying intensities of commercial thinning that may temporarily (15 to 20 years) reduce foraging habitat suitability within the analysis area for goshawks. However, the proposed harvest would likely improve the long-term foraging suitability because the harvesting would: 1) foster conditions that would increase basal area; 2) open the understory in the short-term, which would make some prey species more readily available; and 3) facilitate regeneration in some

proposed harvest units that would provide for future multi-storied foraging habitat. However, because of the recent timber harvests on private industrial timberlands, and the Ryan Gulch Fire, the proposed action would likely have low to moderate risk of cumulative effects to a pair of goshawks. As a result, the goshawk pair may re-locate to more suitable foraging conditions (Desimone 1997).

4.3.4.4.2 Cooper's Hawk

4.3.4.4.2.1 Alternative A: No Action, Direct and Indirect Effects on Cooper's Hawk

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

4.3.4.4.2.2 Alternative A: No Action, Cumulative Effects on Cooper's Hawk

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

4.3.4.4.2.2.3 Alternative B: Action, Direct and Indirect Effects on Cooper's Hawk

Cooper's hawks are highly maneuverable, forest-dwelling raptors that use ambush hunting techniques to obtain prey (Johnsgard 1990, Reynolds 1988). As such, the proposed action would reduce tree densities within the project area. For a species such as the Cooper's hawk, who uses its maneuverability as an advantage to obtain prey, the stand density reductions could potentially affect their ability to obtain avian prey. Additionally, there may be temporary reductions (5 to 10 years) in prey, such as song birds, while understory vegetation recovers from the proposed action.

The landscape surrounding the two affected nests would not see increases in habitat fragmentation as a result of the proposed action; however, resulting stand structures would likely affect the overall landscape nesting suitability for Cooper's hawks (after McGrath et al. 2003). For the largest of the three North American *Accipiters*, northern goshawks appear to prefer specific stand structures (after Oliver and Larson 1996) at varying distances to their nests. Cooper's hawks may have similar habitat affinities when selecting their nest sites. McGrath et al. (2003) postulated that the associated stand structures and landscape compositions may relate to predation avoidance, prey availability, and nesting microclimate. Through thinning the landscape surrounding the affected nests, the Action Alternative would at least temporarily (approximately 10 to 15 years) alter the stand structures that may affect predation rates, prey availability, and nesting microclimate for these species. To partially mitigate for microclimatic changes surrounding the nests, the affected nest stand would be harvested such that post-harvest conditions would meet $\geq$40% crown cover.

Additionally, there would be a ¼-mile horizontal radius buffer around the year's current active nest where no mechanized activity would occur from April 1 through August 31 to avoid disturbance during the breeding season. Vehicle travel may be prohibited during this time, depending upon the proximity of proposed roads to the nest trees. However, due to topography, vehicular traffic would be permitted along the lower road within section 36. Given the mitigations surrounding the nest trees, there would still be temporary (approximately 10 to 15 years) low to moderate risk of direct and indirect effects to a pair of Cooper's hawks as a result of the alterations to stand structures in the surrounding landscape, as proposed in the Action Alternative.

4.3.4.4.2.2.4 Alternative B: Action, Cumulative Effects on Cooper's Hawk

Cooper's hawks are generally associated with forested habitats, with home ranges typically <1000 acres (Johnsgard 1990). Based on forest distribution, the affected nesting pair would likely utilize the forested area within the project area, but also that on adjacent private and School Trust lands. As described in Direct and Indirect Effects, the proposed action could temporarily alter stand structures at a landscape level that would affect this landscape's suitability for nesting by Cooper's hawks. Such effects may cause temporary abandonment of the territory by the pair, or may cause the pair to relocate to a nearby location. Actions such as the proposed action likely simulate the effects of natural fire in the landscape. As fire pulses through the landscape periodically over time, suitable nesting habitat is temporarily made unsuitable. This dynamic would occur across the landscape, causing spatial shifting of suitable nesting habitat and a temporary displacement of breeding pairs (McComb et al. 2002). Thus, while the proposed action would likely reduce a limited area's nesting suitability for Cooper's hawks, the effect would be temporary in nature. Therefore, the Action Alternative would have a low to moderate risk of cumulative effects for Cooper's hawks, with the moderate risk level being associated with individual birds.

4.3.4 Cumulative Effects Associated with other DNRC Projects

Several other Missoula Unit DNRC projects that are currently on the DNRC/SWLO "Three Year Planning List" (Timber Sale Proposals), have undergone public scoping, or are in the vicinity of the Dry Bear Mouth Project Area. The following table displays the name of the proposed activity, the year when activity is planned, and the type of activity proposed. Cumulative impacts with respect to the issues identified for this proposal are discussed, and respective analysis areas identified in their respective sections of this EA.

Table 4-5: OTHER DNRC MISSOULA UNIT ACTIVITIES

Project Name	**Air miles from Dry Bear Mouth Timber Sale Area** (approximate)	**Year of Proposed Activity (Harvested*)**	**Description of proposed Activity**
Turah Creek	18	2003*	Commercial Thinning (CT)
Cramer Creek	3	2003*	Shelterwood
Roman/Six Mile Roman Helo.	40	2005	Commercial Thinning and Pre-CT
Tyler Creek	5	2005	Sanitation-salvage Shelterwood
Davis Point	24	2005	Overstory removal
Land of Lodgepole	3	2003*	Commercial Thinning
St. Regis Beetle	85	2003*	Commercial Thinning
St. Regis Cable	85	2003*	Commercial Thinning
Flat Pardee	75	2003*	Commercial Thinning
Fish Creek	58	2004-2005*	Salvage
Dirty Ike Salvage	11	2003*	Salvage
Deadman Gulch	31	2005	Commercial Thinning
Washoe Creek	8	2007	Shelterwood
Deer Creek	23	2007	Selection
Mill Creek	43	2007	Selection
Timber Creek	94	2007	Selection
Kamas Point	8	2008	Selection

CHAPTER 5

INDIVIDUALS ASSOCIATED WITH THE PROJECT

5.0 List of Individuals Associated with the Project

Preparers:

Renee Myers	Hydrologist, DNRC, SWLO
Jonathan Hansen	Decision Maker/ Unit Manager, Missoula Unit, DNRC, SWLO
Mike McGrath	Wildlife Biologist, DNRC, SWLO
Patrick Rennie	Archeologist, AGMB, DNRC, Helena
Richard Stocker	Forester/ Project Leader, Missoula Unit, DNRC, SWLO

CHAPTER 6

AGENCIES AND PERSONS CONSULTED

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

Mike Thompson Missoula, MT	Wildlife Biologist, MT Fish Wildlife, and Parks,
Patrick Rennie	Archeologist, AGMB, DNRC, Helena
Mack Long Missoula, MT	Regional Supervisor, MT Fish Wildlife, and Parks,
Ecology Center	Missoula, MT
BLM	Missoula, MT
Mark Hanna	Missoula, MT
Kristi DuBois	Wildlife Biologist, MT Fish Wildlife, and Parks
Peter Lesica	Missoula, MT

CHAPTER 7

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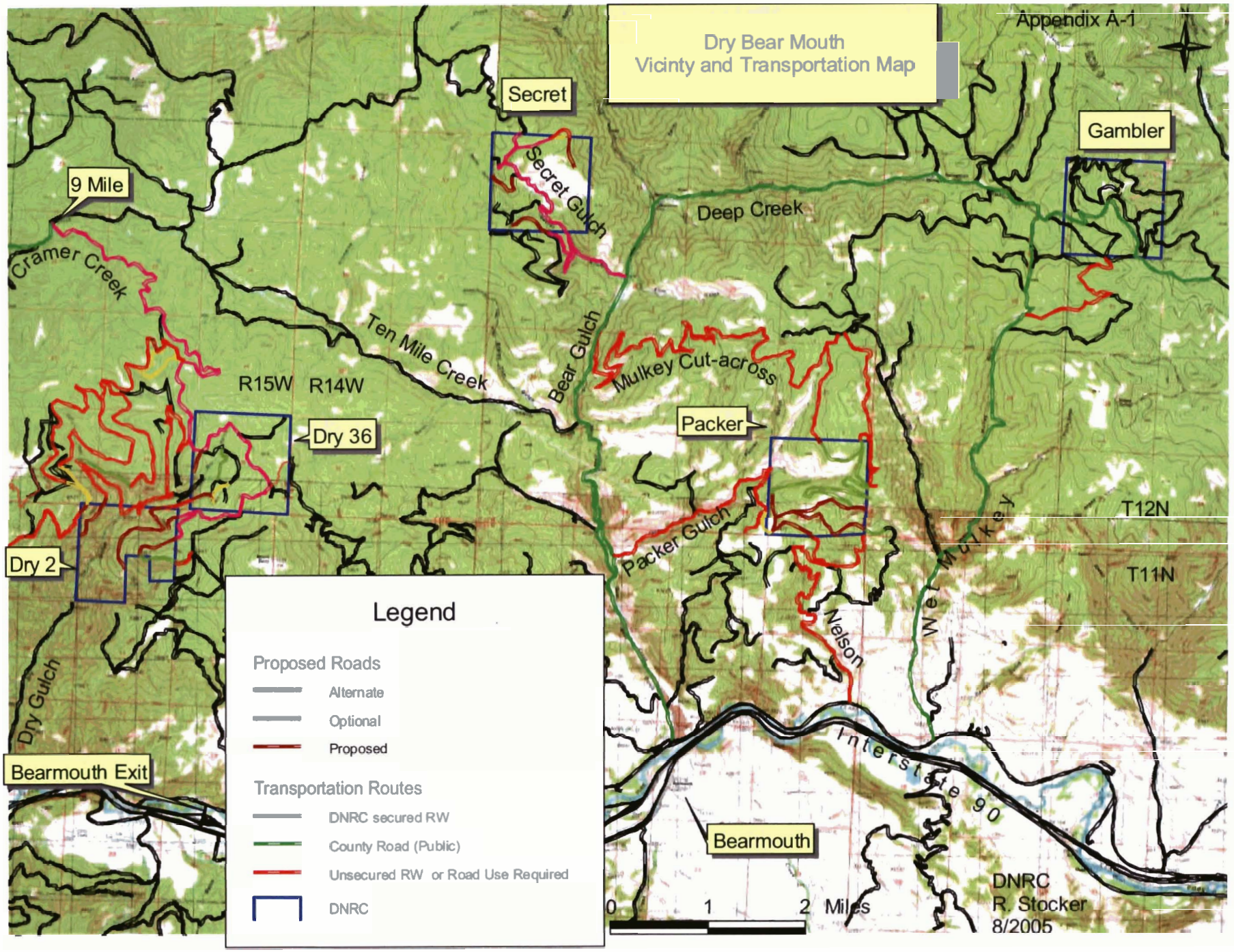
APPENDIX

A-1: Vicinity and Transportation Map



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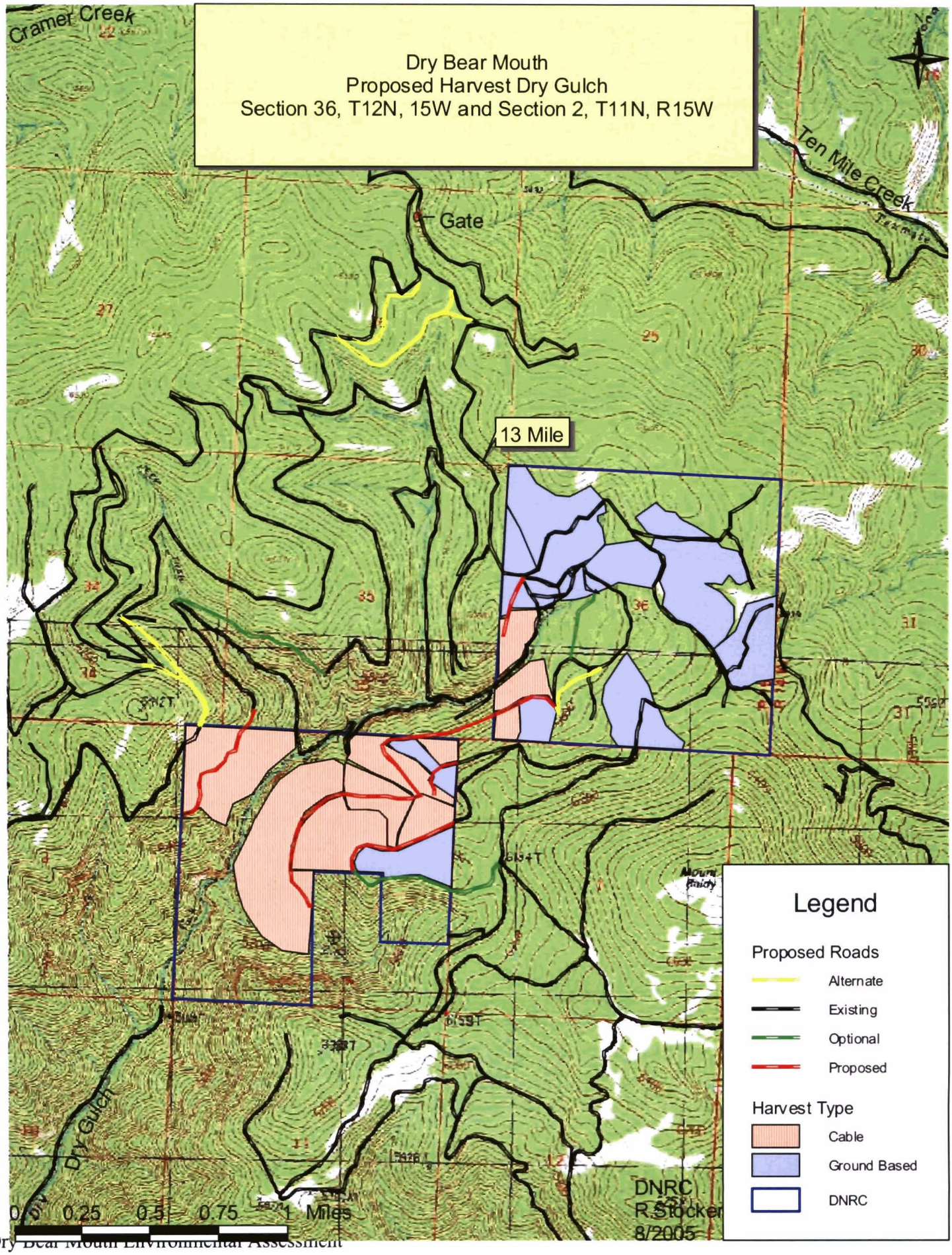

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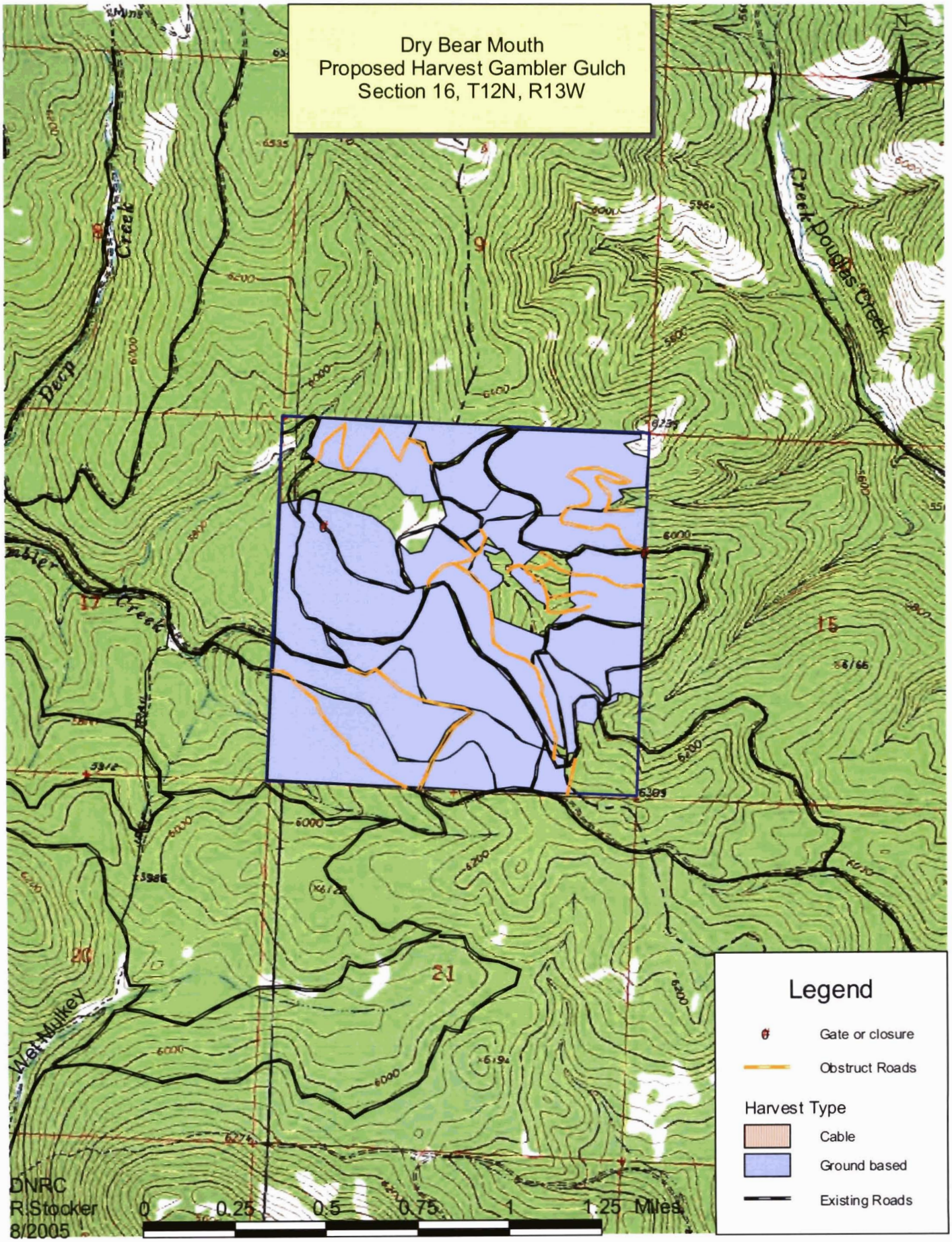

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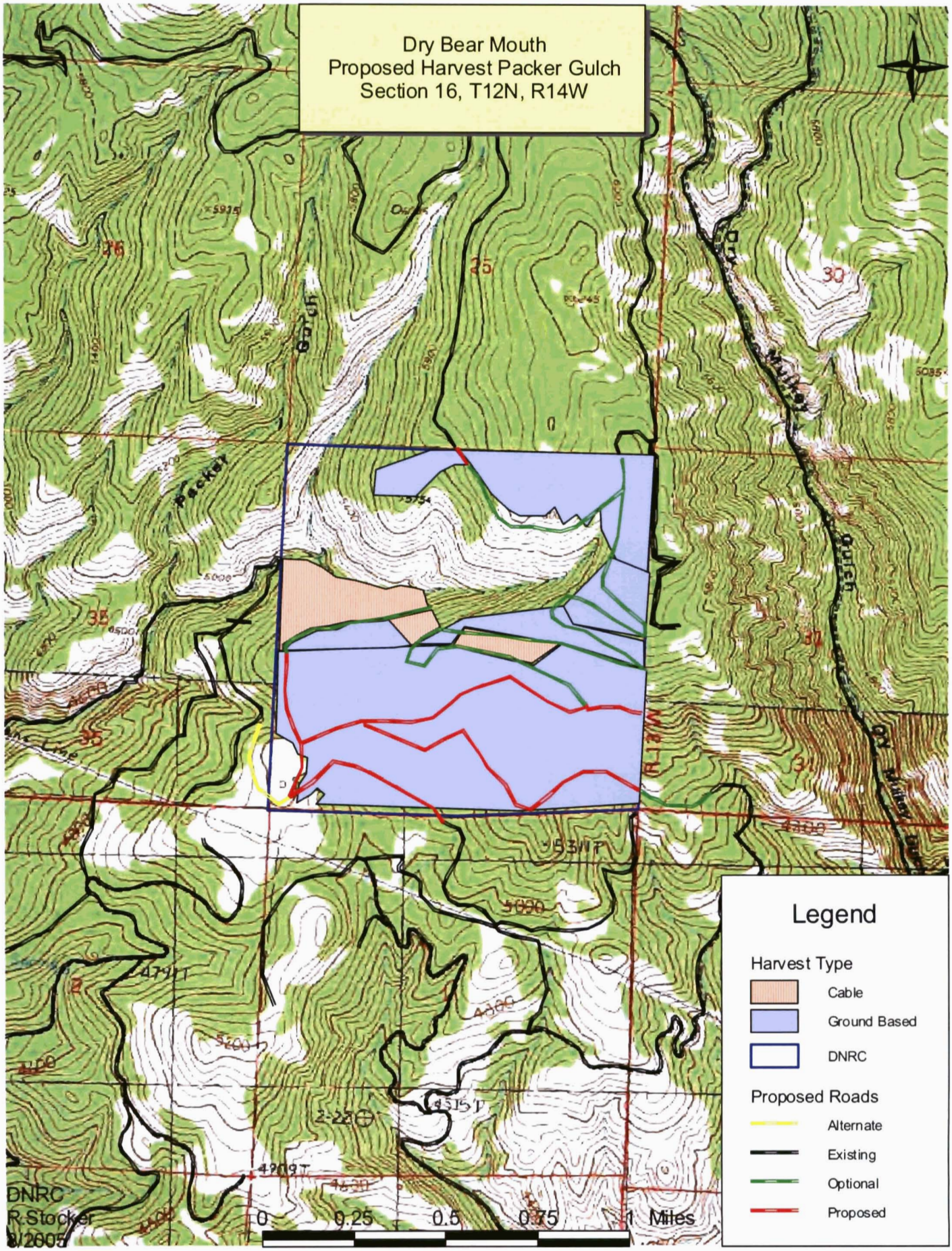

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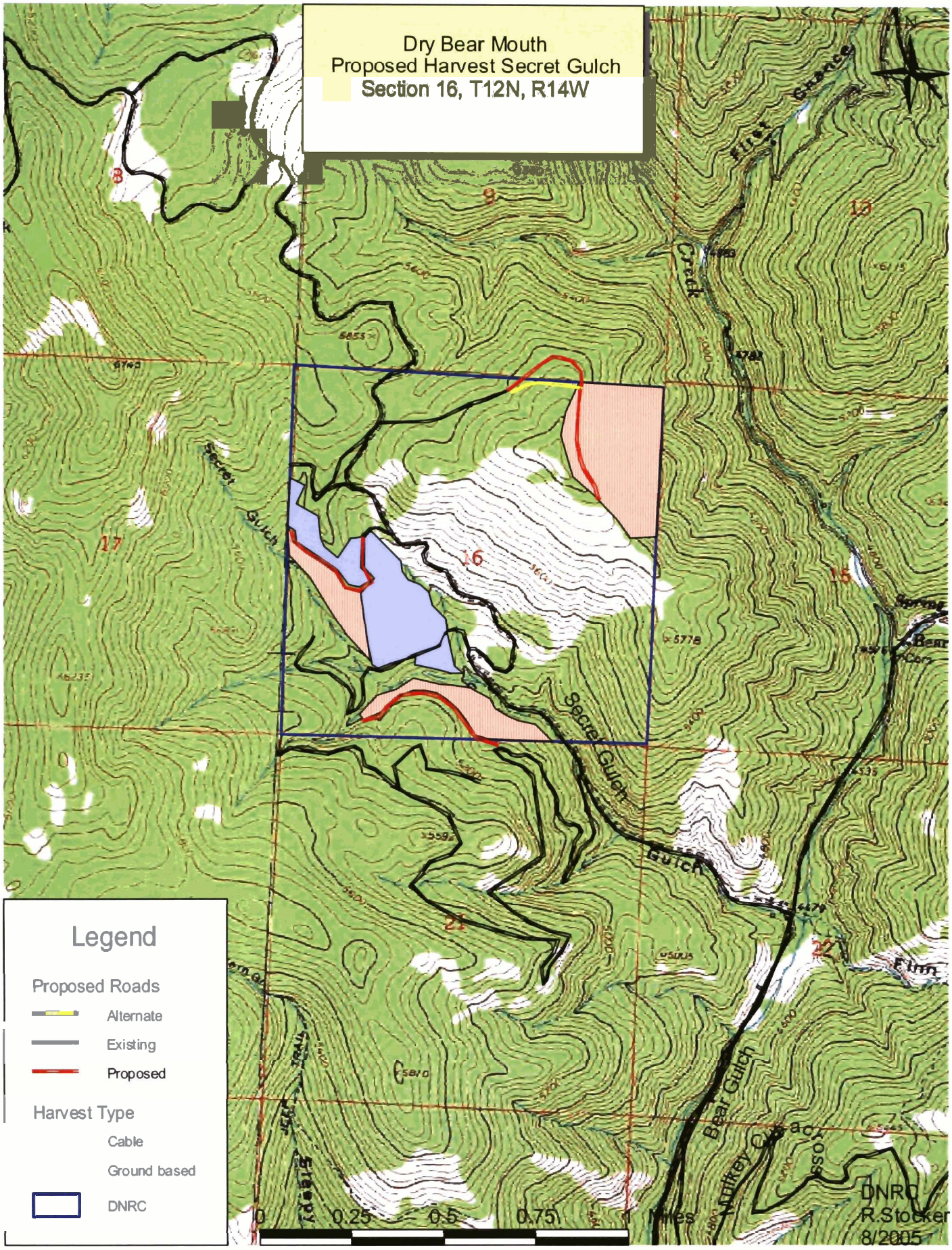

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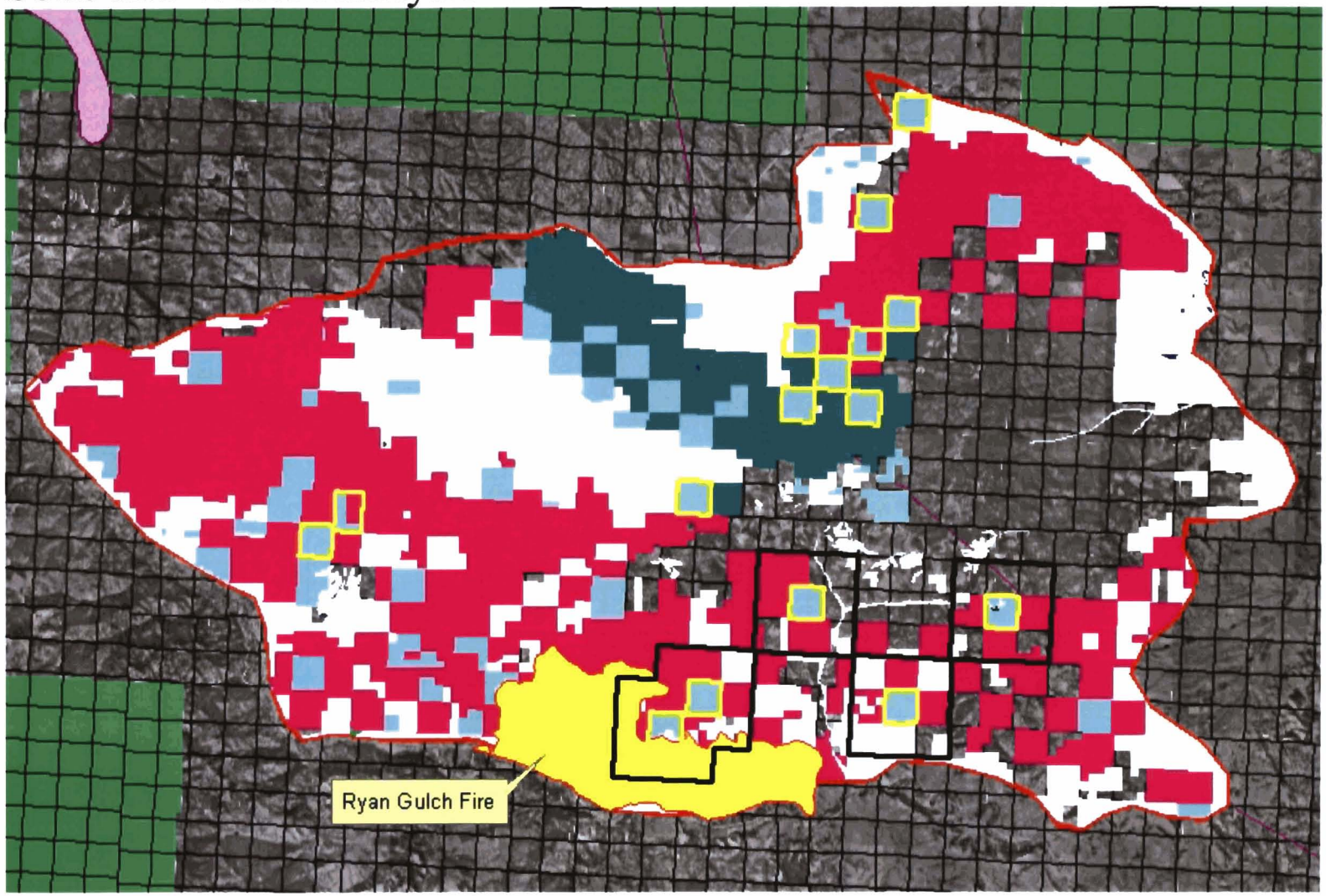

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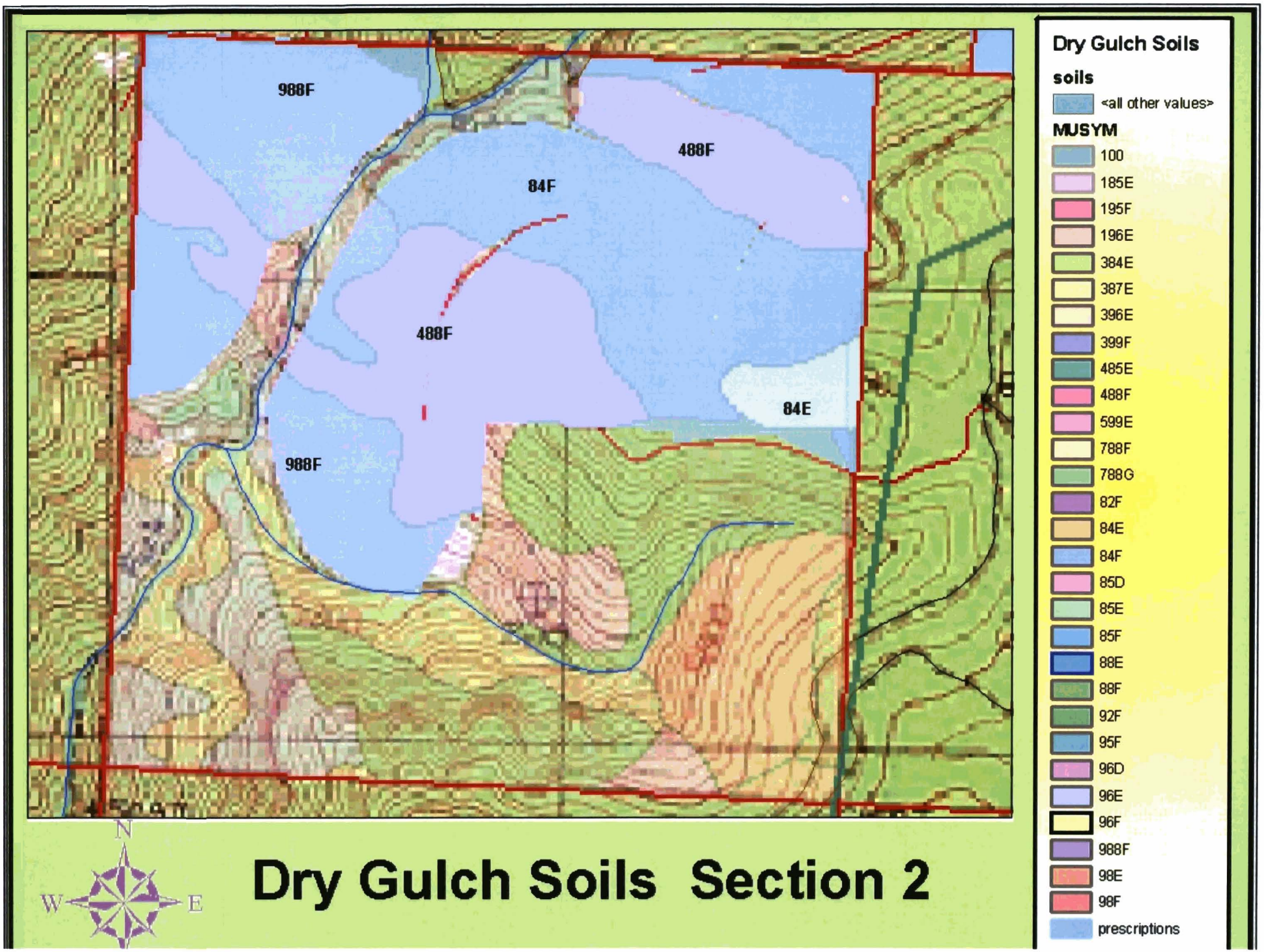
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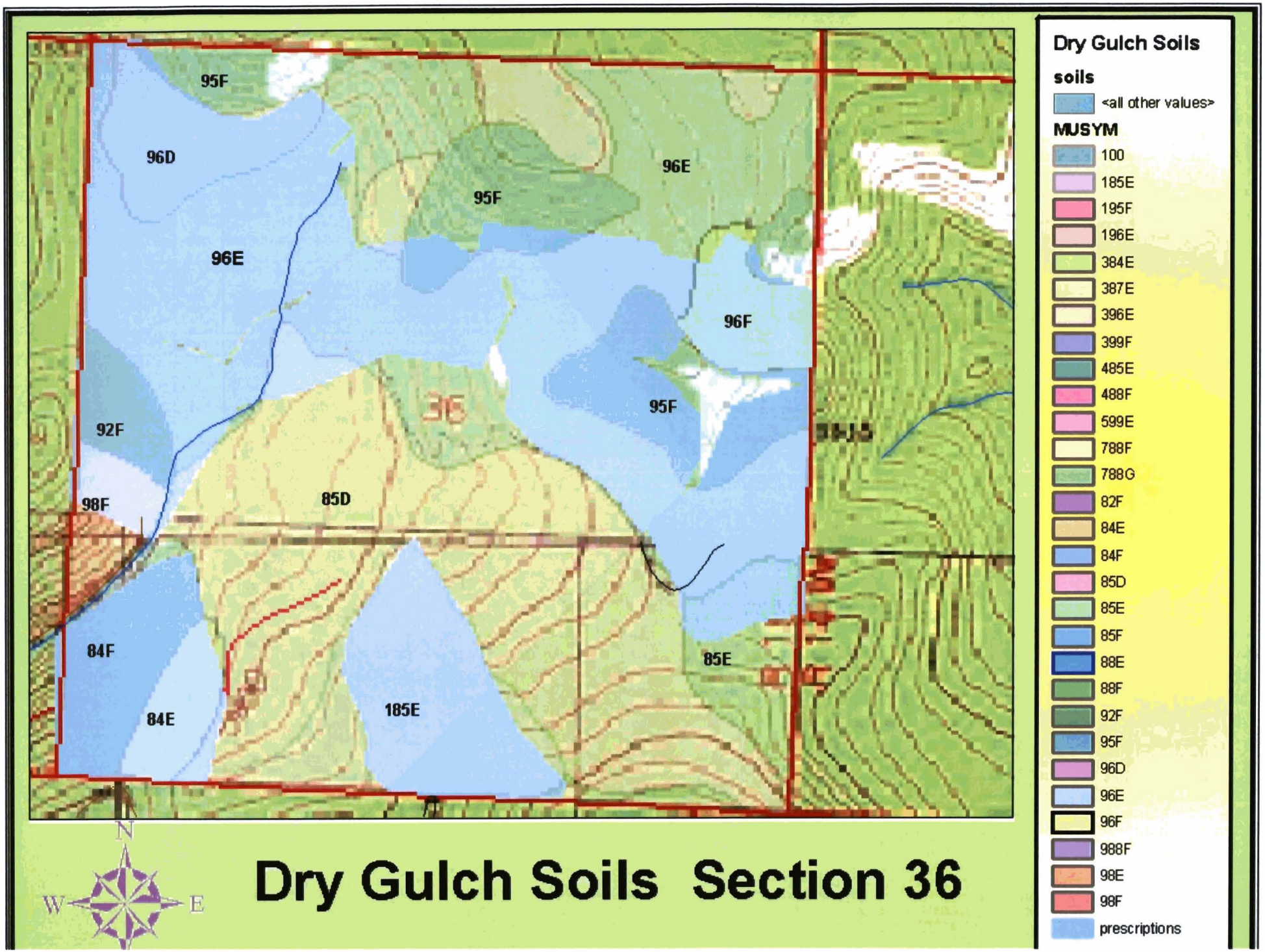
Soils Map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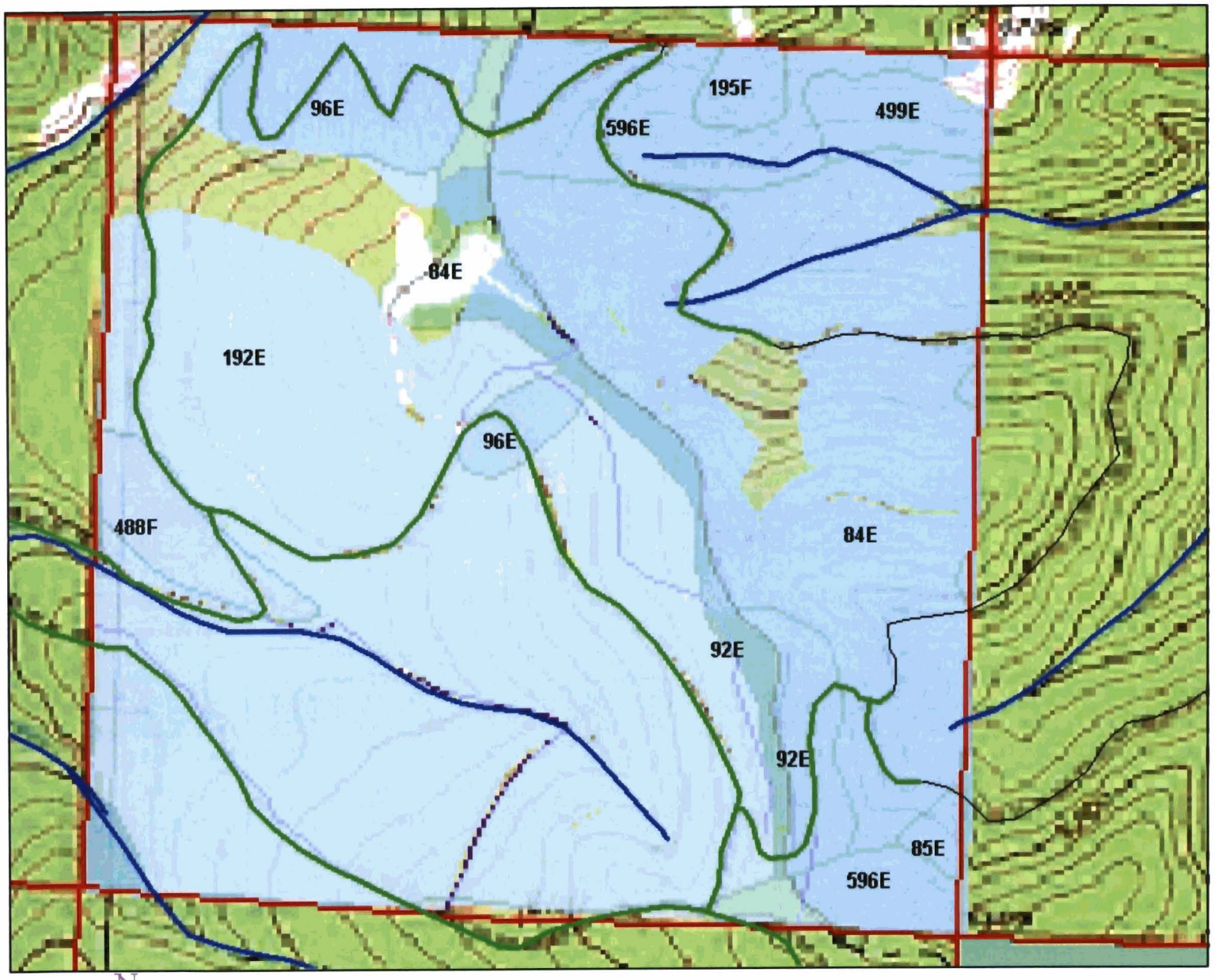
Soils Map



Gambler Creek Soils Section 16

Gambler Gulch Soils

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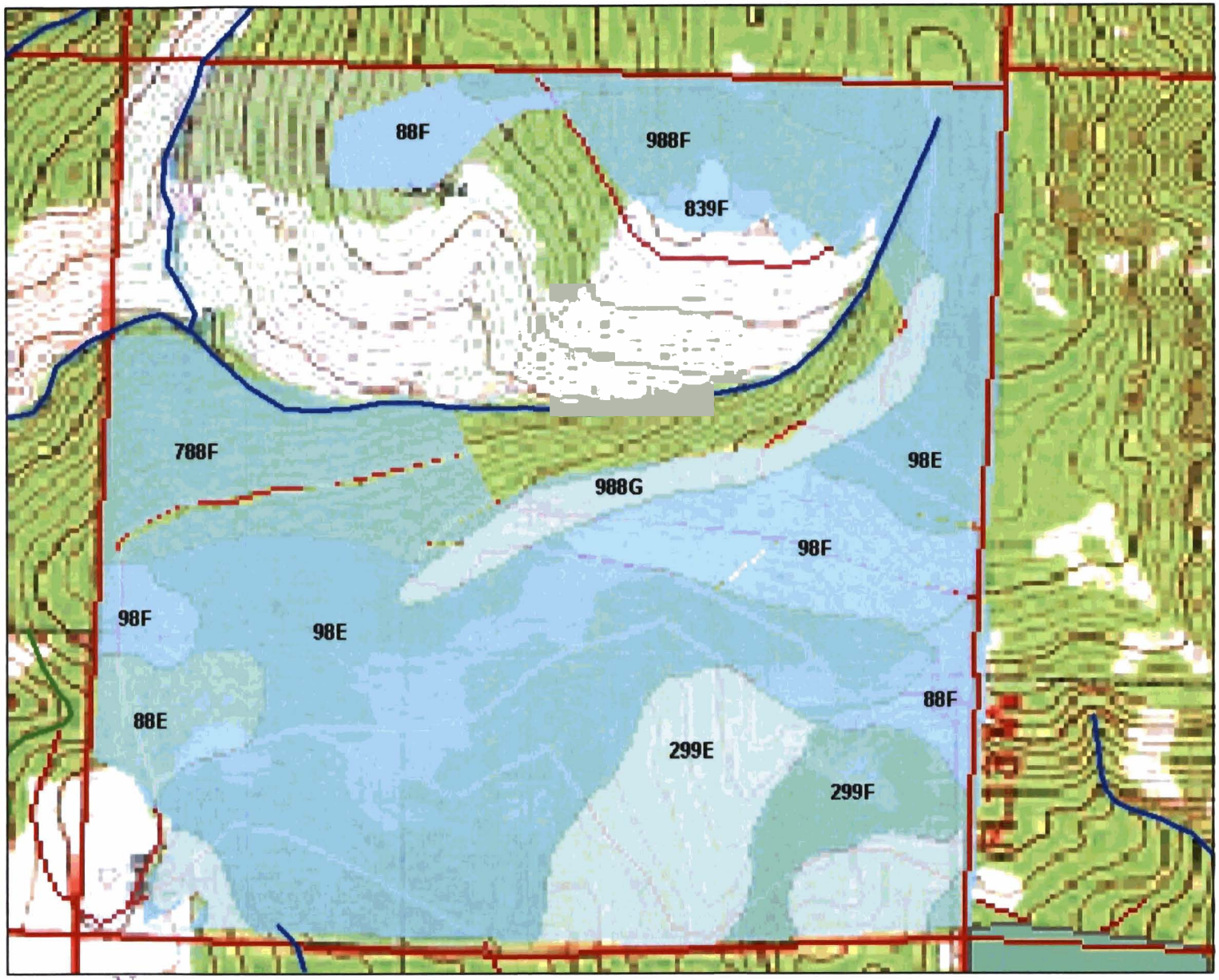
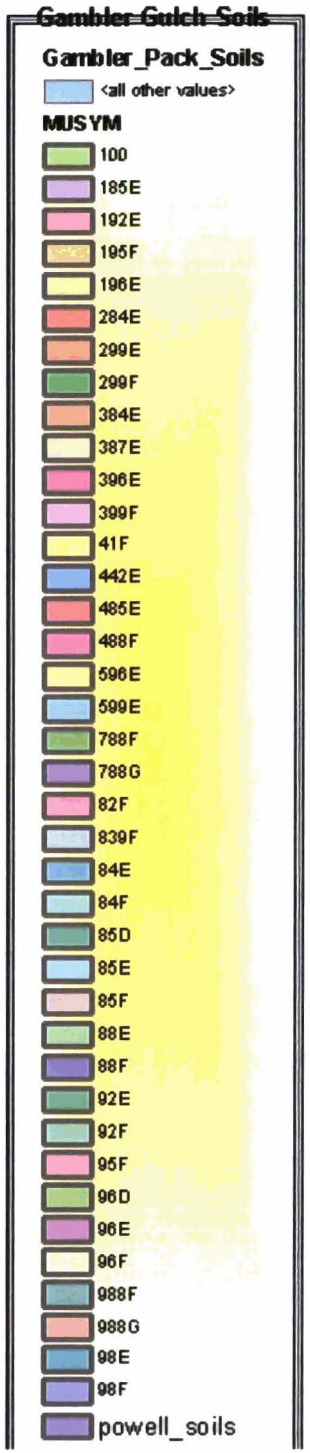
Soils Map



Packer Gulch Soils Section 36



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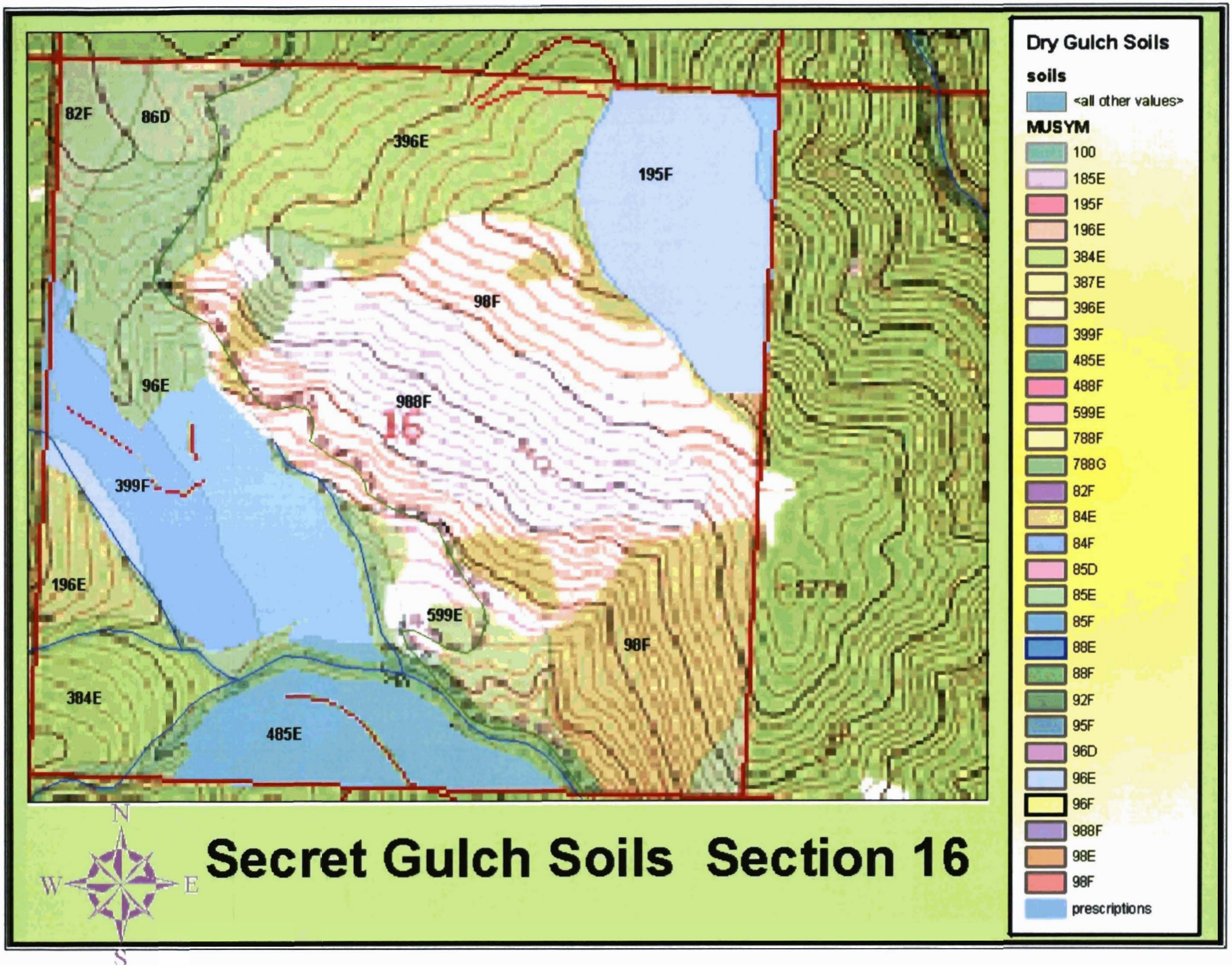
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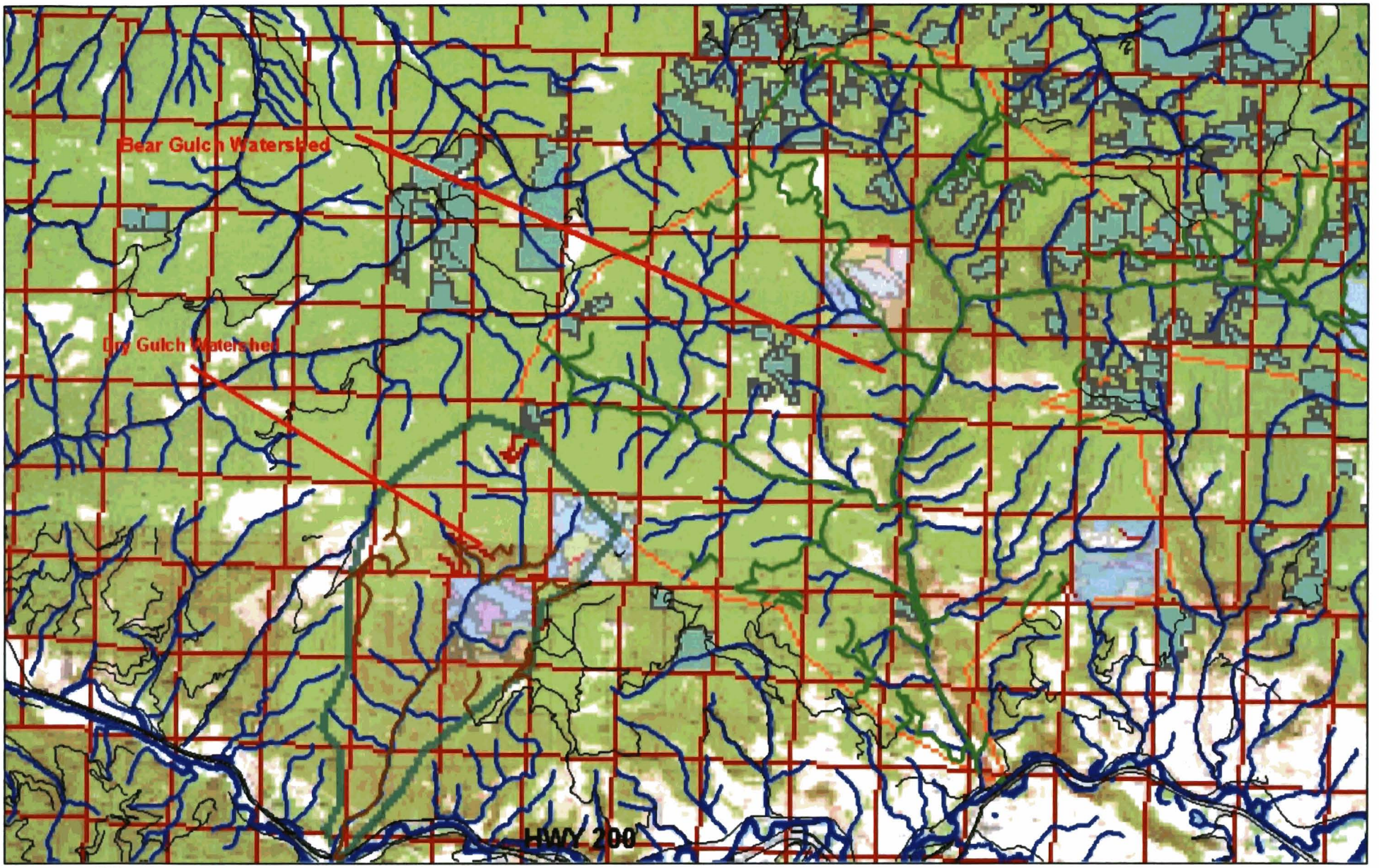

Project Area Watersheds