DNRC - Trust Land Management Division

OLD HIGHWAY TIMBER SALE PROJECT ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

NORTHWESTERN LAND OFFICE

STILLWATER UNIT

OLD HIGHWA

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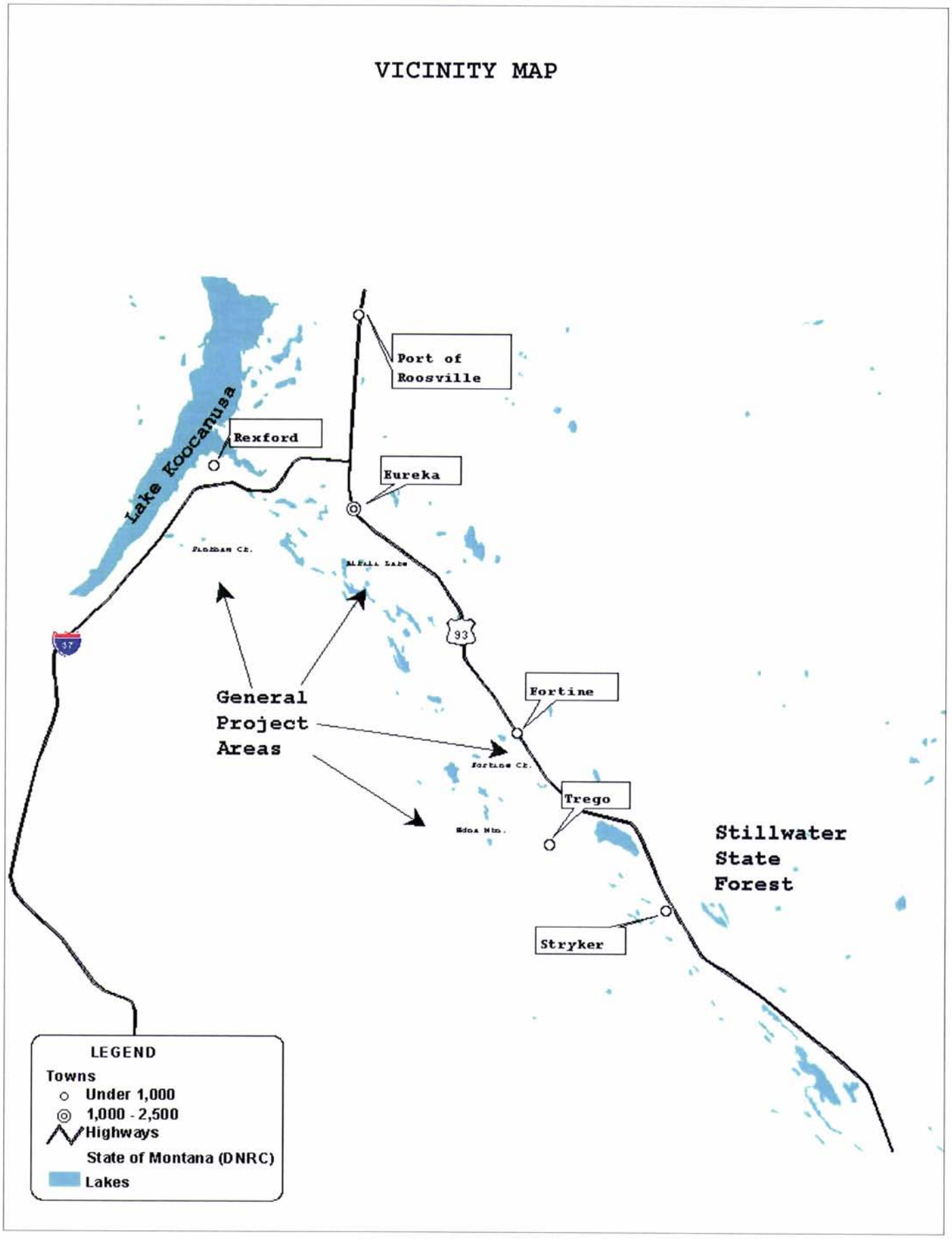
VICINITY MAP



FINDING

PROPOSED OLD HIGHWAY TIMBER SALE PROJECT

STILLWATER STATE FOREST

An Interdisciplinary Team (ID Team) has completed the Environmental Assessment (EA) for the proposed Old Highway Timber Sale Project.

The proposed timber sale project area is located in 4 scattered sections of common school trust lands near the towns of Trego, Fortine, and Eureka in Lincoln County. The specific, legal descriptions are:

- Edna Mountain Section - Approximately 640 acres in Section 16, Township 34 north, Range 26 west.
- Fortine Creek Section - Approximately 183 acres in Section 36, Township 35 north, Range 26 west.
- Alkali Lake Section - Approximately 618 acres in Section 36, Township 36 north, Range 27 west.
- Pinkham Creek Section - Approximately 640 acres in Section 36, Township 36 north, Range 28 west.

After a thorough review of the EA, project file, public correspondence, Montana statutes, and *State Forest Land Management Plan (SFLMP)* and adopted rules, I have made the following 3 decisions:

1. ALTERNATIVE SELECTED:

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

- The No-Action Alternative includes existing activities, but does not include a timber harvest or acquisition of easements to the lands described above.
- The Action Alternative proposes to:
  - harvest approximately 4.9 million board feet (mmbf) of sawlogs and nonsawlog material from 974 acres;
  - remove trees susceptible to root rot diseases and insect infestations; and
  - promote the regeneration of tree species less susceptible to diseases and insects;
  - utilize several types of road-access agreements and easements to provide access to and within State-owned sections for the long term;
  - upgrade the surface drainage on portions of roads to meet Best Management Practices (BMPs); and
  - apply forest fuel-reduction treatments to State land to reduce the risk of catastrophic wildland fires, in particular, on State lands adjacent to urban development.

I have selected the Action Alternative.

RATIONALE FOR DECISION

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

- The Action Alternative meets the *PURPOSE OF PROPOSED ACTION (page I-1)* and *OBJECTIVES OF PROPOSAL (page I-2)* list the specific project objectives.
- The lands involved in this project are held by the State of

Montana in trust for the support of specific beneficiary institutions. DNRC is required by law to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run *(Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11; and, 77-1-202, Montana Codes Annotated [MCA])*. The SFLMP and associated rules provide the management philosophy and framework to evaluate which alternative would maximize real income while sustaining the production of long-term income.

- On March 13, 2003, the Department of Natural Resources and Conservation (DNRC) adopted Administrative Rules for the Forest Management (*Administrative Rules of Montana [ARM] 36.11.401* through *450*). This project is designed in accordance with the Rules.
- The proposed timber sale project contributes to harvest levels mandated by State statute (*MCA 77-5-222*).
- DNRC is required to salvage timber damaged by insects, diseases, fires, or wind before value is lost to decay, provided such harvesting is economically warranted (*MCA 77-5-207*).
- The analyses of identified issues did not reveal information to persuade the DNRC to choose the No-Action Alternative.

HOW THE CHOSEN ALTERNATIVE ADDRESSES CONCERNS AND ISSUES:

The Action Alternative was designed to address concerns expressed by the public and DNRC specialists, which include, but are not limited to, the following:

Vegetation:

- The project does harvest in approximately 14 acres of timber that currently meets DNRC's old-growth definition. This stand is at high risk for Douglas-fir beetle attacks due to characteristics that include the proportion of Douglas-fir, the stocking density, age, and diameter (*page III-2*). Timber stands adjacent and in near proximity to the old-growth stand proposed for harvesting have experienced substantial tree mortality due to Douglas-fir bark beetle infestations. Following this harvest, 8.8 percent of the classified forest acres on Stillwater State Forest and scattered sections in northern Lincoln County will be expected to remain as old growth (*page III-4*). The project complies with DNRC's Forest Management Rules (*ARM 36.11.401 to 450*) by considering a variety of factors at the project level, including timber stand age-class amounts, distribution, stand characteristics, and others. Based on these considerations, DNRC chose to include the 14-acre old-growth stand for harvesting under the Action Alternative. Considering the other programmatic criteria, harvesting in this stand now with this project, rather than at a later date, would best meet DNRC's fiduciary objectives by selling the higher valued live timber rather than lower valued dead timber. This would also better meet the desired future forest condition.

- The project is designed to not harvest where sensitive plants exist within wetland complexes. Additional monitoring and herbicide treatment of noxious weeds is proposed (*page III-6* through *III-8*).
- The risk of wildfire will be reduced on State lands by (*pages III-4* through *III-6*):
  - treating logging slash to limit slash retention to approximately 10 tons of large woody debris per acre, with fine fuels being largely removed from the site following site preparation, piling, and burning;
  - by thinning the existing overstory and understory to remove ladder fuels;
  - creating openings that would help wildfire-suppression efforts by reducing fire intensity and increasing areas where fireline could successfully be constructed; and
  - improving access to State land for fire suppression efforts.

Soils:

The project is designed to protect soil productivity and reduce compaction to existing skid trails when appropriate. The operation of heavy equipment will be limited to when conditions are relatively dry, frozen, or snow covered. The amount of skid trails will be limited to restrict total density (*pages III-22* through *III-28*).

Economics:

The estimated total timber-dollar revenue from this sale is expected to generate $1,215,690 for the Common School Trust and Forest Improvement Fund (*page III-37*).

Water Quality and Fisheries:

The effects to water quality and fisheries would be reduced by:

- meeting all applicable Streamside Management Zone (SMZ) rules and following the Montana Administrative Rules for Forest Management;
- adding erosion-control measures that, over the long term, will reduce sediment delivery to streams;
- using haul routes that meet BMPs, which would reduce sediment to streams and other bodies of water (*pages III-11* through *III-21*).
- utilizing a prescription that would include a 100-foot Riparian Management Zone (RMZ) along Fortine Creek, which would allow no harvesting for the first 25 feet immediately adjacent to the stream channel and harvesting up to 50 percent of the trees 8 inches dbh or larger for the next 75 feet; this would allow future recruitment of down woody debris and retain shading to maintain cool temperatures. No timber harvesting is proposed within 100 feet of Pinkham Creek (*pages III-11* through *III-21*; *pages III-29* through III-35).

Wildlife:

This alternative was designed to retain important wildlife habitat components such as snags, coarse woody debris, hiding cover, and seasonal security (*pages III-38* through *III-57*).

Road Rights-of-way, Acquisitions, and Construction:

Concern was expressed that purchasing rights-of-way may lead to future development of State or adjacent lands. Concern was also expressed that newly constructed roads would be built to a higher standard then necessary for forest management purposes. Road reconstruction and new construction for this project was designed to

meet BMPs and facilitate forest-management activities now and into the future. New road construction will be built with a minimum-width driving surface and to applicable standards to facilitate forest management activities.

2. SIGNIFICANCE OF IMPACTS

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

- I find that no impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources, including any that may be considered unique or fragile, will not be adversely affected to a significant degree. I find no precedent for future actions that would cause significant impacts, and no conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, controlled, or mitigated by the design of the project to the extent that the impacts are not significant.
- Locally Adopted Environmental Plans and Goals - In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP establishes the Agency's philosophy for the management of forested trust land. In March 2003, DNRC adopted the Forest Management Rules concerning the SFLMP. The SFLMP philosophy and associated rules are incorporated in the design of the proposed project.
- Recreational Activities - Recreational opportunities will continue and will not be negatively affected by the proposed project.
- Precedent Setting and Cumulative Impacts - The project area is located on State-owned lands that are "principally valuable for the timber that is on them or for growing timber or for watershed protection" (*MCA 77-1-402*).
- Taken individually and cumulatively, the proposed activities are common practices and no project activities are being conducted on fragile or unique sites.
- The proposed project conforms to the management philosophies of DNRC and is in compliance with existing laws, rules, policies, and standards applicable to this type of proposed action.

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

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

- The EA adequately addresses the issues identified during project development and displays the information needed to make the decisions.
- Evaluation of the potential impacts of the proposed Old Highway Timber Sale Project indicates that no significant impacts would occur.
- The ID Team provided adequate opportunities for public review and comment. Public concerns were incorporated into the project design and analysis of impacts.

Brian Manning

Brian Manning

Unit Manager
Stillwater State Forest
April 5, 2006

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CHAPTER I
PURPOSE AND NEED

INTRODUCTION TO PROPOSED ACTION

The Department of Natural Resources and Conservation (DNRC), Stillwater Unit, is proposing the Old Highway Timber Sale Project. The project area for the proposed timber sale is located on 4 separate sections of Common School trust lands in Lincoln County near the towns of Trego, Fortine, and Eureka. Their general locations are shown on the *VICINITY MAP* (inside front cover); specifically, legal descriptions are:

- Edna Mountain Section - Approximately 640 acres in Section 16, Township 34 north, Range 26 west.
- Fortine Creek Section - Approximately 183 acres in Section 36, Township 35 north, Range 26 west.
- Alkali Lake Section - Approximately 618 acres in Section 36, Township 36 north, Range 27 west.
- Pinkham Creek Section - Approximately 640 acres in Section 36, Township 36 north, Range 28 west.

If the timber-harvest alternative were selected, this project would harvest between 4 and 6 million board feet (mmbf) of timber, regenerate approximately 675 acres, commercially thin approximately 125 acres acquire permanent legal access, and upgrade road systems to improve their long-term use on the 4 separate parcels of land.

PURPOSE OF PROPOSED ACTION

The lands involved in the proposed project are held in trust by the State of Montana for the support of specific beneficiary institutions, such as public schools, State colleges and universities, and other specific State institutions, such as the School for the Deaf and Blind (*Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11*). The Board of Land Commissioners (Land Board) and DNRC are legally required to administer these trust lands to produce the largest measure of reasonable and legitimate long-term return for these beneficiary institutions (*Section 77–1-202, Montana Codes Annotated [MCA]*).

On May 30, 1996, DNRC released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the implementation of the SFLMP on June 17, 1996. DNRC adopted the Administrative Rules (Rules) (*Administrative Rules of Montana [ARM] 36.11.401 through 450*) On March 13, 2003. The SFLMP outlines the management philosophy, and the proposal will be implemented according to the Rules. The philosophy is:

> "Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream… In the foreseeable

future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives."

OBJECTIVES OF PROPOSAL

To meet the goals of the management philosophy adopted through a programmatic review of the SFLMP and the Rules, DNRC has set the following specific project objectives:

- Harvest 3 to 6 mmbf of sawtimber to generate revenue for the appropriate school trusts. The sale(s) would also contribute a sufficient amount of sawlog volume to meet the requirements of sustained yield for the DNRC timber-management program, as mandated by State Statute 77-5-222, MCA.
- Improve the long-term productivity of the timber stands by increasing vigor, reducing incidence of insect infestations and disease infections, and regenerating portions of the stands where growth is decreasing. Actions would be done in a manner that maintains site productivity and favors the retention and regeneration of appropriate species mixes (desired future conditions [ARM 36.11.405]).
- Provide access to DNRC ownership and within the State-owned sections through long-term transportation planning. Several types of road access agreements and easements may be utilized to assure access for the long-term.
- Provide for additional benefits and maintain options for sustained revenue to the school trusts by completing site improvements on existing roads to improve drainage, water quality, and safety.

ENVIRONMENTAL ASSESSMENT (EA) PROCESS

EA DEVELOPMENT

This EA was prepared in compliance with the Montana Environmental Policy Act (MEPA) of 1971. The intent of MEPA is to foster better decisions and wise actions by ensuring that relevant environmental information is available to the public officials and citizens before decisions are made and actions are taken. MEPA requires the State government to consider environmental impacts in its decisionmaking process.

PUBLIC SCOPING

The public scoping process begins during the initial stage of an EA and is used to inform the public that a State agency is proposing an action. The public has the opportunity to express their comments or concerns about the possible impacts of the project.

In April 2005, DNRC solicited public participation on the Old Highway Timber Sale Proposal by placing notices in Eureka's Tobacco Valley News, the post offices at Trego and Fortine, and sending the Initial Proposal with maps to individuals, agencies, industry representatives, and other organizations that had expressed interest in Stillwater State Forest's management activities.

The public-comment period for the initial project proposal was open for 30 days. As a result of the letters and notices, a total of 10 letters, phone calls, and e-mails were received. The issues and concerns identified through the public scoping were summarized and used to further refine the project.

INTERDISCIPLINARY TEAM (ID TEAM)

Early in 2005 the ID Team, made up of DNRC's wildlife biologist, hydrologist, and several foresters, began to compile issues and gather information related to current conditions, as required by the Forest Management Rules. Comments received from the public and other agencies were also utilized in developing the timber sale project and access issues. These issues were considered when the ID Team discussed alternative development. Based on input, the ID Team and decisionmaker made the decision to analyze the effects of 2 alternatives, an action and a no-action alternative.

DECISIONS TO BE MADE

The following decisions are to be made as a result of this EA and will be incorporated into the Finding.

- Do the alternatives presented meet the objectives?
- Does the selected alternative have significant effects on the human environment?
- Should an Environmental Impact Statement (EIS) be prepared?

OTHER AGENCIES WITH JURISDICTION/PERMIT REQUIREMENTS

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

A Short-Term Exemption from Montana's Surface Water Quality Standards (318 Authorization), issued by DEQ, may be required if temporary activities would introduce sediment above natural levels into streams and if the Department of Fish, Wildlife, and Parks (DFWP) recommends it.

MONTANA AIRSHED GROUP

DNRC is a member of the Montana Airshed Group, which regulates slash burning done by DNRC. DNRC receives an air-quality permit through participation in the Montana Airshed Group.

DEPARTMENT OF FISH, WILDLIFE AND PARKS

A Stream Protection Act Permit (124 Permit) is required from DFWP for activities that may affect the natural shape and form of a stream's channel, banks, or tributaries.

UNITED STATES FOREST SERVICE (USFS)

Commercial log hauling on USFS-owned roads requires a Temporary Road Use Permit (TRUP) from Kootenai National Forest (KNF).

Commercial use of roads under Cost-share Agreements or covered by the Federal Roads and Trails Act (FRTA) require annual meetings to coordinate road maintenance.

TABLE I-1 - SUMMARY AND TRACKING OF ISSUES AND CONCERNS

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Vegetation	The timber harvest and proposed prescriptions have the potential to increase fire hazards from logging slash.	Page II-13; pages III-6 through III-8
	Insect infestations have had varying levels of effect on stand health in these 4 parcels. Timber harvesting and the treatment of slash have the potential to improve these circumstances.	Page II-12; pages III-4 through III-6
	Timber harvesting in stands of old-growth timber may affect the amount and distribution of old growth remaining on Stillwater Unit.	Page II-12; pages III-2 through III-4
	Disturbances from timber harvesting and the potential increases and/or decreases in water levels could have an effect on sensitive plants located within the Edna Mountain section.	Pages II-13 and II-14; pages III-9 and III-10
	Soil disturbances and logging equipment could increase the amount and distribution of noxious weeds in the project area.	Page II-13; pages III-8 and III-9
Water Quality and Water Yield	Timber harvesting and road construction have the potential to increase water yield, which, in turn, may affect stream-channel stability.	Pages II-14 and II-15; pages III-11 through III-21
	Timber harvesting and road construction may increase sediment delivery to streams and affect water quality.	
Soils	Timber harvesting may result in reduced soil productivity due to compaction and displacement.	Page II-16; pages III-22 through III-28
Fisheries	Timber harvesting and road construction may affect fish habitat by increasing sediment delivery to streams and reducing shading of stream channels.	Pages II-16 and II-17; pages III-29 through III-35
Air Quality	Log hauling on dirt and gravel roads during dry periods of the year can increase the amount of dust particulates along the roadway.	Page I-5
Economics	The amount of money this sale can generate for the common school trust is primarily an issue that needs to be addressed for decisonmaking.	Pages II-17 and II-18; pages III-36 and III-37

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Wildlife	Timber harvesting could reduce bald eagle habitats and/or disturb bald eagles.	Page II-19; pages III-43 through III-45
	Timber harvesting may displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or influence prey availability.	Page II-20; pages III-46 through III-48
	Timber harvesting and road construction could displace grizzly bears from important habitats and/or reduce grizzly bear security by reducing hiding cover and visual screening.	Page II-20; pages III-45 and III-46
	Timber harvesting could remove fisher habitat and/or disrupt fisher movement through the area.	Pages II-20 and II-21; pages III-50 and III-51
	Timber harvesting may reduce the quality and quantity of pileated woodpecker nesting and feeding habitat.	Pages II-21 and II-22; page III-40; pages III-52 and III-53
	Timber harvesting and associated activities may affect flammulated owl habitat in the project area.	Page II-21; pages III-51 and III-52
	Timber harvesting could influence big game survival by reducing the winter-range capacity and hiding cover.	Pages II-22 and II-23; pages III-53 through III-57
Road Rights-of-way, Acquisitions, and Construction	There was a concern that roads built and easements exchanged should be for resource-management purposes only.	Page II-6; Pages III-22 through III-28: Pages III-36 and 37

ISSUES DROPPED FROM FURTHER CONSIDERATION

AIR QUALITY

During dry periods of the year, gravel and dirt or native-surface roads cause dust relative to the amount of use. The log hauling traffic from this proposed sale may increase on each road system for a 3- to 6-month period; when in full production, 7 to 10 trucks of logs may be hauled per day. Depending on the season of harvest and weather conditions, road dust may become a problem. In cases where the DNRC Forest Officer and/or USFS engineers feel the dust level is unacceptable, watering or applying products such as magenesium chloride may be required during the dusty periods.

CHAPTER II
ALTERNATIVES

INTRODUCTION

This chapter describes the alternatives for the Old Highway Timber Sale Project and summarizes the predicted effect of implementing each alternative. Included is a summary of the alternative development process that occurred on this project. *TABLE II-3 - SUMMARY OF ENVIRONMENTAL EFFECTS* summarizes predicted effects from the detailed environmental analyses in *CHAPTER III - EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS*.

DEVELOPMENT OF ALTERNATIVES

An ID Team was formed in the spring of 2004 to work on the Old Highway Timber Sale Project. The role of an ID Team is to summarize issues and concerns, develop management options within the project area, and analyze the potential impacts of a proposal on the human and natural environments.

DNRC began reviewing resources in this area prior to 2004. Data was collected for resources within the project area to aid in the analyses of wildlife habitat, hydrology, fisheries, old-growth timber stands, timber-harvest feasibility, transportation systems, and economics. This information was also used to develop the proposal, including various mitigations that could be applied to the meet objectives and resource needs.

The proposed timber management in each of these sections was developed to allow for another commercial harvest entry in the near future. DNRC is buying rights-of-way on private and USFS road systems, and continued opportunities for commercial harvests will aid in the future maintenance costs on these roads.

The transportation systems DNRC proposes to buy into are for long-term management, and DNRC intends to acquire the access needed to maximize the benefit to the trust.

ALTERNATIVE DESCRIPTIONS

Both the No-Action Alternative and Action Alternative are described in this section. The decisionmaker may select a modification or combination of the alternatives.

DESCRIPTION OF THE NO-ACTION ALTERNATIVE

The No-Action Alternative may be used as a baseline for comparing the effects that the Action Alternative would have on the environment. The No-Action Alternative is considered a possible alternative for selection. Under this alternative:

- No timber harvesting, tree planting, fuels reduction, and site preparation would take place at this time; therefore, no revenue from timber harvesting would be collected from this alternative.
- Salvage logging, firewood gathering, recreational use, fire suppression, noxious-weed control, and ongoing management, such as grazing on the Pinkham Creek section, may occur. Road maintenance may occur when funding is available and equipment is in the area.
- Natural events, such as plant succession, tree mortality due to

insect infestations and disease infections, windthrow, down-fuel accumulation, ingrowth of ladder fuels, and wildfires, would continue to occur.

- Future proposed management activities, including timber harvesting and rights-of-way acquisition, would again go through the appropriate level of environmental analyses before implementation.

DESCRIPTION OF THE ACTION ALTERNATIVE

Several actions are proposed that would affect timber management and road use within the Edna Mountain, Fortine Creek, Alkali Lake, and Pinkham Creek sections of trust land included in the project area. On each section, common themes of this alternative would:

- silviculturally regenerate western larch, Douglas-fir, and, where appropriate, ponderosa pine;
- reduce the incidence of bark beetle attacks;
- design transportation systems that meet the State Forest Management Rules and Best Management Practices (BMPs), minimize the miles of road, and acquire needed legal access; and
- Harvest areas with merchantable timber volumes to reduce fuel loadings in an economic manner and break up the connectivity of the dense stands, thus, providing opportunities to control fires.

Because of the major differences of these 4 separate parcels of land, the timber- and road-management activities will be described by geographic area. Geographical locations of these sections or parcels are shown on *VICINITY MAP* (back of front cover). A map for each parcel is included in this chapter. In addition to the following project description, the mitigations specified in *APPENDIX A - STIPULATIONS AND SPECIFICATIONS* provide more details related to the specific resources associated with the project.

The total harvest area and sawlog volume estimate for the entire project area are presented in *TABLE II-1 - HARVEST TOTALS*. The total miles of roadwork and easement exchange are presented in *TABLE II-2 - PROJECT TOTALS FOR ROADWORK AND EASEMENTS*.

TABLE II-1 - HARVEST TOTALS

LOCATION AND TYPE **OF HARVEST**	ACRES	**HARVEST VOLUME (MBF)**
Edna Mountain Section		
Regeneration harvest	176	2,131
Commercial thin	27	108
Fortine Creek Section		
Regeneration harvest	91	515
Improvement cut/commercial thin	55	189
Alkali Lake Section		
Regeneration	137	645
Commercial thin	38	76
Pinkham Creek Section		
Regeneration harvest	241	1,135
Improvement cut/commercial thin/overstory removal harvest	34	105
Total regeneration harvest	645	4,426
Total improvement-cut, commercial-thin, and overstory-removal harvests	154	478
Total harvest acres and volume	799	4,904

TABLE II-2 - PROJECT TOTALS FOR ROADWORK AND EASEMENTS

Miles of proposed new road construction	1.8
4 miles of proposed reconstruction, plus BMP improvements (road maintenance not included)	5.0
Miles of road abandonment	5.0
Miles of DNRC easement acquisition	5.3
Miles of easement exchange	0.7

➢ Edna Mountain Section

- ***Timber-Management Activities***

  Regeneration harvests by seedtree methods are proposed on approximately 176 acres; commercial-thin harvests would be accomplished on 27 acres. These treatments would remove between 2 and 2.5 mmbf of timber. All treatments would be accomplished with ground-based logging equipment.

  The harvest units that use seedtree treatments would cut all merchantable timber with the exception of 6 to 10 of the larger-diameter western larch and Douglas-fir per acre. The selected seedtrees would show the most vigor, contain healthy crowns, and have the potential to produce healthy cone crops. Following machine scarification and the piling of logging slash, Douglas-fir and western larch would be expected to regenerate naturally in these openings.

  In the commercial-thin harvest units, 40 to 60 percent of the trees would be harvested to reduce stocking density, improve growth rates and vigor, and increase western larch representation in the stand.

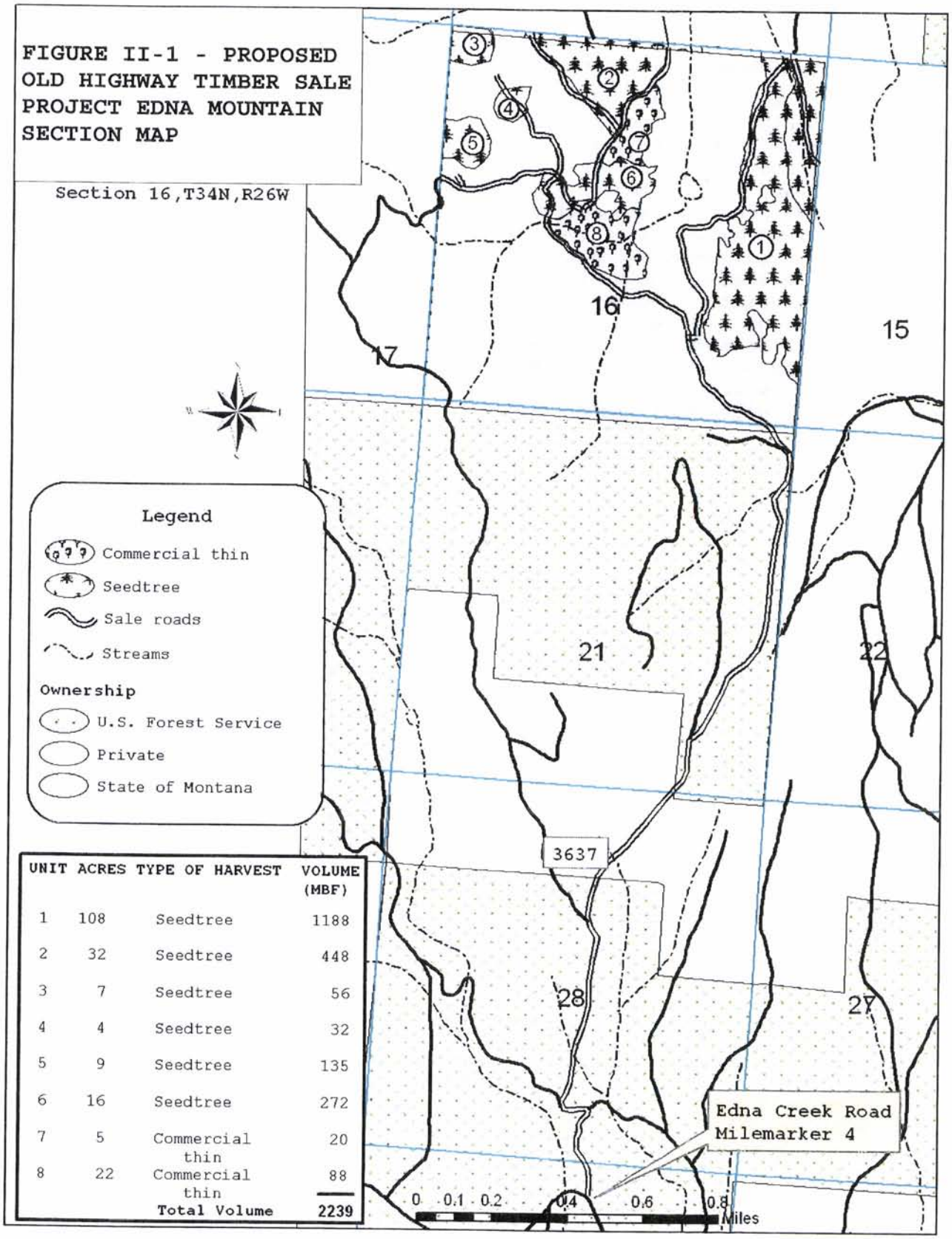
  Hazard reduction for logging slash would meet the State Hazard Reduction Law (*ARM 36.11.223* to *36.11.225*). Specifically, areas within 1,000 feet of a residential structure would meet the *High Standard* specification under this law. Around the perimeter of the harvest unit, the entire harvested tree, including the tops and branches, would be removed to the landing site.

- ***Road-Management Activities***

  DNRC shares in the cost and maintenance of USFS Road 3637, which accesses the State's Edna Mountain Section from the south. DNRC proposes to improve surface drainage and maintenance by installing drive-through drain dips and rubber-flapper water diverters in the road. Safety would be improved with a gravel lift on 2 sections of road where the road slopes at an unsafe angle toward the outside edge (approximately 10 percent outslope). Dust-abatement would be prescribed if log hauling takes place during dry, dusty periods.

  Most of the roads within this DNRC-managed section were built or improved in 1995; this proposal would reconstruct approximately 1,800 feet of road that was not improved, and construct 0.1 mile of temporary road.

  Following harvest treatments, road restrictions for motorized use would be similar to the current condition.



UNIT	ACRES	TYPE OF HARVEST	VOLUME (MBF)
1	108	Seedtree	1188
2	32	Seedtree	448
3	7	Seedtree	56
4	4	Seedtree	32
5	9	Seedtree	135
6	16	Seedtree	272
7	5	Commercial thin	20
8	22	Commercial thin	88
		Total Volume	2239

➢ Fortine Creek Section

- ***Timber-Management Activities***

  Units 1 and 3 would receive a combination of shelterwood and commercial-thin harvests. Timber stand evaluation surveys show that, at a minimum, 10 to 40 trees per acre with healthy crowns and potential to produce healthy cone crops are available in these stands; the shelterwood harvest treatment would leave these trees. Those areas opened up would be machine scarified to allow for natural regeneration. In areas where more trees show signs of vigor that would respond to thinning, tree retention would be at a higher density than 40 trees per acre.

  Unit 2, a stand composed primarily of Engelmann spruce, would receive a modified clearcut-with-reserve-tree harvest treatment. This unit is adjacent to Fortine Creek; therefore, the prescription would be modified to retain groups of larger diameter trees and all small trees within a Riparian Management Zone (RMZ). A few Douglas-fir and ponderosa pine would be left within the main portion of the harvest unit to provide seeds for regeneration. If Engelmann spruce, Douglas-fir, and lodgepole pine seedlings do not regenerate naturally within 5 years, the site would be planted with Engelmann spruce and lodgepole pine.

  Unit 4 would receive a regeneration harvest by seedtree methods. Six to 10 western larch, ponderosa pine, and Douglas-fir seedtrees per acre would be retained to provide seed for regeneration.

  The high standards of the Hazard Reduction Law would be met on areas within 1,000 feet of residences. In addition, smaller diameter trees may be slashed and felled to reduce ladder fuels. This smaller slash load would be piled and burned to reduce the down woody material in the forest to about 10 tons per acre, consisting of material greater than 3 inches in diameter.

  Unit 2 and portions of Unit 1 and 3 would be harvested during winter season when soil conditions are snow-covered or frozen. Unit 4 would be harvested under those same conditions if the road that accesses that parcel is constructed to the minimum standards of a snow road.

- ***Road-Management Activities***

  Access to Unit 2 is proposed when conditions are frozen or snow covered. A temporary road would be built over the frozen/snow-covered soils.

  Access to Units 1, 3, and 4 is through the Meadow Creek Par 3 Golf Course on a county-owned road. Logging access would be limited to fall and winter periods. Within the State ownership, approximately 0.75 miles of road would be reconstructed and 0.3 miles of new road would be constructed. The proposed road leading south through private property to Unit 4 may require the construction of a turnpiked road prism if DNRC receives easements for all lawful purposes. The new construction would be approximately 0.25 miles in length. Nonmotorized public access would be available within the 60-foot right-of-way across the private ownership. If this right-of-way easement has restrictive clauses, access may be limited to frozen or snow-covered conditions.

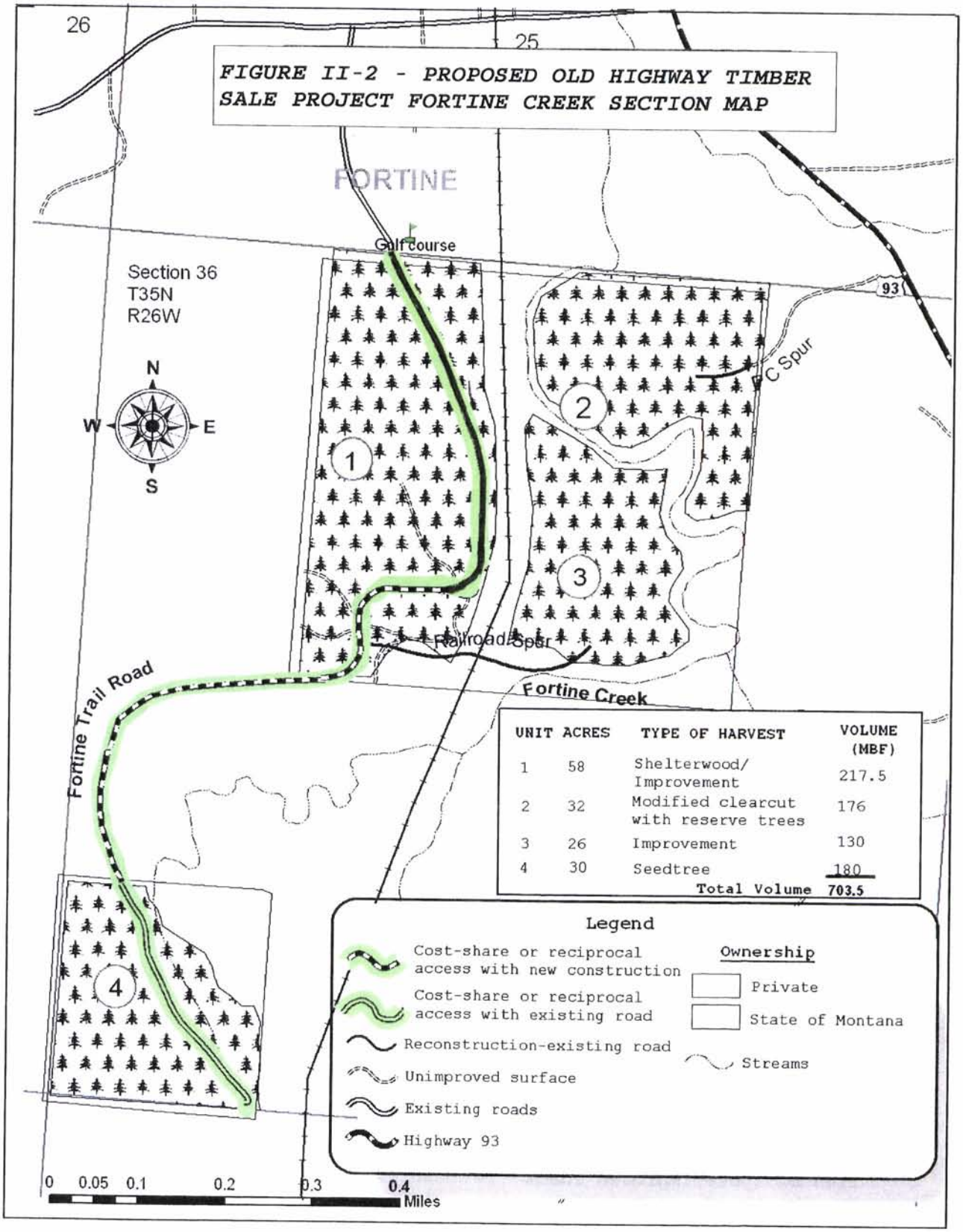


FIGURE II-2 - PROPOSED OLD HIGHWAY TIMBER SALE PROJECT FORTINE CREEK SECTION MAP

UNIT	ACRES	TYPE OF HARVEST	VOLUME (MBF)
1	58	Shelterwood/ Improvement	217.5
2	32	Modified clearcut with reserve trees	176
3	26	Improvement	130
4	30	Seedtree	180
		Total Volume	703.5

➢ Alkali Lake Section

- ***Timber-Management Activities***

  Regeneration harvests by the seedtree method are proposed on approximately 137 acres; commercial-thin harvests would be accomplished on 38 acres. These treatments would remove between 650 and 800 thousand board feet (mbf) using ground-based logging equipment.

  The description of seedtree and commercial-thin harvest treatments and the hazard reduction specifications are similar to those described under *Edna Mountain Section*.

- ***Road-Management Activities***

  During transportation planning on this section, the following items were considered:

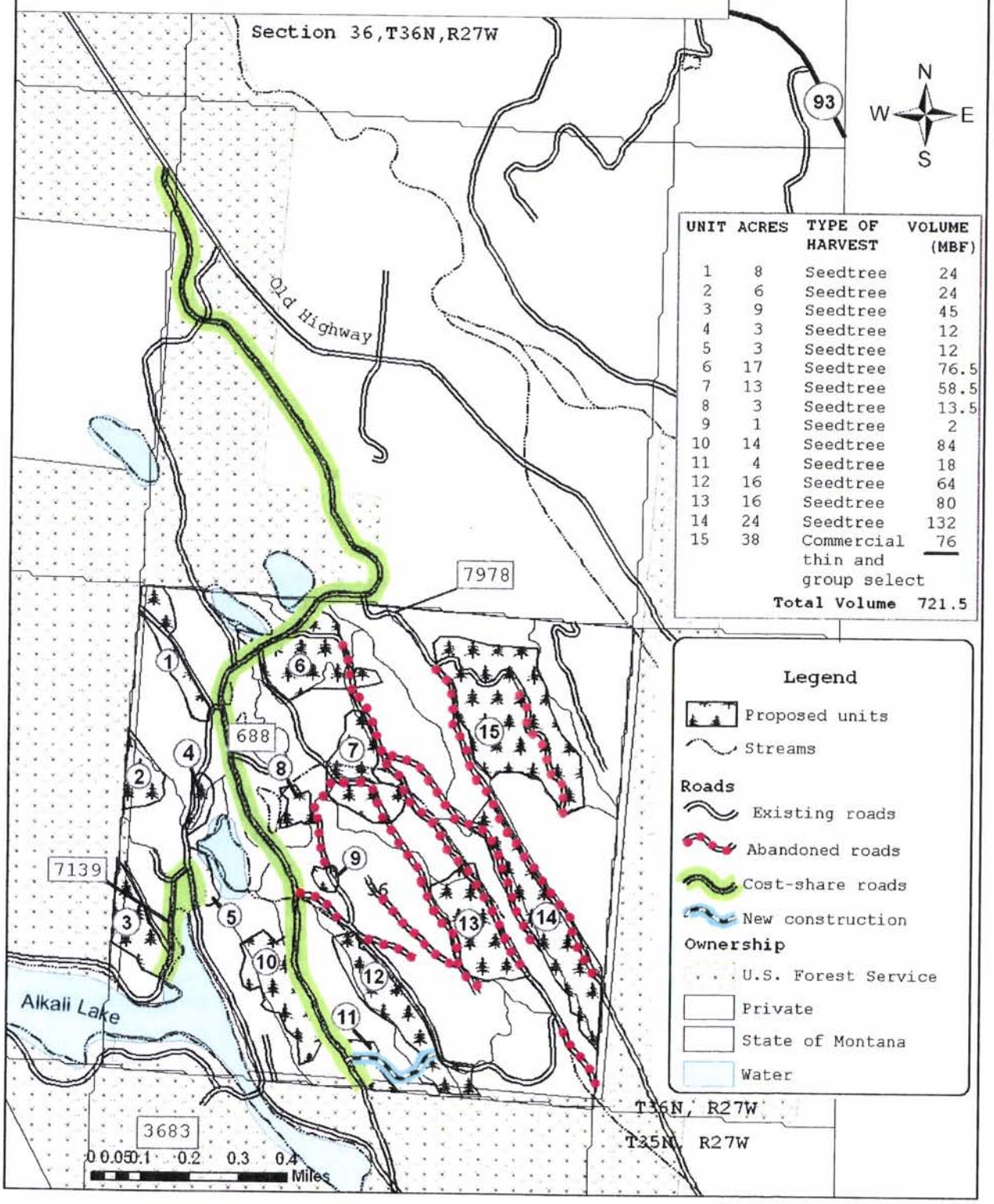
  - Create a safe intersection access point onto Frank Lake Road 688 with improved sight distance and abandon those intersections where sight distance cannot be safely met.
  - Obliterate several access points where sight distance cannot be improved.
  - Reduce the number of road miles that loop through this section to eliminate roads where surface drainage and maintenance are not possible.
  - Achieve the standard presented in the Forest Management Rules and BMPs on this section where the amount of road miles would not increase.

  This section currently has about 7.6 miles of open road. Approximately 4 miles of road would be reconstructed or improved in order to meet BMPs; 0.25 miles of new road would be constructed. Approximately 1.1 miles of these improved roads would be gated, restricting traffic during seasons when rutting may occur. An additional 1.1 miles of existing open road in this parcel would not be reconstructed or receive maintenance. Approximately 2.75 miles of existing road would be abandoned and restricted from motorized use.

  The main access road through the Alkali Lake Section is owned by USFS. Road 688 begins at the junction with the Old Highway, a county road, and runs through DNRC ownership in Section 36. Under the Federal Road Cost-Share Program, DNRC proposes to buy into:

  - Road 688, approximately 2.2 miles, beginning at the junction with the Old Highway and ending at the south line of Section 36.
  - Road 7139, approximately 0.2 mile, beginning at the junction with a State spur road, Road 3683, and Road 7139 and ending with proposed Unit 3.
  - Road 3683, approximately 0.1 mile, beginning at the junction with a State spur road, Road 3683, and Road 7139 and ending with proposed Unit 5.
  - Road 7978, approximately 0.1 mile, beginning at the junction with Road 688 and ending at the northern line of Section 36.

FIGURE II-3 - PROPOSED OLD HIGHWAY TIMBER SALE PROJECT ALKALI LAKE SECTION



UNIT	ACRES	TYPE OF HARVEST	VOLUME (MBF)
1	8	Seedtree	24
2	6	Seedtree	24
3	9	Seedtree	45
4	3	Seedtree	12
5	3	Seedtree	12
6	17	Seedtree	76.5
7	13	Seedtree	58.5
8	3	Seedtree	13.5
9	1	Seedtree	2
10	14	Seedtree	84
11	4	Seedtree	18
12	16	Seedtree	64
13	16	Seedtree	80
14	24	Seedtree	132
15	38	Commercial thin and group select	76
		Total Volume	721.5

➢ PINKHAM CREEK SECTION

- ***Timber-Management Activities***

  Regeneration harvests by seedtree and shelterwood methods are proposed on approximately 241 acres; commercial-thin and overstory-removal harvests would be accomplished on 34 acres. These treatments would remove between 1.25 and 1.40 mmbf.

  The harvest units using seedtree treatments would cut all merchantable timber with the exception of 6 to 10 of the larger-diameter western larch and Douglas-fir per acre. The shelterwood treatment would retain approximately 10 seedtrees and an additional 15 to 25 trees to shade new regeneration. The selected seedtrees would show the most vigor, healthy crowns, and the potential to produce healthy cone crops. Douglas-fir and western larch would be expected to regenerate naturally in these openings following machine scarification and the piling of logging slash. Approximately 38 acres would require broadcast burning to reduce fuels and establish site preparation for western larch seedlings.

  In the commercial-thin and overstory-removal harvest units, 40 to 60 percent of the trees would be harvested to reduce stocking density, improve growth rates and vigor, and increase western larch representation in the stand.

  Treatments would be accomplished using ground-based equipment on 181 acres and skyline cable logging equipment on 94 acres.

- ***Road-Management Activities***

  Pinkham Creek bisects this section; as a result, this parcel requires 2 separate transportation systems. Access to South Pinkham Road from the south is via Gut Creek Road (USFS 494) and USFS 3630. Access from the north uses USFS 7901, off Pinkham Creek Road near Black Butte Road.

  DNRC proposes to buy into the USFS roads through the Federal Road Cost-Share Program.

  The road system on the south side of the State parcel was constructed in 1996 and meets DNRC access needs and BMPs.

  Due to safety concerns regarding the approach to Pinkham Creek Road, the transportation plan for the north side of the creek would require reconstruction or, possibly, relocation of USFS 7901.

  Approximately 1.0 mile of new road would be built within DNRC-managed State land to facilitate access to the harvest units requiring skyline cable logging systems, as well as the ground-based logging units above the road. NE Pinkham Road, an existing road accessing Pinkham Creek near the east section line, would be closed to motorized use approximately 200 feet above the creek. Other existing roads on this section, approximately 1.3 miles, would be abandoned. Seasonal road restrictions, which would reduce rutting and road maintenance expenses, would be placed on the new road system.

FIGURE II-4 - PROPOSED OLD HIGHWAY TIMBER SALE PROJECT PINKHAM CREEK SECTION MAP

Section 36, T36N, R28W

UNIT	ACRES	TYPE OF HARVEST	VOLUME (MBF)
1	89	Seedtree	356
2	5	Seedtree	20
3	24	Seedtree	168
4	8	Seedtree	32
5	5	Seedtree	35
6	5	Seedtree	20
7	8	Overstory removal	24
8	10	Seedtree	80
9	33	Shelterwood	82.5
10	10	Commercial thin	25
11	16	Overstory removal	56
12	28	Seedtree	108
13	6	Seedtree	24
14	14	Seedtree	84
15	14	Seedtree	126
		Total Volume	1240.5

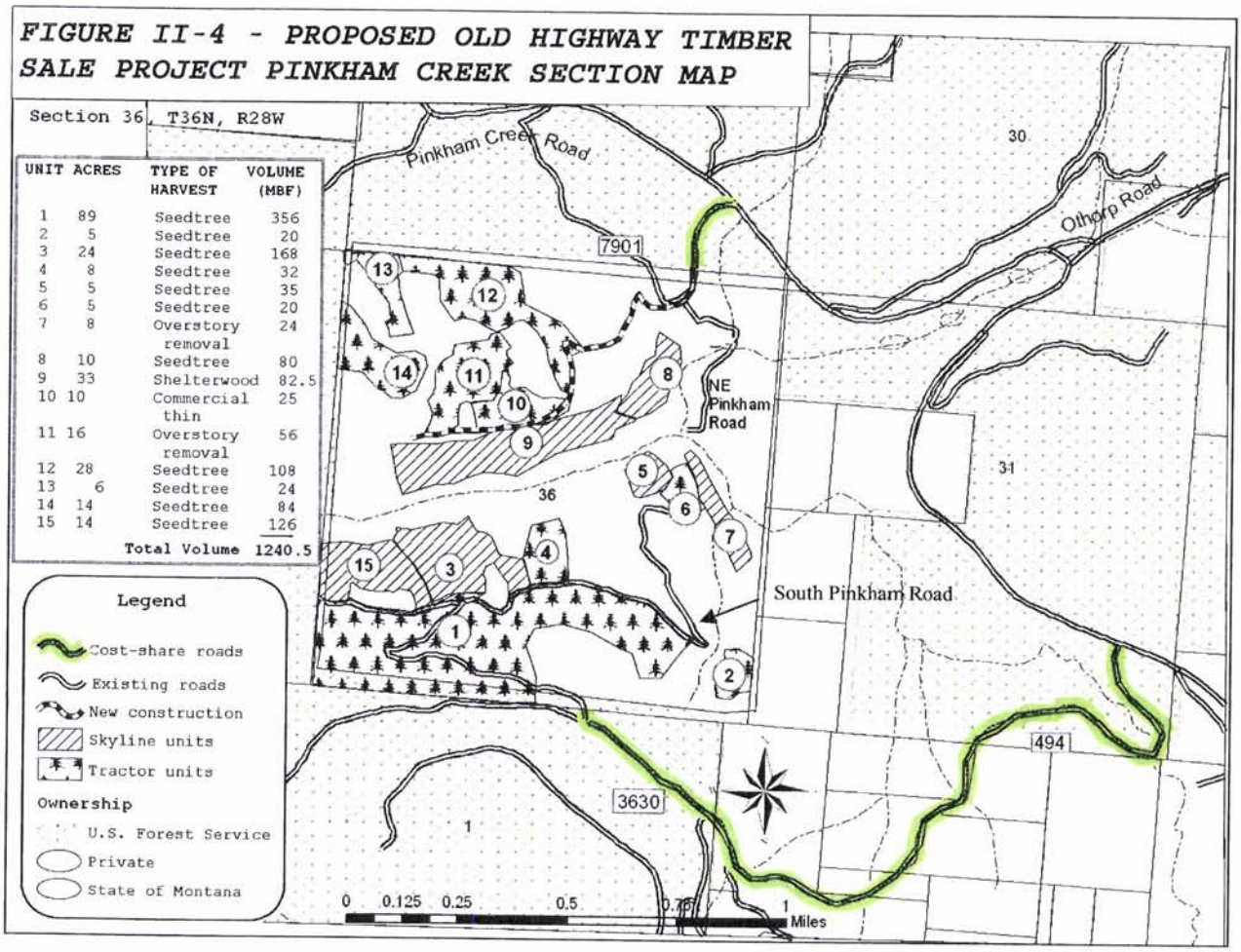


TABLE III-3 — SUMMARY OF ENVIRONMENTAL EFFECTS

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION		
Old Growth	***No-Action Alternative***	
	The acreage and distribution of old-growth stands would not be affected at this time. Over time, there is a high likelihood that mortality could remove a 22-acre stand from meeting DNRC's old-growth definition.	Following harvesting activities on other Stillwater Unit timber sales, approximately 8,840 acres (8.8 percent) of old growth would remain on Stillwater Unit.
	Action Alternative	
	Fourteen acres of old growth would be harvested and no long meet DNRC's old-growth definition.	Following harvesting activities on this and other Stillwater Unit timber sales, approximately 8,826 acres (8.8 percent) of old growth would remain on Stillwater Unit.
Insects and Diseases	***No-Action Alternative***	
	Insect populations would rise or fall based on natural disturbance events or climatic conditions. Based on current conditions, insect outbreaks should remain small and of low intensity on the Edna Mountain and Fortine Creek sections. An increase in mortality due to the Douglas-fir beetle is likely on Pinkham Creek Section. The indirect effects of this would be the loss of sawlog value and enough mortality in a stand of old growth to remove the stand from the status of old growth.	Insect populations would rise or fall based on natural disturbance events or climatic conditions.
	Action Alternative	
	Insect populations would rise or fall based on natural events or climatic conditions. Harvesting would reduce the amount of trees susceptible to the Douglas-fir and spruce beetles by more than 500 acres.	Insect populations would rise or fall based on natural disturbance events or climatic conditions and western larch regeneration would be promoted and managed for the long term, thereby improving resistance to insect and disease problems.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION (CONTINUED)		
Forest Fuels	***No-Action Alternative***	
	High levels of ladder fuels and very high amounts of trees per acre would remain. The risk of wildfires torching and crowning would remain high.	Projects of fuels reduction on adjacent ownerships have played a role in the successful containment of wildfires.
	Action Alternative	
	Ladder fuels would be removed in most harvest units and the slash and fuel treatments would limit the intensity of fires within those areas harvested.	Projects of fuels reduction on adjacent ownerships have played a role in the successful containment of wildfires. In addition, the location of the proposed units, fuels reduction within harvest areas, and the new transportation systems should improve the success of aerial and ground attacks on wildfires.
Noxious Weeds	***No-Action Alternative***	
	Weed populations would likely continue to increase.	If funding remains available, weed spraying would reduce current weed populations.
	Action Alternative	
	New infestations of noxious weeds and infestations of weeds not listed by Lincoln County as noxious (such as woolly mullen) are likely to increase. Mitigations, such as weed spraying, equipment washing, and planting grass seed for prompt revegetation, should reduce the potential for infestations within the forest.	If funding remains available, weed spraying would reduce current weed populations. As surveys and administration of postharvest activities occur within the project areas, monitoring of weed populations would continue.
Sensitive Plants	***No-Action Alternative***	
	No increases in water depth of the wetland area or activities increasing chances of noxious weed populations would be expected; therefore, sensitive plant populations would not be affected.	Same as direct and indirect effects

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION (CONTINUED)		
Sensitive Plants (continued)	***Action Alternative***	
	No effects are expected to the sensitive plant populations from increases in water depths of the wetland; water yield may increase, but water levels would not likely change. Mitigation measures and increased monitoring would limit the potential for noxious weed encroachment; therefore, no change to sensitive plant habitat is expected.	Same as direct and indirect effects.
HYDROLOGY		
Sediment Delivery and Water Yield	***No-Action Alternative***	
	Edna Mountain Section A low risk of sediment delivery would occur.	Edna Mountain Section No additional cumulative effects would likely occur.
	Fortine Section Sediment delivery to Fortine Creek from the ford would continue.	Fortine Section No additional adverse cumulative effects would likely occur.
	Alkali Lake Section Delivery of sediment to waterbodies would not likely change. The potential for water-quality problems would be limited.	Alkali Lake Section No additional cumulative effects would likely occur.
	Pinkham Creek Section A moderate risk of sediment delivery would remain from 1 road segment near the stream.	Pinkham Creek Section No additional cumulative effects would likely occur.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
HYDROLOGY (CONTINUED)		
	Action Alternative	
Sediment Delivery and Water Yield (continued)	Edna Mountain Section The risk of sediment delivery to streams would be low. The annual water-yield increase is estimated at 3.2 percent in the Deep Lake watershed and less than 0.5 percent in the Dudley Slough watershed. The risk of impacts to water quality would be low.	Edna Mountain Section The risk of additional in-stream sediment or an increased amount of sediment delivery would be low. The annual water-yield increase is estimated at 9.8 percent. The risk of additional cumulative impacts would be very low.
	Fortine Creek Section Sediment delivery to Fortine Creek from the ford would be reduced.	Fortine Creek Section The risk of additional sediment delivery would likely be very low. Annual water-yield increases would be negligible. The risk of additional cumulative effects to water quality would be low.
	Alkali Lake Section The 150 equivalent clearcut acres (ECA) generated would be divided into 4 watersheds. No adverse effects to water quality would be expected.	Alkali Lake Section Following harvesting and road construction and maintenance activities, the potential for scoured stream channels developing would be low. The risk of additional cumulative effects would be low.
	Pinkham Creek Section The short-term potential for sediment delivery to Pinkham Creek would be mitigated. The increase in water yield would be less than 1 percent. The risk of adverse effects to water quality would be low.	Pinkham Creek Section No additional cumulative effects would likely result.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SOILS		
Soil Productivity	***No-Action Alternative***	
	Effects of past harvesting would continue to recover from compaction.	Effects of past harvesting would continue to recover from compaction.
	Action Alternative	
	The risk of detrimental long-term impacts would be acceptable. Direct and indirect effects to soils are 30.5 acres on the Edna Mountain Section; 17.3 acres on the Fortine Creek Section; 26 acres on the Alkali Lake Section; and 36.5 acres on the Pinkham Creek Section.	Adverse impacts to soils would affect less than 15 percent of the harvest unit areas. Overtime, abandoned roads would recover from compaction.
FISHERIES		
Sediment Delivery	***No-Action Alternative***	
	Potential sediment sources on all parcels in the project areas would remain the same.	Existing sediment sources on all parcels in the project areas would continue to contribute sediment to the streams.
	Action Alternative	
	Edna Mountain Section The risk of having an increased level of in-stream sediment or an increased amount of sediment delivery from sources outside of channels is low; therefore, the risk of impacts to fisheries would be low.	Edna Mountain Section The risk of cumulative effects to fisheries is very low.
	Fortine Creek Section The risk of having an increased level of in-stream sediment or an increased amount of sediment delivery from sources outside of channels is low; therefore, the risk of impacts to fisheries would be low.	Fortine Creek Section The risk of cumulative effects to fisheries is low.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
FISHERIES (CONTINUED)		
Sediment Delivery (continued)	***Action Alternative***	
	Alkali Lake Section This parcel does not have defined stream channels; therefore, the risk of impacts to fisheries is very low.	Alkali Lake Section No additional cumulative effects would likely result.
	Pinkham Creek Section The risk of having an increased level of in-stream sediment is very low. Sediment delivery to Pinkham Creek has potential for a short time period.	Pinkham Creek Section The risk of cumulative effects to fisheries is low.
Large-Woody-Debris Recruitment on Fortine Section	***No-Action Alternative***	
	Changes to riparian stands, and, therefore, the amount of large woody debris for recruitment, would be dictated by natural events.	The cumulative risk to fisheries would be low because the availability of large woody debris is expected to be adequate.
	Action Alternative	
	Adequate recruitable woody debris for fisheries habitat would remain the same; therefore, the risk of impact to fisheries would be low.	Cumulative risk to fisheries would be low because the availability of large woody debris is expected to be adequate.
ECONOMICS		
	No-Action Alternative	
	Revenue for the trust would not be realized at this time. Access rights would not change, and the value of these DNRC-managed State lands would remain similar to current conditions.	The deferral of harvesting would change the region where trees are harvested and volumes are taken, which would impact other areas of the State.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
ECONOMICS (CONTINUED)		
	Action Alternative	
	An estimated 4.9 mmbf would be harvested to meet DNRC's annual sustained-yield target of 53.2 mmbf. Approximately $1,120,140 would be deposited into the Common Schools trust; approximately $95,550 would be deposited into the FI account. Approximately 5.3 miles of rights-of-way easements would be purchased, increasing the value of these DNRC-managed State lands.	This timber sale would be part of DNRC's State-wide sustained-yield annual harvest of timber from State trust lands. The net revenue of this sale would add to the Common Schools trust fund.
WILDLIFE		
Forested Habitats and Connectivity	***No-Action Alternative***	
	No changes in wildlife use would be expected. Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high amounts of canopy cover.	Continued use by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be expected.
	Action Alternative	
	Proposed treatments would lead to younger, more-open stands, which could disrupt movement by some species requiring extensive, connected forested habitats; however, connectivity would persist. Habitat conditions would improve for species adapted to the more-open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions.	Reductions in mature forested habitats associated with this alternative would be additive to losses associated with past harvesting activities. Across the analysis area, extensive forested habitats would still exist and landscape connectivity would persist.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (CONTINUED)		
Snags and Coarse Woody Debris	***No-Action Alternative***	
	No direct changes in the deadwood resources would be expected. Snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris on these State parcels.	Snags and snag recruits have been retained with some of the past harvesting in the vicinity. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area.
	Action Alternative	
	Present and future deadwood material could be reduced during timber harvesting. Several snags and snag recruits would be retained within the proposed units. The future snag quality would be enhanced with silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species.	The loss of snags and coarse woody debris associated with this alternative would be additive to the loss associated with past harvesting and firewood gathering in the analysis area. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area.
Bald Eagles	***No-Action Alternative***	
	Neither direct nor indirect effects to bald eagles would be expected.	Disturbance associated with ongoing human development and timber management would continue. No further changes in bald eagle habitats or disturbance levels would be expected. Continued use of the nesting territories would be expected.
	Action Alternative	
	Some displacement of bald eagles would occur. Disturbance to nesting eagles would be reduced with seasonal restrictions on portions of the project area. Habitat attributes that could lead to eagle use in the future would be retained.	Disturbances would be additive to those associated with ongoing human development and timber management on adjacent ownerships. No additional disturbances or habitat modifications would be expected. Continued use of the nesting territories would be expected.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (CONTINUED)		
Grizzly Bear	***No-Action Alternative***	
	No direct effects to grizzly bears would be expected. No changes in road densities or hiding cover would be anticipated.	Motorized access to the area and hiding cover would remain unchanged. In the long term, forest succession would continue and may reduce food sources, but the amount of hiding cover may increase.
	Action Alternative	
	Disturbance would increase due to harvesting and associated human access. Grizzly bears could be directly affected through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Open-road densities would decrease marginally.	Open-road densities would temporarily increase, but in the long term, marginal reductions in open-road densities would be anticipated. Reductions in hiding cover would be additive to the reductions due to past timber sales; however, considerable hiding cover exists within the vicinity.
Gray Wolf	***No-Action Alternative***	
	Disturbance to wolves would not increase. No changes in wolf prey availability would be expected.	No changes in wolf prey would be expected. No effects to wolf den or rendezvous sites would occur.
	Action Alternative	
	Harvesting activities could disturb wolves using the area. After harvesting, wolf use of the project area for denning and rendezvous sites would likely revert to preharvest levels. Shifts in prey availability would alter wolf use of the project area.	Reductions in hiding cover within the project area could shift big game use; however, no appreciable changes at the pack home-range level would be anticipated. No changes to den or rendezvous sites would be anticipated.
Fisher	***No-Action Alternative***	
	No effects to fishers would be expected under this alternative. Fisher denning and resting habitats may improve with continued tree growth.	Fisher denning and resting habitats would be retained. No changes in fisher habitats would be anticipated.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (CONTINUED)		
Fisher (continued)	***Action Alternative***	
	Approximately 341 acres of fisher habitats would receive treatments, which would likely produce stands that are too open for appreciable fisher use. However, these areas are largely away from riparian areas where fishers are more commonly found, so minimal effects would be anticipated. A minor reduction in human access could benefit fishers.	Reductions in potential fisher habitats would be additive to the losses associated with past timber harvesting in the area. Landscape connectivity would be maintained. Negligible changes to riparian habitats would have no effects on the landscape-level riparian habitats. A reduction in human access could reduce trapping mortality.
Flammulated Owl	***No-Action Alternative***	
	No changes in flammulated owl habitats would be anticipated. Continued succession would reduce habitat quality and quantity.	Through time, conversion of stands to shade-tolerant species would reduce flammulated owl habitats. Portions of the analysis area have been managed in the past, which may have improved habitats for flammulated owls.
	Action Alternative	
	Flammulated owls could be displaced with the proposed harvesting. A slight improvement in habitat quality could be realized with harvesting and the resultant open stands.	The minor improvements associated with this alternative would be additive to minor habitat improvements on adjacent ownerships. However, continued maturation in other stands has decreased habitat quality for flammulated owls.
Pileated Woodpecker	***No-Action Alternative***	
	No direct effects would be anticipated. Stands once dominated by seral species would continue to be converted through succession to shade-tolerant stands. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time and then decline.	Through time, conversion of stands to shade-tolerant species would reduce nesting substrates for pileated woodpeckers.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (CONTINUED)		
Pileated Woodpecker (continued)	***Action Alternative***	
	Proposed for treatment are 299 acres of woodpecker habitats, which could reduce pileated woodpecker use in the project area. Silvicultural treatments designed to recruit shade-intolerant tree species would benefit pileated woodpeckers in the distant future by providing nesting, roosting, and foraging habitats.	The loss of pileated woodpecker habitats associated with the proposed harvesting would be additive to habitat losses associated with past harvesting on all ownerships. Additionally, continued maturation of stands in the analysis area would improve pileated woodpecker habitats.
BIG GAME		
Winter Range	***No-Action Alternative***	
	Big game thermal cover in the project area would not be altered in the near term. In the longer term, continued succession could reduce forage production while increasing thermal cover.	No changes would be anticipated in thermal cover and snow intercept. Continued forest management and development on other ownerships would likely reduce winter range values. Continued use of the winter range would be anticipated.
	Action Alternative	
	Some displacement of big game would be anticipated. Thermal cover for big game would be reduced with the canopy cover on 650 acres. The proposed harvesting could stimulate browse production for big game.	The reduction in thermal cover and snow intercept on winter range associated with this alternative would be additive to past reductions across the white-tailed deer winter range. Continued use of the winter range would be anticipated.
Elk Security	***No-Action Alternative***	
	No changes would be anticipated in elk security habitat, hiding cover, human access, or elk survival.	No changes would be anticipated in elk security habitat, hiding cover, human access, or elk survival.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE - *BIG GAME (CONTINUED)*		
Elk Security (continued)	***Action Alternative***	
	No changes in security habitat would occur. Minimal effects to elk vulnerability or human access would be expected. Hiding cover would be reduced on 799 acres.	Negligible impacts to big game survival would be anticipated. No changes in security habitat would be expected. Reductions in hiding cover would be additive to reductions elsewhere in the analysis area. Minor reductions in human access could improve big game survival.

CHAPTER III
EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter describes both the existing environment and environmental effects relevant to the resource issues defined in *CHAPTER I - PURPOSE AND NEED* and is arranged in the same order.

The following information, presented by issue category, presents both the existing conditions, or the affected environment, and the potential environmental effects on the resource as the result of implementing either the No-Action or Action alternative. The description of the affected environment, in part, serves as a baseline to compare changes resulting from the Action Alternative.

VEGETATION AND TIMBER STAND ANALYSIS

INTRODUCTION

This analysis provides a detailed description of the conditions of the forest in the analysis area and addresses the potential effects of the proposed alternatives related to the following issues. The forest conditions that will be described are:

- forest covertypes,
- old-growth timber stands,
- insect and disease conditions,
- forest fuel conditions,
- noxious weeds, and
- sensitive plants.

ANALYSIS

ANALYSIS METHODS

The current stand conditions will be compared to stand conditions that DNRC considers as the desired future conditions and appropriate for the site. The procedures used to assign covertypes on State forested lands are explained in detail in the Forest Management Rules (*ARM 36.11.405*).

The methods to identify old-growth timber stands are initiated from models run on DNRC's Stand Level Inventory (SLI), field reconnaissance, and plot data. This proposal will address the direct and indirect effects to old-growth amounts. The cumulative impacts of other proposed or active timber sales will be addressed for the assessment of cumulative effects.

To assess the existing condition of the project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, and consultations with other professionals provided information for the analysis. The existing condition and effects assessments for insects, diseases, and forest fuels consider:

- forest covertypes,
- tree species and size classes,
- fire regimes, and
- risks associated with fire and further infestations or infections.

Noxious weed and sensitive plant population and location assessments were completed from the spring of 2004 through the fall of 2005.

ANALYSIS AREA

The forest covertype and old-growth analyses have been completed on Stillwater State Forest and the scattered State sections north in Lincoln County. This is considered Stillwater Unit's primary administrative unit and covers approximately 100,163 acres of forested land.

The noxious weed and sensitive plant surveys and condition assessments of insects, diseases, and fuels were conducted on the 4 sections within the project area.

FOREST COVERTYPES

Western larch/Douglas-fir is the primary covertype in the 4 sections within the project area. This project would not convert covertypes from their existing condition; therefore, an effects assessment will not be carried further in this document. In reference to desired future conditions, recent analyses from the *Point of Rocks Timber Sale EA* show that Stillwater State Forest is underrepresented by the western larch/Douglas-fir covertype by nearly 21 percent and overrepresented by the subalpine fir by 9 percent and mixed-conifer covertypes by 22 percent.

OLD GROWTH

EXISTING CONDITION

An old-growth stand is defined as a stand that meets the minimum criteria (minimum number of trees per acres that have a minimum diameter at breast height [dbh] and a minimum age for a given site (old-growth group from habitat type).

These minimums can be found in *Green et al (Old Growth Forest Types of the Northern Region)*.

Based on SLI data and field surveys within the project area and in several other sections on Stillwater State Forest, approximately 9.1 percent (9,145 acres) of the Stillwater Forest Analysis Area can be classified as old growth.

Within the project area, 2 stands of old growth have been verified in the Pinkham Creek Section; no other parcels in the project area have stands meeting DNRC's old-growth definition. One 12-acre stand of large diameter western larch and Engelmann spruce is located in the flat along Pinkham Creek; the other, a 22-acre stand of Douglas-fir and western larch, is located south of the creek on a steep, north-facing aspect (see *FIGURE III-1 - OLD-GROWTH STANDS IN THE OLD HIGHWAY TIMBER SALE PROJECT AREA*). Both stands are adjacent to each other, and timber stands on USFS ownership, west of DNRC's ownership, have similar characteristics. As stated in the *INSECT AND DISEASE* evaluation of this EA, the area is at high risk for further infestations of the Douglas-fir beetle (*Dendroctonus pseudotsugae*). This stand in the Pinkham Creek drainage is a risk particularly due to the amount, age, and diameter of the Douglas-fir in the stand (*Furniss 1981*).

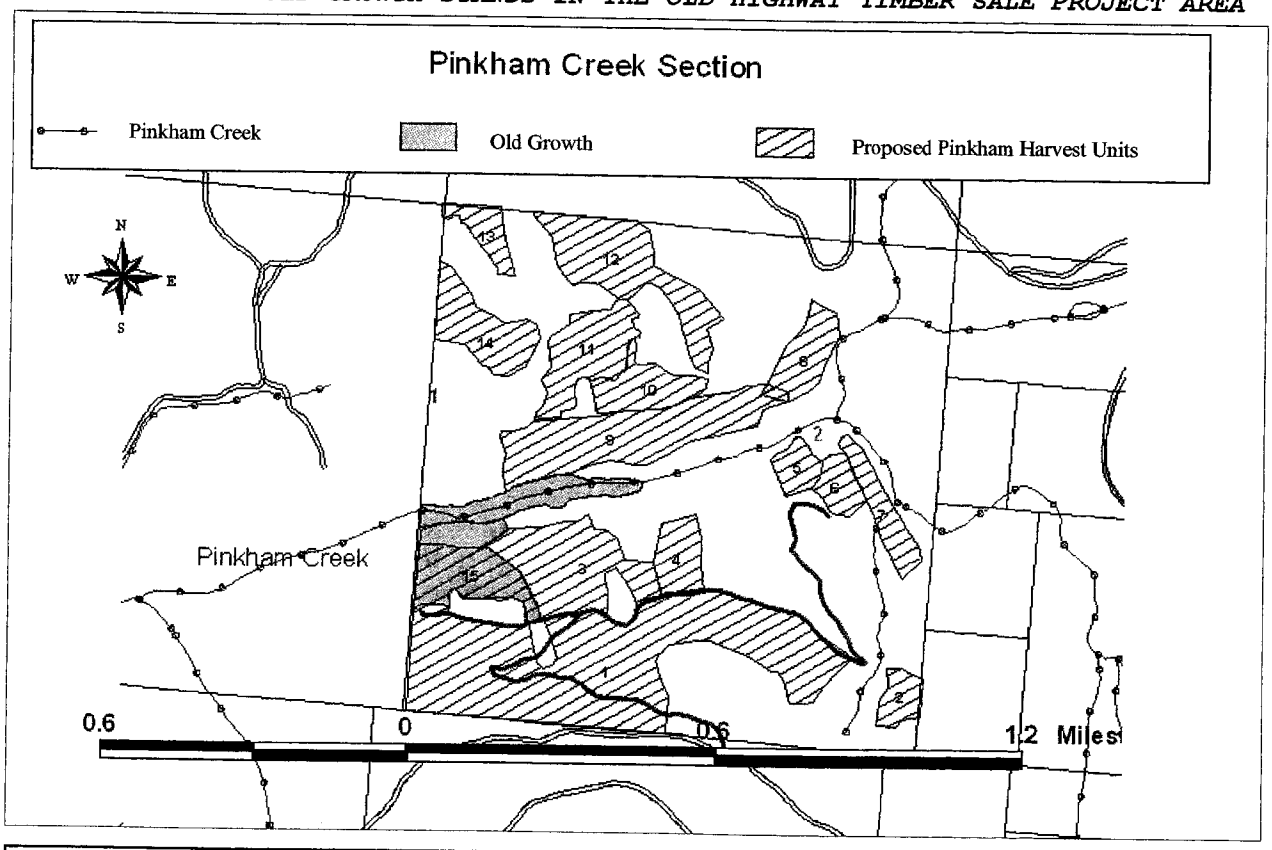
ALTERNATIVE EFFECTS TO OLD GROWTH

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Old Growth***

  The acreage and distribution of old-growth stands would not be affected at this time. Based on the current stand density, proportion of Douglas-fir in the stand, stand age and diameter, level of current beetle activity

FIGURE III-5 - OLD-GROWTH STANDS IN THE OLD HIGHWAY TIMBER SALE PROJECT AREA



in proximity to this stand, and the resulting environmental stress caused by drought and the Camp 32 Fire in 2005, a high likelihood of mortality would remove the 22-acre stand from meeting the old-growth definition in the near future. The 12-acre stand in the creek bottom would likely continue to meet DNRC's old-growth definition well into the future.

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

  Approximately 14 acres of old-growth timber would be harvested in the Pinkham Creek Section. The characteristics of the old-growth stand proposed for harvesting have a high hazard and risk rating for Douglas-fir beetle attacks. The proposed 14-acre seedtree harvest (see *FIGURE III-1 - OLD GROWTH IN THE PINKHAM CREEK SECTION*) would recover merchantable sawlog value from trees at high risk to the Douglas-fir beetle and, following harvesting, these 14 acres would no longer meet DNRC's definition for old growth. Due to inaccessibility with a cable logging system, 8 acres on the north-facing stand is not proposed for harvesting. This portion of the stand may continue to meet DNRC's old-growth definition into the future.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Old Growth***

  With the expected implementation and harvest of old-growth timber stands in the King Bear Timber Sale (*Taylor South EIS, 2001*) and West Fork Timber Sale (*West Fork of Swift Creek Timber Sale Project FEIS, 2005*), the total amount of old growth on Stillwater State Forest and the scattered sections in north Lincoln County would be reduced by 305 acres, leaving approximately 8,840 acres, or 8.8 percent.

  The amounts and distributions of older age-class stands, and therefore old growth, will shift and change overtime.

- ***Cumulative Effects of the Action Alternative to Old Growth***

  With the implementation of this proposal and the implementation and harvest prepared for in the King Bear and West Fork timber sales, the total amount of old growth on Stillwater State Forest and the scattered sections in north Lincoln County would be reduced by 319 acres, leaving approximately 8,826 acres or 8.8 percent.

  The amounts and distributions of older age-class stands, and therefore old growth, will shift and change over time.

INSECTS AND DISEASES

EXISTING CONDITIONS

This section will address current and potential situations that insects may have within the project area and address the objectives of improving the long-term productivity of timber stands, increasing vigor, reducing incidence of insect infestation, and regenerating stands with the appropriate tree species presented in *CHAPTER I - PURPOSE AND NEED*.

➢ **Edna Mountain Section**

Minor Douglas-fir beetle infestations have been noted in several small areas since 2003. Based on *Furniss et al (1979)* studies on stand susceptibility, about 70 percent of the stands in this section are at risk for infestation. Stand susceptibility is correlated with the proportion of Douglas-fir in the stand; its density and age; diseases, such as root rot; and tree injuries, such as those caused from wind events or fire. In part, no increase in mortality has occurred in this

section because of the low amount of recent wind events or fire adjacent to or within the section.

- **Fortine Creek Section**

Spruce beetle, *Dendroctonus rufipennis*, infestations are incidental in the Engelmann spruce stands along Fortine Creek. Blowdown and subsequent spruce bark beetle infestations have been occurring for over 15 years. Based on species, tree age, size class, and the potential for continued disturbances such as blow down events, the stand meets the classification of high risk.

Recent Douglas-fir bark beetle mortality has been noted in the 40-acre parcel of this section.

Flatheaded fir borers, *Melanophila* spp., have been instrumental in the mortality of scattered, drought-stressed Douglas-fir and western larch on the drier sites.

- **Alkali Lake Section**

Flatheaded fir borers have been sporadically active in the Douglas-fir and western larch throughout the section.

- **Pinkham Creek Section**

Douglas-fir beetle activity and subsequent mortality in the Douglas-fir trees have been noted in the Pinkham Creek Section since 1994. A timber harvest was performed by DNRC in 1997 and some of the "at-risk" Douglas-fir were harvested within the harvest units. Since that time, several large infestation pockets have occurred in areas that were not harvested and the harvested areas have scattered mortality. The Douglas-fir bark beetle populations have increased in the vicinity of this State section according to the annual Aerial Detection Surveys conducted by the USFS from 1997 through 2005. Fires during the summer of 2000 in the Pinkham Creek drainage have escalated beetle populations; the 2005 Camp 32 Fire is adjacent to this section and will increase beetle populations even more.

ALTERNATIVE EFFECTS TO INSECTS AND DISEASES

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Insects and Diseases***

In general, insect populations would continue to rise or fall based on the natural disturbance events or climatic conditions. For example, the infestations of flatheaded fir borers would not likely be sustained once the effects of drought have subsided. On the Edna Mountain Section, over 400 acres of timbered stands are susceptible to continued infestation from the Douglas-fir beetle. Under current conditions, future beetle outbreaks should remain small and of low intensity, although, as mentioned above, this could change based on fire occurrences or major wind events that cause blowdown or stem breakage.

On the Fortine Creek Section, approximately 32 acres of Douglas-fir are susceptible to continued infestation from the Douglas-fir beetle. Approximately 50 acres are susceptible to spruce beetle infestations in the spruce habitat types along Fortine Creek. Under current conditions, future beetle outbreaks should remain small and of low intensity, although, as mentioned above, this could change based on fire occurrences or major wind events that cause blowdown or stem breakage.

On the Pinkham Creek Section, most of the stands on this 640 acres would continue to have Douglas-fir mortality as a result of infestations by the Douglas-fir beetle. An increase in infestations is likely due to the

2005 Camp 32 Fire and its proximity to the project area. Indirectly, the continued presence of beetle infestations has had an effect on the designation of old-growth stands in this section. One current old-growth stand is dominated by large-diameter Douglas-fir, and, if this alternative is selected, a large portion of the stand would likely be infested; with the resulting mortality, the stand would be removed from old-growth designation. Loss of sawlog value would also be an effect due to the rapid deterioration of the wood and expense of using a cable logging system for salvaging the timber.

- ***Direct and Indirect Effects of the Action Alternative to Insects and Diseases***

  Insect populations would continue to rise or fall based upon the natural disturbance events or climatic conditions. The increased vigor of the new regeneration and species being regenerated, primarily western larch and ponderosa pine, would improve long-term resistance to insect and disease problems.

  - Edna Mountain Section - Seedtree harvests would reduce the amount of trees susceptible to Douglas-fir bark beetle infestations on approximately 176 acres.
  - Fortine Creek Section - Seedtree harvests would reduce the amount of trees susceptible to Douglas-fir bark beetle infestations on approximately 30 acres. The regeneration harvest in Unit 2 would reduce the potential for a spruce bark beetle outbreak on approximately 32 acres, although mature trees that would be retained along the creek in the RMZ may blow down and maintain a small beetle population for several years.
  - Pinkham Creek Section - The proposed harvests would reduce the amount of trees susceptible to Douglas-fir bark beetle infestations on approximately 275 acres.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Insects and Diseases***

  Overall, the insect infestations and occurrences on the Edna Mountain, Fortine Creek, and Alkali Lake sections are at low levels and populations would continue to rise or fall depending on disturbance events or climatic conditions. The 2005 Camp 32 Fire predisposes the lower Pinkham Creek area to continued bark beetle attacks; sawlog value for the school trusts would not be recovered.

- ***Cumulative Effects of the Action Alternative to Insects and Diseases***

  Overall, the insect infestations and occurrences on the Edna Mountain, Fortine Creek, and Alkali Lake sections are at low levels and populations would continue to rise or fall depending on disturbance events or climatic conditions. The 2005 Camp 32 Fire predisposes the lower Pinkham Creek area to continued bark beetle attacks; some sawlog value would be recovered for the school trusts. Western larch regeneration would be promoted and managed for the long-term, thereby improving resistance to insect and disease problems on those areas being harvested.

FOREST FUELS

EXISTING CONDITIONS

The fire regimes for stands in the Fortine Creek, Alkali Lake, and Pinkham Creek sections are a combination of warm and dry Douglas-fir types and moist Douglas-fir types (*Fisher*). Fire regimes are based on several physiological

attributes (covertypes, habitat types, etc.), and fire regimes are used to discuss the frequency, type, and severity of wildfires, such as mixed-severity and stand-replacement fires. Under natural conditions, the drier sites had more frequent fires than the moister sites, but dense thickets of understory trees would become established, thus increasing the fuel loading until the next fire.

The Edna Mountain Section is primarily a moist subalpine habitat type, where the understory is usually green enough to limit rapid fire spread unless severe conditions persist. The average fire interval is 128 years and fires are often low severity, causing a vegetative mosaic of tree species and age classes; under severe conditions, stand-replacing fires do occur.

Past timber management, fire suppression, and the subsequent stand development have influenced the amount and distribution of fuels on these various stands in the project area. Stands in these sections have developed a high number of stems per acre and several levels of canopy. A fire in forests under these conditions can reach the upper canopy levels through the available ladder fuels, causing torching and, under some conditions, resulting in crown fires.

Units recently harvested in the Edna Mountain and Pinkham Creek sections have met the Montana Hazard Reduction Law standards, reduced ladder fuels, and have retained approximately 15 tons of large woody debris on site to facilitate nutrient cycling for the soils.

ALTERNATIVE EFFECTS TO FOREST FUELS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Forest Fuels***

  Stands would continue to retain ladder fuels and have very high amounts of trees per acre until a disturbance, man-caused or natural, occurs. Risk of torching and crown fires would remain high. As the trees in the more recently harvested areas grow, ladder fuels would increase.

- ***Direct and Indirect Effects of the Action Alternative to Forest Fuels***

  Areas treated with clearcut, seedtree, and shelterwood treatments would retain approximately 10 tons of large woody debris following site-preparation treatments. Fire is always a potential, but the ladder fuels to crowns would be removed in the proposed harvest units and the fuel treatments would limit the fire intensity under most circumstances. The success of aerial and ground attacks on wildfires would likely be improved.

  Areas treated with overstory removals and commercial-thin treatments would have the amount of trees, and thereby fuel loads, reduced. The connectivity of fuel and ladder fuels may not be reduced. In some circumstances, the risk of wildfires may be increased due to an increased amount of wind, drying fuels on the forest floor, and the remaining ladder fuels that have not been significantly reduced.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Forest Fuels***

  In the past 10 years, approximately 50 acres of harvest area in the Edna Mountain Section and 230 acres of harvest area in

the Pinkham Creek Section have had fuels treated to levels meeting Montana's Hazard Reduction Law. USFS has conducted, and is currently conducting, numerous fuels-reduction projects in areas surrounding the Alkali Lake and Pinkham Creek sections. Fuels-reduction projects on USFS and private ownerships played a major role in the successful containment of the 2005 Camp 32 Fire that burned north and west of the Pinkham Creek Section.

- ***Cumulative Effects of the Action Alternative to Forest Fuels***

  In addition to the actions displayed under the *Cumulative Effects of the No-Action Alternative to Forest Fuels*, 800 acres would be harvested and the slash and fuel loading would effectively and efficiently be reduced to meet the Hazard Reduction Law; in many areas of the Wildland Urban Interface, the slash reduction would meet the *High Standards* set forth in the Hazard Reduction Law.

  Due to the location of proposed harvest units, reduced fuel loads, the reduced amount of canopy, and transportation planning, the success of aerial and ground attacks on wildfire would likely be improved.

NOXIOUS WEEDS

EXISTING CONDITION

A noxious weed is defined as a nonnative plant competing with desirable plants for nutrients, water, and sunlight, and is harmful to agriculture, wildlife, forestry, and other beneficial uses, which reduces the value and productivity of the land. Most noxious weeds are exotic species, originating in Eurasia (*Lincoln County Weed-Management Plan*). Montana has declared 15 weeds noxious; Lincoln County has added 10 to their *Noxious Weed Management* list. The following weeds have been located on DNRC ownership and along access routes to the project areas:

- Spotted knapweed (*Centraurea maculosa*)
- St. Johnswort (*Hypericum perforatum*)
- Sulfur cinquefoil (*Potentilla recta*)
- Orange hawkweed (*Hieracium aurantiacum*)
- Oxeye daisy (*Chrysanthemum leucanthemem*)
- Houndstongue (*Gynoglos sum officianle L.*)

The first 5 species listed are Category 1 weeds, which are established weeds with high disbursement; Houndstongue is a Category 2 weed, which is established, but has a moderate disbursement level. These weeds are not new invading weed species to Lincoln County; new invading weed species would be listed as Category 3 weeds.

Currently, limited weed spraying with Tordon is done to control the spread of these weeds along most USFS roads accessing the project area.

ALTERNATIVE EFFECTS TO NOXIOUS WEEDS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Noxious Weeds***

  Populations would likely continue to increase, with the greatest likelihood on segments of roads open to motorized use and the least on those areas with restrictions on motorized use.

  This alternative would not collect funds for the management of noxious-weeds, which would reduce DNRC's ability to treat noxious weeds in this area.

- ***Direct and Indirect Effects of the Action Alternative to Noxious Weeds***

  New infestations (including wooly mullen [*Verbascum thapsus*], which is not classified as a noxious weed) and existing populations are likely to increase with disturbances as road construction, harvesting, and site preparation equipment expose mineral soil. Grass seeding soon after soil disturbances take place would reduce the likelihood of new or increased infestations. The requirement that off-road equipment is thoroughly washed and inspected for weed seed would reduce the likelihood of spotted knapweed and St. Johnswort infestations reaching into the forest.

  DNRC proposes to spray Tordon on those roads in the Alkali Lake Section that would be abandoned. Weeds may continue to occupy sites along these abandoned trails, but, as they become reestablished with trees, their presence would be reduced.

  Money would be collected for the Forest Improvement (FI) fund, which helps fund Stillwater Unit's weed-management program.

Cumulative Effects

- ***Cumulative Effects of the Action and No-Action Alternatives to Noxious Weeds***

  The open roads in the project area have traffic from dispersed recreation, timber-management activities, and other uses on a regular basis. These disturbances and illegal off-road motorized use increase exposure to weed establishment. Over time, the weed-management program at Stillwater Unit, including cooperation with the USFS and weed departments of Flathead and Lincoln counties, has improved. If funding remains available, some of the large populations of weeds in the analysis area would be treated, reducing the current weed populations.

SENSITIVE PLANTS

EXISTING CONDITION

A sensitive-plant survey was conducted on the 4 parcels of the project area by a contracted botanist in the summer of 2005. Edna Mountain was the only section where sensitive plant species were found; 6 species of special concern were located in the wetland complex. This survey information has been submitted to the Montana Natural Heritage Program (MNHP).

Flat-leaved bladderwort (*Utricularia intermedia*) is an aquatic carnivorous plant found associated with the wetland complex in the northwest quarter of the section; in Montana, this plant is ranked as being critically imperiled because of extreme rarity or a factor of its biology makes it especially vulnerable to extirpation.

The other 5 species of concern are present in the section, but are categorized State-wide as having vulnerability to imperiled population levels and include:

- Round-leaved orchis (*Amerorchis rotundifolia)*
- Small yellow lady's slipper (*Cypripedium parviflorum*)
- Beaked spikerush (*Eleocharis rostellata*)
- Tufted club-rush (*Scirpus cespitosus*)
- *Scorpidium scirpoides*

All of the above plant species appear to be vigorous, thriving, and well diffused in their localized habitats. Adverse effects to these populations would include a change in hydrology either by drying or flooding the site. Currently, on State ownership, the outlets of the pond or streams have no obstructions that would potentially increase the water level in the wetland complex. Weed invasion could also adversely

affect the long-term viability of these populations. Noxious weeds are present in the Edna Mountain Section, but are currently on roads outside of the forested areas.

ALTERNATIVE EFFECTS TO SENSITIVE PLANTS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Sensitive Plants***

  Based on natural conditions, the water level of the wetland complex is expected to remain the same; the pond is spring fed, although drought could have an effect on water levels.

  No change is expected in the encroachment of noxious weeds on the habitats of these sensitive plant species since no soil-disturbing activities would occur nearby and no changes to the canopy cover are anticipated.

- ***Direct and Indirect Effects of the Action Alternative to Sensitive Plants***

  The water level of the wetland complex is expected to remain the same based on natural conditions; the pond is spring fed, although drought could have an effect on water levels. No physical changes, such as culvert installations, would occur to stream channels that would cause an increase or decrease in the water-holding capacity of the pond and spring areas.

  No change is expected in the encroachment of noxious weeds on the habitats of these sensitive plant species. A road would be reconstructed approximately 50 feet from the wetland areas associated with the pond, but grass seeding and equipment washing would mitigate the potential for the establishment of noxious weeds. The disturbances to the existing trees, shrubs, and forbs within the wetland complex and area buffering the wetlands would be very minor; therefore, noxious weed populations are not expected to move into those areas. This alternative would collect fees that could be used, in part, to fund measures that monitor and control weeds; this would allow land managers to react to current and future establishments of exotic species near sensitive plant habitat in the project area.

Cumulative Effects

- ***Cumulative Effects of the Action and No-Action Alternatives to Sensitive Plants***

  Cumulative effects are expected to be similar to the combination of the direct and indirect effects. Management actions on Stillwater Unit are being initiated with mitigation measures to prevent the spread of weeds more often than in the past; these actions should reduce the spread of weeds from past levels. In contrast, the amount of dispersed recreation on Stillwater State Forest has increased substantially, which has also allowed an increase in the introduction of weeds to the area. Stillwater Unit's weed management program provides a way to monitor the overall population, identify major problem areas, and treat areas to control populations. Control treatments could prevent future outbreaks of exotic species in sensitive plant habitats.

  Timber harvesting projects initiated on Stillwater State Forest analyze for potential effects to water yield. Mitigation measures are included in the development of projects to reduce increases in water yield that might affect the habitat of sensitive plants.

HYDROLOGY ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the hydrologic resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding water quality, although BMPs and riparian-area protection were expressed as recommendations. The following issue statements were expressed from internal comments regarding the effects of the proposed timber harvesting:

- Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect stream-channel stability.
- Timber harvesting and road-construction activities may increase sediment delivery into streams and affect water quality.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area.

The *ALTERNATIVE EFFECTS* sections disclose the anticipated direct, indirect, and cumulative effects to water resources within the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

The primary concerns relating to aquatic resources within the analysis area are potential impacts to water quality from sources outside, as well as inside, the channel. In order to address these issues, the following parameters are analyzed by alternative:

- Miles of new road construction and road improvements;
- potential for sediment delivery to streams; and
- increases in Equivalent Clearcut Acre (ECA) and annual water yield.

ANALYSIS

ANALYSIS METHODS

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect, and cumulative effects include a field review to look at potential sediment sources from haul routes. Roads were evaluated to determine the potential for sediment introduction to streams.

Water Yield

Water yield will be disclosed as a cumulative effect in the *Existing Conditions* portion of this report because the existing condition is a result of all past harvesting, wildfires, and associated activities. In the *ALTERNATIVE EFFECTS* portion of this report, annual water-yield increases as a result of this *project* will be disclosed as a direct or indirect effect. The cumulative annual water-yield increase for each alternative will be disclosed in the *Cumulative Effects* section.

The water-yield increase for the watershed in the project area was determined using the ECA method as outlined in *Forest Hydrology, Part II (Haupt et al, 1976)*.

ECA is a function of total area roaded, harvested, or burned; percent of crown removed during harvesting or wildfire; and amount of vegetative recovery that has occurred in the harvested or burned areas. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward preharvest water use. ECA condition refers to a portion of a watershed that has an increased

water-yield production potential due to vegetation conditions similar to a clearcut. As vegetative recovery occurs over time, it may take several acres of past harvests or wildfires to equal 1 acre of a watershed in ECA condition.

In order to evaluate the potential effects of annual water-yield increases, a threshold of concern for each watershed was established per Administrative Rules of Montana (*ARM 36.11.423*). Thresholds were established based on evaluating the acceptable risk level, resource value, and watershed sensitivity.

ANALYSIS AREA

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect, and cumulative effects include a field review to look at potential sediment sources from haul routes. Roads were evaluated to determine existing sources of introduced sediment.

Water Yield

The annual water-yield analysis area is described in each individual parcel analysis.

CUMULATIVE EFFECTS

The cumulative effects analysis area is described in each individual parcel analysis.

WATER USES AND REGULATORY FRAMEWORK

WATER-QUALITY STANDARDS

This portion of the Kootenai River basin, including Fortine Creek, Pinkham Creek, and Edna Creek, is classified as B-1 by the DEQ, as stated in *ARM 17.30.607*. The water-quality standards for protecting beneficial uses in B-1 classified watersheds are located in *ARM 17.30.623*. Water in B-1 classified waterways is suitable for drinking; culinary and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life; waterfowl and furbearers; and agricultural and industrial water supply.

State water-quality regulations prohibit any increase in sediment above a naturally occurring concentration in water classified B-1. Naturally occurring means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied. Reasonable land, soil, and water conservation practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. The State of Montana has adopted BMPs through its nonpoint-source management plan as the principle means of meeting Water Quality Standards.

WATER-QUALITY-LIMITED SEGMENTS

Fortine Creek is listed as a water-quality-limited waterbody in the 1996 and 2004 303(d) lists. Fortine Creek is cited in the *Draft 2004 Montana Water Quality Integrated 303(d)/305(b) Report* as partially supporting aquatic life, cold-water fisheries, and primary contact recreation. The 303(d) list is compiled by the DEQ as required by Section 303(d) of the *Federal Clean Water Act* and the *Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130)*. Under these laws, DEQ is required to identify waterbodies that do not fully meet water-quality standards or where beneficial uses are threatened or impaired.

STREAMSIDE MANAGEMENT ZONE (SMZ) LAW

All rules and regulations pertaining to the SMZ Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater then 35 percent.

An SMZ width of 50 feet is required when the slope is less than 35 percent.

WATER RIGHTS AND BENEFICIAL USES

Water rights for surface water exist downstream of each parcel as shown in *TABLE* III-1 - *WATER RIGHTS WITHIN 3 MILES DOWNSTREAM OF THE OLD HIGHWAY TIMBER SALES PARCELS* below.

TABLE III-1 - WATER RIGHTS WITHIN 3 MILES DOWNSTREAM OF THE OLD HIGHWAY TIMBER SALE PARCELS

PARCEL	WATERBODY NAME	BENEFICIAL USES PRESENT
Edna Mountain	Unnamed tributary of Deep Lake	Stock watering
	Deep Lake	Stock watering
	Unnamed tributary of Fortine Creek	Stock watering
Fortine Creek	Fortine Creek	Industrial
	Unnamed tributary of Fortine Creek	Stock watering
Alkali Lake	Alkali Lake	Stock watering
	Unnamed tributary of Alkali Lake	Fish/wildlife
	Unnamed tributary of Tobacco River	Stock watering
Pinkham Creek	Pinkham Creek	No water rights present for beneficial uses

➢ Edna Mountain Parcel

ANALYSIS AREA

The annual water-yield and cumulative-effects analysis areas for the Edna Mountain parcel consists of 2 small watersheds, Dudley Slough and Deep Lake, both tributaries of Fortine Creek. Both watersheds are low gradient and dampen the effects of runoff prior to Fortine Creek.

EXISTING CONDITION

The State parcel is located within the 2 small watersheds of Deep Lake and Dudley Slough. Both watersheds are characterized by low-gradient channels with sloughs and pothole lakes that retain runoff and dampen the effects of high flows. Eventually, both watersheds drain to Fortine Creek.

In the Deep Lake watershed, which is approximately 2,000 acres, water draining within and adjacent to the State section is not within defined channels and most of the runoff evaporates or goes subsurface, except for the springs and channels that flow north. A series of freshwater springs feed an approximate 1-acre pothole lake near the center of this parcel. From this pothole lake, water flows off the section towards the north in 2 separate channels (*DNRC, 1994*). Both channels contribute to Deep Lake and, eventually, to Marl Lake through intermittent channels. The eastern-most of these channels has been impacted by road construction and channel alteration on private land immediately downstream of the State parcel. The impacted portion of this channel is contributing sediment to the watershed from the road surface and near vertical, unvegetated banks.

The Dudley Slough watershed is a second-order intermittent watershed containing approximately 1,560 acres and drains southeast from the State parcel. No defined channels exist within the State parcel that contributes surface flow to this watershed.

Roads within the State parcel are generally grassed-over, low-standard roads. No stream crossings were inventoried during field reconnaissance and no direct

sediment delivery from roads was identified.

CUMULATIVE EFFECTS OF PAST AND CURRENT ACTIONS

Land ownership is mostly nonindustrial private, followed by State trust lands, F.H. Stoltze Land and Lumber Company, and USFS. Aerial photo interpretation suggests that most of the Deep Lake watershed had been harvested during the 1900s. In addition, slab piles are evidence of timber harvesting on DNRC-managed land. After using aerial photos to identify timber harvest units and estimate crown removal on all ownerships, the cumulative annual water-yield increase is estimated at 6.6 percent over a fully forested condition.

DESCRIPTION OF PROPOSED ACTION RELATED TO SEDIMENT DELIVERY AND WATER YIELD IN THE EDNA MOUNTAIN PARCEL

- ***No-Action Alternative***

  No timber harvesting or associated activities would occur.

- ***Action Alternative***

  Approximately 203 acres would be harvested using conventional ground-based equipment. A seedtree prescription would be implemented on 176 of the acres, and the remaining 27 acres would be commercially thinned.

  Approximately 1,800 feet of existing road would be reconstructed and 350 feet of temporary road would be constructed and obliterated following harvesting. All haul roads would have maintenance and minor drainage improvements installed as necessary to meet BMPs.

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELD IN THE EDNA MOUNTAIN PARCEL

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  No direct or indirect effects to sediment delivery would be expected.

- ***Direct and Indirect Effects of the Action Alternative***

  Approximately 178 ECA would be generated in 2 watersheds. The majority of the ECA, approximately 170, would be generated in the Deep Lake watershed, and the remaining 8 ECA would be generated in Dudley Slough watershed. The expected water-yield increase for the Deep Lake watershed would be estimated at 3.2 percent. The water-yield increase for the Dudley Slough watershed would be less than 0.5 percent.

  Because BMPs would be employed during timber harvesting and no stream crossings are proposed, a low risk of sediment delivery from sources outside the channel would result from the implementation of this alternative. Due to the low risk of increased sediment from in-stream sources and the low risk of sediment delivery from sources outside the channel, DNRC expects a low risk of impacts to water quality and beneficial uses.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative***

  No additional cumulative effects would be expected from the implementation of this alternative.

- ***Cumulative Effects of the Action Alternative Parcel***

  Cumulative annual water-yield increases are estimated to be 9.8 percent over fully forested conditions. The pothole lake in the center of the section would dampen any increase and maintain a low risk of additional in-stream erosion downstream of the project area. No measurable cumulative annual water-yield increase would be expected in the Dudley Slough watershed from the implementation of this alternative.

  By maintaining cumulative water-yield increases below the threshold of concern, DNRC expects a very low risk of additional cumulative effects to water quality from this alternative.

➢ Fortine Creek Parcels

ANALYSIS AREA

The water yield and cumulative effects analysis area for the Fortine Creek parcels is the Fortine Creek watershed. Due to the large watershed size in relation to the small scale of the proposed action, potential effects may be dampened. However, because the creek divides the State parcel, the logical analysis area is the entire watershed. Where possible, the Lower Fortine watershed area will be used to produce more definable impacts where they may exist.

EXISTING CONDITION

The Fortine Creek parcels are both located in Section 36, T35N, R26W. The main parcel in this section is comprised of 160 acres divided north to south by the railroad tracks; the parcel is further divided by Fortine Creek. Harvesting occurred in this parcel in 1994 as a salvage permit.

Fortine Creek is a 161,000-acre watershed that generally flows south to north before joining with Grave Creek to form Tobacco River. Fortine Creek meanders through this parcel as a relatively low-gradient stream. Channel stability in this reach is considered to be fair due to the unvegetated vertical banks present at outcurves and the low rock content of the lower and upper banks. The limited rock content in the banks makes the stream susceptible to in-stream erosion from high flows.

The smaller parcel is a 40-acre area in the southwest corner of the section with a small, unnamed stream that runs south to north through a field on private land after leaving State-managed lands and contributes surface flow to Fortine Creek during most of the year. This stream is well entrenched with grass-covered banks.

Roads within the State parcels are limited to low-standard forest roads in the main parcel generally located away from streams. One historical stream crossing on Fortine Creek exists on the main parcel. This crossing is a ford that appears to have been heavily used during the early 1900s. Most likely after Highway 93 was constructed, use of this crossing nearly stopped altogether. During field reconnaissance, no sediment delivery from roads was noted in the Fortine Creek parcels except at the crossing that historically forded Fortine Creek.

CUMULATIVE EFFECTS OF CURRENT AND PAST ACTIONS

As part of the Upper Kootenai Subbasin Review (UKSR) completed by KNF in 2002, the Lower Fortine watershed (approximately 39,000 acres) was estimated to have 9 percent in an ECA condition. The entire Fortine Creek watershed was

estimated to have 21 percent in an ECA condition. While the percent of the watershed in an ECA condition is not a direct measurement of water-yield increase, it helps describe the condition of the watershed. As described in the *UPPER KOOTENAI SUJBBASIN REVIEW* (UKSR), when the ECA condition is greater that 15 percent of the watershed area, further analysis may be appropriate. Due to the size of the watershed and the limited amount of State-managed land within the watershed, including the Edna Mountain parcel, cumulative effects from water yield would not be measurable and, therefore, further analysis is not necessary.

Description of Alternatives

- ***No-Action Alternative***

  No timber harvesting or associated activities would be implemented. Sediment delivery to Fortine Creek would likely continue from the ford location.

- ***Action Alternative***

  Approximately 146 acres would be harvested using conventional ground-based methods. Winter logging would be required on approximately 88 acres.

  Approximately 0.55 miles of new road would be constructed; 0.4 miles would be abandoned or obliterated, including the ford location, and 0.5 mile of temporary snow road would be constructed. In addition, about 1.4 miles of existing road would be maintained and have minor drainage improvements installed to meet current BMPs.

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELD IN THE FORTINE CREEK PARCELS

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  No timber harvesting or related activities would occur. The sediment delivery to Fortine Creek from the ford would continue.

- ***Direct and Indirect Effects of the Action Alternative***

  A majority of the timber would be harvested during frozen and/or snow-covered conditions due to the landtypes present and the proximity to Fortine Creek. This would reduce the potential for soil disturbance. In addition, the nearly flat topography of the units near Fortine Creek would limit the potential for sediment transport.

  Along Fortine Creek, an RMZ of 100 feet on each side of the creek would have limited timber harvesting, as follows:

  - from the ordinary high-water mark to 25 feet, no harvesting; and
  - from 25 feet to 100 feet, harvesting of up to 50 percent of the trees 8 inches dbh or greater.

  The harvest prescription in the RMZ would also maintain a majority of the shrubs and merchantable/submerchantable trees, which would keep a live root mass to help armor streambanks from erosive flows.

Cumulative Watershed Effects

- ***Cumulative Effects of the No-Action Alternative***

  Sediment delivery to Fortine Creek from the ford would continue. No additional cumulative effects would be expected.

- ***Cumulative Effects of the Action Alternative***

  Sediment delivery from the ford across Fortine Creek would be reduced due to the restoration and obliteration of that segment of road. No additional crossings would be constructed. Therefore, a very low risk of additional sediment delivery would result from roads.

  Timber harvesting along Fortine Creek would be implemented during the winter with frozen and/or snow-covered conditions. Timber harvesting under these conditions typically results in very low soil disturbance (see *SOILS ANALYSIS)*. Because of the low potential for soil disturbance and the flat topography limiting the potential for sediment transport efficiency, the risk of additional cumulative effects to water quality and beneficial uses from sediment delivery associated with timber harvesting operations would be low.

➢ **Alkali Lake Parcel**

ANALYSIS AREA

The water-yield and cumulative-effects analysis areas for the Alkali Lake parcel consists of 4, small watersheds—Alkali Lake, Lost Lake, Rock/Long Lake, and an unnamed tributary to Tobacco River.

EXISTING CONDITION

The Alkali Lake parcel is a relatively low elevation (2,750 to 3,200 feet) section of trust land with no scoured stream channels, although the U.S. Geographic Survey (USGS) topographic map identifies intermittent channels on the section. A review of the landtype topography indicates that surface drainage features are not common on gentler slopes (*Kuennen and Gerhardt, 1984*). Runoff from the State parcel is split between 4 small watersheds, although it is unlikely that surface water travels any substantial distance before percolating into the soil. Average annual precipitation in these watersheds is approximately 20 inches per year. Several small seasonal ponds and wetlands exist with varying periods of surface water. Alkali Lake is the largest body of water within the section and is located in the southwest corner.

Approximately 9.5 miles of road exists in the State parcel. Most are low-standard, native-surface roads used primarily by recreationists for hunting and camping. Most roads have no surface drainage installed and are generally rutted to varying degrees. Although these roads do not meet current BMPs, the general lack of streams limits the potential for water-quality problems from road sediment.

CUMULATIVE EFFECTS OF PAST AND CURRENT PRACTICES

Past harvesting and clearing for roads in the State parcel and surrounding ownerships have not resulted in defined, scoured stream channels from annual water-yield increases. Because the gentle topography, well-drained soils, and the stratification of the parcel into 4 watersheds have maintained a lack of defined stream channels on the State parcel, cumulative impacts from water yield are not measurable.

DESCRIPTION OF PROPOSED ACTIONS RELATED TO SEDIMENT DELIVERY

- ***No-Action Alternative***

  No timber harvesting or associated activities would be implemented.

- ***Action Alternative***

  Approximately 175 acres would be harvested using conventional ground-based equipment. A seedtree prescription would be implemented on 137 acres, while the remaining 38 acres would be commercially thinned.

  Approximately 0.25 mile of new road would be constructed and approximately 5.5 miles of road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Approximately 3.3 miles of road would be abandoned or obliterated.

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELD IN THE ALKALI LAKE PARCEL

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  Recreationists would continue to use the extensive road system in this section. Because of the lack of scoured stream channels and stream crossings, delivery of sediment to waterbodies would not likely change.

- ***Direct and Indirect Effects of the Action Alternative***

  A reduction in road miles would result from the abandonment and obliteration of roads. The remaining roads would be improved to meet current BMPs as required in *ARM 36.11.422*. Because none of the roads are located near water and the proposed 0.25 mile of new road construction would not be located near a stream or lake, no adverse direct or indirect to water quality or beneficial uses from sediment delivery would be expected.

  The timber harvest would generate approximately 150 ECA, divided into the 4 watersheds. Three of the four watersheds (Lost Lake, Rock/Long Lake, and an unnamed tributary to the Tobacco River) would each receive less than 15 ECA. The fourth watershed (Alkali Lake) would receive approximately 100 ECA.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative***

  No additional cumulative effects would be expected.

- ***Cumulative Effects of the Action Alternative***

  Due to the gentle topography, the current lack of defined streams, and the low annual average precipitation, a very low risk of adverse cumulative effects would result from annual water-yield increases. The low risk of cumulative effects includes a very low potential for developing scoured channels.

➢ PINKHAM CREEK PARCEL

ANALYSIS AREA

The analysis area for water yield and cumulative effects for the Pinkham Creek parcel is the Pinkham Creek watershed. Due to the large watershed size in relation to the small scale of the proposed action, potential effects may be dampened. However, because the creek divides the State parcel, the logical analysis area is the entire watershed. Where possible, the Lower Pinkham Creek watershed area will be used to help define potential impacts where they exist.

HYDROLOGY ANALYSIS

EXISTING CONDITION

Pinkham Creek is, approximately, a 50,000-acre watershed that flows in a general south-to-north direction before turning west and entering Koocanusa Reservoir. Pinkham Creek is perennial through the State-managed parcel, but generally is dry during the late summer months near Camp 32, which is located approximately 1 mile downstream of the State parcel.

During August 2000, the Lydia and Stone Hill wildfires burned substantial acreage in the Pinkham Creek watershed. Prior to the 2000 fire season, subdrainages in the Pinkham Creek watershed were in relatively good condition (*U.S. Department of Agriculture [USDA] Forest Service, 2001*). With the majority of the streams in the Pinkham drainage classified as a Rosgen 'B' channel, negative effects such as channel widening, aggradation, degradation, or increased bank erosion are less likely to occur during a natural disturbance or emulation of a natural disturbance. During August 2005, the Camp 32 Fire burned a small portion of the Pinkham Creek watershed. No measureable impacts are expected from this fire because of the limited area burned within the watershed (*Price, personal communication*).

Within the State parcel, porous soils allow water to infiltrate and become subsurface before reaching Pinkham Creek, making sediment transport unlikely (*DNRC, 1995*)

Roads within the State-managed parcel are generally low standard and located in areas that are not conducive to sediment delivery, such as benches well away from streams. One exception to the location of roads away from streams is an old 2-track road, which accesses the north side of Pinkham Creek and is used primarily by recreationists. Due to the steep grade of the road and the proximity to the creek, sediment-delivery potential from this short segment is considered moderate.

CUMULATIVE EFFECTS OF PAST AND CURRENT ACTIONS ON WATER YIELD

The Pink Stone Fire Recovery Project, implemented by Kootenai National Forest's Rexford Ranger District, identified the response reaches in the Pinkham Creek watershed. Response reaches were identified because they are the most sensitive to disturbances such as wildfire or management practices. Maximum peak flow increases (pfi) were recommended as part of the Pink Stone Fire Recovery Project to protect the identified response reaches. The maximum pfi recommended by USFS for the entire Pinkham Creek drainage (approximately 50,000 acres), including the State parcel, is 13 percent. The peak flow increase for Pinkham Creek after the 2000 fires and subsequent salvage harvest was estimated at 11 percent over fully forested conditions.

The percent of the Lower Pinkham Creek watershed (approximately 31,000 acres) in an ECA condition was estimated at 17 percent as part of the *USKR* completed by the KNF in 2002 (*USFS 2002*). The entire Pinkham Creek was estimated to have 21 percent of the drainage area in an ECA condition. While the percent of the watershed in an ECA condition is not a direct measurement of water-yield increase, it helps describe the condition of the watershed. As described in the *USKR*, when the ECA condition is greater that 15 percent of the watershed area, further analysis may be appropriate.

Taking into account the precipitation, aspect, and elevation in the Pinkham Creek watershed, DNRC estimates that over 1,200 acres of ECA would be needed to increase the annual water yield by 1 percent. Because the State only manages 640 acres in the watershed, the potential for a measurable increase in water yield or adverse impacts from water-yield increases is low and will not be further discussed in this analysis.

DESCRIPTION OF PROPOSED ACTIONS RELATED TO SEDIMENT DELIVERY AND WATER YIELD IN THE PINKHAM CREEK DPARCEL

- ***No-Action Alternative***

  No timber harvesting or associated activities would be implemented.

- ***Action Alternative***

  Approximately 275 acres would be harvested using a combination of conventional ground-based equipment and cable systems.

  Approximately 1.0 mile of new road would be constructed and 4.6 miles of forest road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Approximately 1.3 miles of road would be abandoned or obliterated.

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELD IN THE PINKHAM CREEK PARCEL

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  Potential sediment sources would remain in the State parcel, with a moderate risk of sediment delivery to Pinkham Creek.

- ***Direct and Indirect Effects of the Action Alternative***

  Potential sediment sources from roads would be reclaimed. Reclamation activities could result in a short-term potential for sediment delivery; however, this potential could likely be mitigated with a sediment fence. Minor drainage improvements, such as drain dips, would result in reduced surface erosion from roads.

  Approximately 225 ECA would be generated on this parcel from timber harvesting. This ECA generation would increase the water yield by less than 1 percent and likely result in no measurable stream channel adjustments. No harvest units would be located within 100 feet of any perennial stream. Because of the location of harvest units away from streams and the inclusion of BMPs into the project design, as required by *ARM 36.11.422 (2)*, sediment from timber harvesting would have a low risk of entering streams in the project area; therefore, no adverse direct or indirect effects to water quality or beneficial uses would result.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative***

  The potential for sediment contribution from the 2-track road would still exist; however, no additional cumulative effects would be expected.

- ***Cumulative Effects of the Action Alternative***

  A low risk of additional measurable adverse cumulative effects to the Pinkham Creek watershed would result because BMPs would be incorporated into the project design and timber-harvesting activities would be

located away from perennial stream channels. A reduction in the potential for sediment entering Pinkham Creek would be realized from rehabilitation of the 2-track road; however, this reduction would not likely be measurable.

SOILS ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding soil productivity. The following issue statement was expressed from internal comments regarding the effects of the proposed timber harvesting: Timber harvesting activities may result in reduced soil productivity due to compaction and displacement, depending on the area and degree of the harvesting effects.

ANALYSIS

ANALYSIS AREA

The analysis areas for soils are the proposed harvest units in the State parcels described as follows:

- Pinkham Creek Parcel - Section 36, T36N, R28W
- Alkali Lake Parcel - Section 36, T36N, R27W
- Fortine Creek Parcels - E½NW¼, Section 36, T35N, R26W; W½NE¼, Section 36, T35N, R26W; SW¼SW¼, Section 36, T35N R26W
- Edna Mountain Parcel - Section 16, T34N, R26W

These analysis areas will adequately allow for disclosure of the existing conditions and direct, indirect, and cumulative impacts.

ANALYSIS METHODS

Soil productivity will be analyzed by evaluating the geology/soils in the analysis areas, current levels of soil disturbance in the proposed project area, and anticipated impacts from each alternative. While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.

EXISTING CONDITIONS

GEOLOGY

The majority of the bedrock in the Kootenai area consists of slightly metamorphosed sedimentary rocks formed from sand, silt, clay, and carbonate materials in the great shallow Belt Basin during the Precambrian time. These sediments were compressed and cemented into sedimentary rocks. These sedimentary rocks were metamorphosed by heat and pressure so that sandstone became quartzite, siltstone became siltite, and shale became argillite.

Since the Precambrian time, glaciation in northwestern Montana occurred. The Cordilleran Ice Sheet was estimated to cover approximately 70 percent of KNF. This glacial activity coupled with alpine glaciation strongly influenced the location and character of surface material in the area. Some areas were scraped down to bedrock, while other areas received deposits of gravel, glacial till, and glacial lake silts. Other influences on surface materials are attributed to volcanic ash from Mount Mazama and other smaller eruptions (*USFS, 1984*).

LANDTYPES

Landtypes in the analysis area were mapped during the inventory of KNF. Eight landtypes are present in the analysis areas described earlier. A brief description of the landtypes, soils, and their locations can be found in *TABLE III-2 - GENERAL SOIL DESCRIPTIONS*.

TABLE III-2 - GENERAL SOIL DESCRIPTIONS

SOIL DESCRIPTION					MANAGEMENT IMPLICATIONS			
LAND TYPE	GENERAL SETTING	SUBSOILS	SURFACE SOILS	SEASON OF USE	PARCELS AFFECTED	TIMBER	ROADS	COMMENTS
102	Flat to undulating lacustrine terraces in valley bottoms Slope: 0-15% Elevation: 2000-3700′	Light gray silt loam 15-30 inches thick	Dark yellowish-brown silt loam 7-12 inches thick formed in volcanic ash-influenced loess	Very limited	Alkali Lake and Fortine Creek	Potential productivity: High to very high Equipment: Tractor Regeneration: Frost heaving can be a problem to regeneration success.	Poorly suited. Bearing strength is low. Cutslopes slump readily. Surfaces are dusty when dry.	Operating on dry, frozen, or snow-covered ground to maintain soil productivity can mitigate compaction of the surface layer.
105	Poorly drained floodplains and alluvial lands in valley bottoms Slope: 0-10% Elevation: 2000-4500′	Pale brown very gravelly sandy loam 15-30 inches thick	Dark yellowish-brown silt loam 4-6 inches thick formed in volcanic ash-influenced loess	Very limited	Fortine Creek	Poorly suited due to high water table. Equipment: Tractor Regeneration: Frost pockets may limit success.	Poorly suited due to high water table.	Operations on frozen ground can mitigate compaction potential.
201	Steep, rocky slopes along streams. Slope: 60+% Elevation: 2400-4800′	Light gray to pale brown, very stoney or extremely stony sandy loam 5-15 inches thick	Brown, stony very fine sandy loam surface layer 2-6 inches thick	Longer than average due to rock	Pinkham Creek	Poorly suited due to limited timber stands. Equipment: Cable, helicopter Regeneration: Limited due to droughtiness	Poorly suited due to nonrippable rock and steep slopes, which limit excavation.	Rock outcrops can cover as much as 50% of the landtype.
251	Steep, rocky slopes Slope: 60+% Elevation: 2500-3800′	Dark yellowish-brown very gravelly sandy loam 5-20 inches thick	Reddish-brown gravelly silt loam 7-10 inches thick	Longer than average due to rock	Pinkham Creek	Potential productivity: Low to moderate Equip: Cable or helicopter Regeneration: Low potential due to shallow rocky soils	Poorly suited due to nonrippable rock and steep slopes that limit excavation.	Rock outcrops can cover as much as 50% of the landtype.
322	Low-relief rolling foothills Slope: 15-35% Elevation: 2500-4500′	Reddish-brown gravelly silty clay loam 10-20 inches thick	Dark reddish-brown silt loam 7-12 inches thick formed in volcanic ash-influenced loess	Average	Edna Mountain	Well suited to timber management Potential productivity: High to very high Equipment: Tractor Regeneration: Average potential	Moderately suited to road construction, although cutbanks tend to slump and bearing strength is low.	Operating on dry, frozen, or snow-covered conditions helps to maintain soil productivity.

TABLE III-2 - GENERAL SOIL DESCRIPTIONS (CONTINUED)

SOIL DESCRIPTION					MANAGEMENT IMPLICATIONS			
LAND TYPE	**GENERAL SETTING**	**SUBSOILS**	**SURFACE SOILS**	**SEASON OF USE**	**PARCELS AFFECTED**	**TIMBER**	**ROADS**	
324	Low-relief rolling hills with shallow alkali lakes. Slope: 15-35% Elevation: 2500-4000'	Calcareous light yellowish-brown very gravelly silt loam	Pale brown silt loam	Average	Pinkham Creek Alkali Lake Fortine Creek	Potential productivity: Moderate Equip: Tractor Regeneraton: May be limited by moisture stress and solar insolation. Limey subsoils can restrict tree rooting.	Well suited to road construction, although revegetation may be difficult.	
328	Rounded, rolling mid-elevation ridges and valleys. Slope: 15-35% Elevation: 3000-4500'	Very gravelly silt loam formed in dense glacial till	Reddish-brown silt loam 7-12 inches thick formed in volcanic ash-influenced loess	Average	Edna Mountain	Potential productivity: Moderate to high Equipment: Tractor Regeneration: Brush limitation in some habitat types	Well suited to road construction with standard techniques.	Operating on dry, frozen, or snow-covered conditions helps to maintain soil productivity.
329	Rolling, convex ridges Slope: 15-35% Elevation: 3000-5000'	Very gravelly silt loam formed in dense glacial till.	Brown silt loam 7-12 inches thick formed in volcanic ash-influenced loess	Average	Edna Mountain	Potential productivity: Moderate Equipment: Tractor Regeneration: Average potential	Well suited to road construction with standard techniques. Nonrippable bedrock exists in some areas.	Operating on dry, frozen, or snow-covered conditions helps to maintain soil productivity.

CUMULATIVE EFFECTS FROM PAST AND CURRENT USES

Currently, DNRC strives to maintain soil productivity by limiting cumulative soil impacts to 15 percent or less of a harvest area, as noted in the State Forest Land Management Plan (*DNRC 1996 [SFLMP]*). As a recommended goal, if existing detrimental soil effects exceed 15 percent of an area, proposed harvesting should minimize any additional impacts. Harvest proposals on areas with existing soil impacts in excess of 20 percent should avoid any additional impacts and include restoration treatments, as feasible, based on site-specific evaluation and plans. Past monitoring on DNRC timber sales from 1988 to 2003 has shown an average of 13.9 percent soil impacts (*DNRC 2004*).

Cumulative effects from past and current uses on these parcels are limited to skid trails, roads, and off-road trails made by vehicles. In general, past harvesting operations during the 1940s utilized dispersed skidding patterns to harvest trees for railroad ties. While many of these skid trails and roads are still discernable, vegetation similar to the surrounding vegetation is present and growing. Through the freeze-thaw cycles and root masses penetrating the soil, impacts from entries during the 1940s are generally ameliorated. Because of the dispersed skidding and approximately 60 years of freeze-thaw cycles, cumulative detrimental impacts to soils in these parcels is estimated to be less than 10 percent of the analysis areas.

In addition to the general cumulative impacts described above, the Alkali Lake parcel has several 2-track roads that are used by recreationists. Many of these roads are rutted and have little or no vegetation to minimize erosion.

DESCRIPTION OF ALTERNATIVES AS RELATED TO SOIL ISSUES

- ***No-Action Alternative***

  No timber harvesting or associated activities would occur.

- ***Action Alternative***

  - **Edna Creek Parcel**

    Approximately 203 acres would be harvested using conventional ground-based equipment. Harvest may be completed during summer or winter conditions.
    Approximately 1,800 feet of existing road would be reconstructed and 350 feet of temporary road would be constructed and obliterated following harvesting. All haul roads would have maintenance and minor drainage improvements installed as necessary to meet BMPs.

  - **Fortine Creek Parcels**

    Approximately 145 acres would be harvested using conventional ground-based methods. Winter logging would be required on approximately 50 acres; the remaining may be completed during summer or winter conditions.
    Within the State ownership, approximately 0.75 miles of road would be reconstructed; 0.3 miles of new road would be constructed, and 0.4 miles would be abandoned/obliterated, including the ford location on Fortine Creek. If DNRC receives an easement across private ownership to the south of the 160-acre parcel, an additional 0.25 mile of new road would be constructed. To access proposed Unit 2, an 800-foot temporary snow road would be constructed across a hay meadow.

- **Alkali Lake Parcel**

  Approximately 175 acres would be harvested using conventional ground-based equipment. Harvest may be completed during summer or winter conditions.

  Approximately 0.25 mile of new road construction and approximately 5.5 miles of road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Approximately 3.3 miles of road would be abandoned or obliterated.

- **Pinkham Creek Parcel**

  Approximately 180 acres would be harvested using conventional ground-based equipment and 95 acres would employ cable systems. Harvesting may be completed during summer or winter conditions. Approximately 1.0 miles of new road would be constructed and approximately 4.6 miles of forest road would be maintained or have minor drainage improvements installed, as necessary, to meet BMPs. Approximately 1.3 miles of road would be abandoned or obliterated.

ALTERNATIVE EFFECTS TO SOIL PRODUCTIVITY

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Soil Productivity***

  No timber harvesting or associated activities would occur. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases.

- ***Direct and Indirect Effects of the Action Alternative to Soil Productivity***

  The majority of the area proposed for harvesting has been harvested in the past using ground-based harvesting methods. In order to limit cumulative impacts, existing skid trails would be used if they are properly located and adequately spaced. By reusing existing skid trails and mitigating the direct and indirect effects with soils moisture restrictions, season of use, and method of harvest, the risk of detrimental long-term impacts to soil productivity would be low.

  TABLES III-3 through *TABLE III-6* exhibit the expected impacts to soil from compaction and displacement if:

  - The season of operation is during the summer and fall, except for the estimated 50 acres of required winter operation in the Fortine parcels.
  - Trafficked areas of skid trails and landings are restricted to 20 percent of the harvest units.
  - Summer harvesting restricts harvest-equipment operation to periods of 20 percent or less soil moisture at 6 inches below the soil surface.

  Due to the compaction and displacement impacts to the soil, as shown in the tables above, DNRC would expect a reduction in soil productivity from the action alternative on the displayed acres. As vegetation begins to establish on the impacted areas and freeze-thaw cycles occur, the area of reduced productivity would decrease. Therefore, direct effects to long-term soil productivity in the project area would be considered acceptable.

  Across all parcels in the project, approximately 1.8 miles of new road would be constructed,

TABLE III-3 - EXPECTED ACRES OF IMPACTS TO SOIL IN THE EDNA MOUNTAIN PARCEL

HARVEST METHOD	ACTION ALTERNATIVE
Ground-based[1]	30.5
Cable[2]	0
Total impacted acres	30.5
Total harvest acres	203
Percent area impacted	15.0

[1]75 percent of the summer ground-based skid trails may exhibit impacts.
[2]10 percent of the cable ground may exhibit impacts.

TABLE III-4 - EXPECTED ACRES OF IMPACTS TO SOIL IN THE FORTINE CREEK PARCELS

HARVEST METHOD	ACTION ALTERNATIVE
Ground-based[1]	14.3
Ground-based[2] (winter harvest only)	3.0
Cable[3]	0
Total impacted acres	17.3
Total harvest acres	145
Percent area impacted	11.9

[1]75 percent of the summer ground-based skid trails may exhibit impacts.
[2]Impacts from winter ground-based skid trails are estimated at 6 percent after reviewing impacts on similar soils.
[3]10 percent of cable ground may exhibit impacts.

TABLE III-5 - EXPECTED ACRES OF IMPACTS TO SOIL IN THE ALKALI LAKE PARCEL

HARVEST METHOD	ACTION ALTERNATIVE
Ground-based[1]	26
Cable[2]	0
Total impacted acres	26
Total harvest acres	175
Percent area impacted	15.0

[1]75 percent of the summer ground-based skid trails may exhibit impacts.
[2]10 percent of the cable ground may exhibit impacts.

TABLE III-6 - EXPECTED ACRES OF IMPACTS TO SOIL IN THE PINKHAM CREEK PARCEL

HARVEST METHOD	ACTION ALTERNATIVE
Ground-based[1]	27
Cable[2]	9.5
Total impacted acres	36.5
Total harvest acres	275
Percent area impacted	13.3

[1]75 percent of the summer ground-based skid trails may exhibit impacts.
[2]10 percent of the cable ground may exhibit impacts.

removing this ground from timber production. In addition, approximately 6.3 miles of road would be abandoned/obliterated.

Additional mitigation measures to maintain long-term soil productivity can be found at the end of this document.

CUMULATIVE EFFECTS OF ACTIVITIES ON SOIL PRODUCTIVITY

Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15 percent of harvest units through implementation of BMPs, skid trail planning on tractor unit, and limiting operations to dry or frozen conditions. Future harvest opportunities would likely use the same road system, skid trails, and landing sites to reduce additional cumulative impacts. Large woody debris would be retained for nutrient cycling for long-term soil productivity.

The abandoned/obliterated roads would be returned to timber production as the impacts from compaction ameliorate over time.

FISHERIES ANALYSIS

INTRODUCTION

This analysis is designed to disclose the existing condition of the fisheries resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following issues were expressed regarding the effects of the proposed timber harvesting: Timber harvesting and road construction activities may affect fish habitat by increasing sediment delivery to streams and decreasing levels of recruitable large woody debris.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery on fish habitat in the project area and the amount of woody debris available preharvest and postharvest.

ANALYSIS

ANALYSIS AREA

Sediment Delivery

The analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes in-channel and upland sources of sediment that could result from this project.

Woody-Debris Recruitment

The analysis area for woody debris is the portion of the State parcels that are adjacent to fish-bearing streams.

CUMULATIVE EFFECTS

The cumulative effects analysis area for sediment delivery is limited to the harvest units and roads used for hauling. Included are in-channel and upland sources of sediment that could result from this project.

ANALYSIS METHODS

Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline, disclosing the expected changes due to the alternatives proposed.

Sediment Delivery

The analysis methods for sediment delivery will mimic those used in *HYDROLOGY ANALYSIS*.

Woody-Debris Recruitment

The analysis method for woody-debris recruitment will employ vegetative inventory plots taken during 2005. The existing inventory will then be modeled for changes due to the proposed alternative prescriptions. Because Fortine Creek is the only parcel that would be affected with harvesting proposed within 100 feet of a stream, analysis will not be conducted on the other parcels involved in this timber sale proposal.

EXISTING CONDITION

This proposal includes timber harvesting and associated activities on 5 parcels located in 4 sections near Eureka and Fortine, Montana. ***TABLE III-7 - FISH SPECIES PRESENT IN STREAMS WITHIN EACH PARCEL*** *(following page)* exhibits each parcel and its associated stream(s) and likely fish presence.

TABLE III-7 - FISH SPECIES PRESENT IN STREAMS WITHIN EACH PARCEL

PARCEL	LEGAL DESCRIPTION	STREAM/WATERBODY	FISH SPECIES PRESENT
Pinkham Creek	Section 36, T36N, R28W	Pinkham Creek	Rainbow/cutthroat hybrid[1] Brook trout[1]
Alkali Lake	Section 36, T36N, R27W	Alkali Lake	Rainbow trout[2] Arctic grayling[2] Brook trout[2] Westslope cutthroat trout[2]
Fortine Creek	SW¼SW¼, Section 36, T35N, R26W	Unnamed tributary to Fortine Creek	Unknown
Edna Mountain	Section 16, T34N, R26W	Unnamed tributary to Deep Lake	Unknown

[1]*Pink Stone Fire Recovery Environmental Impact Statement*
[2]*Natural Resource Information System*

SEDIMENT DELIVERY

Potential sediment sources from roads and stream crossings were identified during field reconnaissance. All sediment sources identified as part of the existing condition can be found in *HYDROLOGY ANALYSIS*.

WOODY-DEBRIS RECRUITMENT

To delineate the RMZ, as required by *ARM 36.11.425 (5)*, site potential tree heights were determined along Fortine Creek. Using regional index curves, the site potential tree height for a 100-year-old tree is estimated at 96 feet. Trees used to determine the site potential tree height ranged in age from 50 to 90 years old and from 59 to 97 feet tall. In addition to the RMZ delineation, riparian cruise plots were taken during 2005 to estimate the size and number of trees within the RMZ.

The number of trees per acre ranged up to 1,230 in the riparian cruise plots. The dbh of trees in each plot ranged up to 23 inches, although the majority of the trees have a dbh of less than 6 inches. The average trees per acre with a dbh greater than or equal to 8 inches are estimated to be 170, with a range up to 320 trees of this size per acre.

The 'effective tree height' is defined by *Robinson and Beschta (1990)* as that part of the tree height that would provide woody debris of a minimum diameter to a stream. The minimum size assumed to be effective for this project is 10 centimeters in diameter and 3 meters in length. After averaging the existing tree heights and diameters, the effective tree height for the Fortine Creek parcel is approximately 50 feet.

DESCRIPTION OF PROPOSED ACTIONS RELATED TO SEDIMENT DELIVERY AND LARGE WOODY DEBRIS

- ***No-Action Alternative***

  No timber harvesting or associated activities would occur under this alternative.

- ***Action Alternative***

  - **Edna Mountain Parcel**

    Under the Action Alternative, approximately 203 acres would be harvested using conventional ground-based equipment. Harvesting could be completed during summer or winter conditions.

Approximately 1,800 feet of existing road would be reconstructed, and approximately 350 feet of temporary road would be constructed and obliterated following harvesting. All haul roads would have maintenance and minor drainage improvements installed as necessary to meet BMPs.

- **Fortine Creek Parcels**

Under the Action Alternative, approximately 145 acres would be harvested using conventional ground-based methods. Winter logging would be required on approximately 90 of these acres. The remaining acres could be harvested during summer or winter conditions.

Within the State ownership, approximately 0.75 mile of road would be reconstructed, 0.3 mile of new road would be constructed, and 0.4 miles of road would be abandoned/obliterated, including the ford location on Fortine Creek. If DNRC receives an easement across private ownership to the south of the 160-acre parcel, an additional 0.25 miles of new road would be constructed. To access proposed Unit 2, an 800-foot temporary snow road would be constructed across a hay meadow.

- **Alkali Lake Parcel**

Under the Action Alternative, approximately 175 acres would be harvested using conventional ground-based equipment. Harvesting could be completed during summer or winter conditions.

Approximately 0.25 mile of new road construction is associated with this alternative. In addition, approximately 5.5 miles of road would be maintained or have minor drainage improvements installed as necessary to meet BMPs. Approximately 3.3 miles of road would be abandoned or obliterated.

- **Pinkham Creek Parcel**

Under the Action Alternative, approximately 275 acres would be harvested using conventional ground-based equipment and cable systems. Harvesting could be completed during summer or winter conditions.

Approximately 1.0 miles of new road would be constructed as part of this alternative. In addition, about 4.6 miles of forest road would be maintained or have minor drainage improvements installed, as necessary, to meet BMPs. Approximately 1.3 miles of road would be abandoned or obliterated.

ALTERNATIVE EFFECTS TO FISHERIES

This section discloses the anticipated indirect, direct, and cumulative effects to fisheries within the affected environment from proposed actions. Past and current activities on all ownerships, as well as future planned State actions, within the analysis areas described above have been taken into account for the cumulative effects analysis.

The primary concerns relating to fisheries within the affected environment are potential impacts to water quality from sources outside and inside the channel and adequate large-woody-debris recruitment. In order to address these issues, the following parameters are analyzed by alternative:

- miles of new road construction and new stream crossings on fish-bearing streams;
- the potential for sediment delivery to streams; and

- changes in recruitable woody debris.

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Fisheries***

Sediment Delivery

Under this alternative, no timber harvesting or related activities would occur. Potential sediment sources that currently exist would remain.

Large-Woody-Debris Recruitment

No timber harvesting would occur in riparian zones under this alternative; therefore, changes to riparian stands would be dictated by natural events.

- ***Direct and Indirect Effects of the Action Alternative to Fisheries***

Sediment Delivery

➢ **Edna Mountain Parcel—**

If the Action Alternative were selected for implementation, approximately 178 ECA would be generated in 2 watersheds. The majority of the ECA, approximately 170, would be in the Deep Lake watershed, and the remaining 8 ECA would be generated in the Dudley Slough watershed. The expected annual water-yield increase for the Deep Lake watershed would be estimated at 3.2 percent. The annual water-yield increase for the Dudley Slough watershed would be less than 0.5 percent. Because the annual water-yield increases would not likely be measurable, a low risk of increased in-stream sediment would result.

Because BMPs would be employed during timber harvesting and no stream crossings are proposed, a low risk of sediment delivery from sources outside the channel would result from the implementation of this alternative. Due to the low risk of increased sediment from in-stream sources and the low risk of sediment delivery from sources outside the channel, DNRC expects a low risk of impacts to fisheries from sediment.

➢ **Fortine Creek Parcels**

Due to the size of the Fortine Creek watershed in relation to the proposed harvest in these parcels, a measurable annual water-yield increase would not likely occur. Therefore, only a very low risk of increased in-stream sediment would result.

A majority of the timber would be harvested during frozen and/or snow-covered conditions due to the landtypes present and the proximity to Fortine Creek. This would reduce the potential for soil disturbance. In addition, the nearly flat topography of the units near Fortine Creek would limit the potential for sediment transport.

Along Fortine Creek, an RMZ of 100 feet each side of the creek would have limited timber harvesting as follows:

- from the ordinary high-water mark to 25 feet, no harvest;
- from 25 feet to 100 feet, harvest up to 50 percent of trees 8 inches dbh or greater.

The harvest prescription in the RMZ would also maintain a majority of the shrubs and merchantable/submerchantable trees, which would maintain a live root mass to help armor streambanks from erosive flows. Sediment delivery from roads would likely decrease because the ford on Fortine Creek would be rehabilitated and BMPs would be incorporated into all haul roads.

Because the topography is generally flat, harvesting would be restricted to frozen and/or snow-covered conditions, and increases in annual water yield would not likely be measurable, only a low risk of increased sediment delivery would result from this alternative. For this reason, DNRC expects a low risk of impacts to fisheries from sediment.

- **Alkali Lake Parcel**

Due to the gentle topography, current lack of defined streams, and low annual average precipitation, DNRC does not expect the timber harvest to result in annual water-yield increases that would produce scoured channels.
Under the Action Alternative, a reduction in road miles would result from the abandonment and obliteration of roads. The remaining roads would be improved to meet current BMPs as required in *ARM 36.11.422*. Because no roads are located near water and the proposed 0.25 mile of new road construction would not be located near a stream or lake, a very low risk of adverse direct or indirect effects to water quality or beneficial uses, such as cold-water fisheries, from sediment delivery would be expected.

- **Pinkham Creek Parcel**

If this alternative were selected, potential sediment sources from roads would be reclaimed. Reclamation activities could result in a short-term potential for sediment delivery. This potential could likely be mitigated with a sediment fence. Minor drainage improvements, such as drain dips, would result in reduced surface erosion from roads.

Approximately 225 ECA would be generated on this parcel from timber harvesting. This ECA generation would increase the water yield by less than 1 percent and likely result in no measurable stream channel adjustments.
No timber harvest units would be located within 100 feet of a perennial stream. Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)*, sediment from timber harvesting would not be expected to enter streams.

Because of the limited potential for sediment delivery from in-stream and out-of-channel sources, a low risk of direct and indirect impacts to fisheries would result from the implementation of this alternative.

Large-Woody-Debris Recruitment on the Fortine Creek Parcel

Under the Action Alternative, the 100-foot RMZ prescription along Fortine Creek would include (1) no harvesting for the first 25 feet immediately adjacent to the stream channel; and, (2) the next 75 feet would have up to 50 percent of the trees 8 inches dbh and larger harvested.

With the average effective tree height at approximately 50 feet, the majority of the woody-debris recruitment would come from this distance from the stream. After implementation of the Action Alternative, approximately 93 trees per acre with a dbh of 8 inches or greater would remain as available woody debris. This would be a reduction from approximately 170 trees per acre. *Bower (2004)* analyzed large-woody-debris data from reference reaches on KNF and found that channels similar to Fortine Creek have a mean large woody debris concentration of 46 pieces per

1,000 feet of stream channel, although wider channels tend to retain fewer pieces of wood.

Because all recruitable woody debris within 25 feet of Fortine Creek would be maintained and at least 50 percent of the recruitable woody debris would be maintained in the remainder of the recruitable area, DNRC expects the prescription to retain adequate recruitable woody debris for fisheries habitat. More information can be found in the project file.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Fisheries***

  No timber harvesting or road construction is associated with this alternative. Existing sediment sources would continue to contribute sediment to streams until remedial action were implemented or natural healing occurs.

- ***Cumulative Effects of the Action Alternative to Fisheries***

  Sediment Delivery

  - **Edna Mountain**

    In the Edna Mountain parcel, cumulative annual water-yield increases would be estimated at 9.8 percent over fully forested conditions. Because of the dampening effect of the pothole lake in the center of the section, the cumulative annual water-yield increase would be expected to remain below the threshold of concern. No measurable cumulative annual water-yield increase would be expected in the Dudley Slough watershed. By maintaining cumulative water-yield increases below the threshold of concern, DNRC expects a very low risk of additional cumulative effects to fisheries resources from this alternative.

  - **Fortine Creek**

    A very low risk of in-channel increases in sediment due to cumulative annual water-yield increase would result from the implementation of the action alternative.
    Sediment delivery from the ford across Fortine Creek would be reduced due to the restoration and obliteration of that segment of road. No additional crossings would be constructed. Therefore, the risk of additional cumulative impacts to sediment from roads would be very low.
    Timber harvesting along Fortine Creek would be implemented during the winter with frozen and/or snow-covered conditions. Timber harvesting under these conditions typically results in very low soil disturbance (see *SOILS ANALYSIS)*. Because of the low potential for soil disturbance and flat topography limiting the potential for sediment transport efficiency, the risk of additional cumulative effects to sediment delivery from timber-harvesting operations would be expected to be low.

    Because of the risk of sediment delivery from the cumulative annual water-yield increase, road locations and timber harvesting would be low; therefore, the risk of cumulative effects to fisheries from sediment delivery would be low.

  - **Alkali Lake**

    In the Alkali Lake parcel, due to the gentle topography, current lack of defined streams, and low annual average precipitation, DNRC does not expect the timber harvesting to result in water-yield increases

that would produce scoured channels. Therefore, no cumulative impacts to fisheries from sediment would be expected.

- **Pinkham Creek**

No additional adverse cumulative effects to the Pinkham Creek watershed would be measurable from the implementation of this alternative because: (1) cumulative annual water-yield increase would remain below the threshold expected to increase in-stream erosion, and (2) timber-harvesting activities would be located away from perennial stream channels. A reduction in the potential for sediment entering Pinkham Creek would be realized from rehabilitation of the two-track road; however, this reduction would not likely be measurable. Because the implementation of this alternative would result in a low risk of sediment delivery from each of these variables, collectively, the risk of cumulative effects to fisheries resources would be low.

Large-Woody-Debris Recruitment on the Fortine Creek Parcel

While some past timber harvesting has removed recruitable large woody debris, this has been taken into account as part of the riparian cruise plots for the existing condition. Therefore, additional cumulative effects to recruitable woody debris would include a reduction in the available woody debris due to timber harvesting. After reviewing the plot data collected during 2005 and modeling the Action Alternative for recruitment, DNRC expects remaining recruitable woody debris to be an adequate amount to maintain fisheries habitat.

Because large woody debris would be expected to be adequate and the risk of adverse cumulative impacts from sediment delivery would be low, the cumulative risk to fisheries would be low.

ECONOMIC ANALYSIS

METHODS

The analysis will include estimates of costs, revenues, and returns; these estimates are intended for the relative comparison of alternatives and are not intended for use as absolute estimates of return. The stumpage value was estimated to equal the delivered log prices minus costs. Costs include estimated development, logging, hauling, and FI payments. Stumpage prices from recent local sales were also considered as an indication of the current market. The *Montana Sawlog and Veneer Log Price Report*, based on July through September 2005 data, was used for estimating the delivered price of the logs.

Easements and access to DNRC-managed State ownership will view how the road cost-share program is calculated and the effects of having shared easements.

EXISTING CONDITION

Based on past study, 20 to 35 percent of the economy of Flathead County can be attributed to the woods-products industry (*The Role of the Wood Products Industry in the Economy of Flathead County, Montana, an Estimate of the Effects on Total Employment Using Input-Out Analysis, Beckly 1994*). Current log prices on the market are average with the outlook contingent on housing starts and how Canadians are able to market their timber (*personal communication with Paul Engelman, DNRC Forest Economist*). DNRC does not yet have permanent legal access to the Pinkham Creek or Alkali Lake sections or the 40-acre parcel on the Fortine Creek Section in the southwest quarter of Section 36, T35N, R26W.

ALTERNATIVE EFFECTS

DIRECT EFFECTS

- ***Direct Effects of the No-Action Alternative to Economics***

  As displayed in *TABLE III-8 - COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE,* revenue from the project area would not be realized at this time.

  Access rights to DNRC ownership would not change.

- ***Direct Effects of the Action Alternative to Economics***

  As displayed in *TABLE III-8 - COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE,* an estimated $1,120,140 in revenue would be deposited into the Common School trust and an estimated $95,550 would be deposited into the FI account. Approximately $67,120 of road development and maintenance work would be accomplished. An estimated $105,000, or $130/acre, would be spent from the FI budget to reduce fire hazards and prepare harvested areas for natural and planted regeneration.

  DNRC would purchase permanent road easements on approximately 5.0 miles of road through the Federal Road Cost-Share Program and approximately 0.3 miles of road through the State Reciprocal Access Program. In part, costs are based on the proportional amount of property accessed by those roads, the market value of the property within the right-of-way, and the current cost of the road. Easement payments and maintenance are usually made from the FI budget. Participating parties share in road management and maintenance costs.

ECONOMIC ANALYSIS

TABLE III-8 - COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE

	ALTERNATIVES	
	NO-ACTION	ACTION
Estimated total harvest volume (mmbf)	0	4.9
Road development costs ($/mbf)		13.70
Estimated stumpage value ($/mbf)		228.60
FI fee ($/mbf)		19.50
Estimated stumpage value, FI, and development cost ($/mbf)		261.80
Total timber-dollar value based on estimated stumpage value, FI, and road-development value, multiplied by the estimated harvest volume.	0	1,282,820
Estimated stumpage value and FI ($/mbf)		248.10
Total revenue ($) to the State (stumpage value and FI)	0	1,215,690
Total revenue ($) to the Common Schools trust (stumpage value)	0	1,120,140

INDIRECT EFFECTS

- ***Indirect Effects of the No-Action Alternative to Economics***

  Local mills may not be able to substitute the potential loss of logs that would not be generated from this alternative. School funding would not benefit from this alternative. The value of DNRC ownership would remain similar due to unchanged access rights.

- ***Indirect Effects of the Action Alternative to Economics***

  Local loggers and mills would likely harvest and receive the logs from this project, thereby benefiting the industry and employment levels. This alternative would provide some funding for the Common Schools trust. The value of these DNRC-managed lands would increase due to increased access rights.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative on Economics***

  DNRC has a State-wide sustained-yield annual harvest goal of 53.2 mmbf. If this project were not sold, this volume could come from sales elsewhere; however, the timber may be from other areas and not benefit this region of the State. This forest area would again be available for harvesting considerations.

- ***Cumulative Effects of the Action Alternative on Economics***

  This sale is planned to be a portion of the annual harvest of 53.2 mmbf of timber from Montana's forested trust lands. The net revenue from this sale would contribute to the Common Schools trust.

WILDLIFE ANALYSIS

INTRODUCTION

The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the project area. This includes the large carnivores often displaced by human disturbance, such as grizzly bears (*Ursus arctos*) and gray wolves (*Canus lupus*). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or occur in lower abundance due to the decline of these elements across the landscape. Within the vicinity of the project area, the forests are a mosaic of mature stands, which benefit species relying on mature forests, and regenerating forests, which benefit wildlife species that use early seral stages either exclusively or seasonally. Additionally, portions of the project area are found near open habitats, including grasslands and hay fields, and a variety of wetlands and riparian habitats.

The parcels range from 2,760 to 4,280 feet in elevation; the State sections vary from steep slopes to rolling hills to relatively flat areas and face most all aspects. Over time, due to fire suppression and continued timber stand management, tree densities have increased and shade-tolerant species, such as Douglas-fir, have become more prevalent than they were historically. These departures probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats. Past timber harvesting has likely reduced the quality and quantity of snags and coarse woody debris compared to historical conditions, thus, reducing habitat for those wildlife species that require these components.

ANALYSIS

ANALYSIS AREA

In this section the discussions will focus on 2 areas of different scale. The first will be the "project area", which consists of the State parcels listed in *TABLE III-9 - GENERAL DESCRIPTION OF STATE SECTIONS USED AS THE PROJECT AREA*. The second scale or the "analysis area" relates to the surrounding landscape for assessing cumulative effects. The scale of this analysis area varies according to the species being discussed, but generally approximates the size of the home range of the discussed species. In the cumulative-effects analysis area, prior and reasonably foreseeable future State actions and existing conditions on adjacent ownerships were considered and discussed. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by either alternative.

TABLE III-9 - GENERAL DESCRIPTION OF STATE SECTIONS USED AS THE PROJECT AREA

NAME	LEGAL DESCRIPTION	APPROXIMATE ACRES	ELEVATION (FEET)	PREDOMINANT COVERTYPES OR TREE SPECIES
Fortine Creek	Section 36, T35N R26W	200	2,920 to 3,160	Western larch/Douglas-fir, Engelmann spruce
Alkali Lake	Section 36, T36N R27W	640	2,760 to 3,200	Douglas-fir, western larch/Douglas-fir
Pinkham Creek	Section 36, T36N, R28W	640	2,840 to 3,600	Western larch/Douglas-fir, ponderosa pine
Edna Mountain	Section 16, T34N, R26W	640	3,600 to 4,280	Western larch/Douglas-fir, mixed conifer

WILDLIFE ANALYSIS

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a 'coarse-filter approach', which favors an appropriate mix of stand structures and compositions on State lands (*ARM 36.11.404*). Appropriate stand structures are based on ecological characteristics (e.g., landtype, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species will persist and biodiversity will be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape.

DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a "fine-filter approach" for threatened, endangered, and sensitive species (*ARM 36.11.406*). The fine-filter approach focuses on a single species' habitat requirements.

The existing conditions and effects analyzed for the coarse-filter analysis will be discussed first; then, the existing conditions and effects of the project on individual species will be discussed for the fine-filter analysis.

To assess the existing condition of the project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, MNHP data, and consultations with other professionals provided information for the following discussion and effects analysis. Specialized methodologies are discussed under the species in which they occur.

EXISTING CONDITION

COARSE-FILTER ASSESSMENT

➢ Mature Forested Habitats and Landscape Connectivity

Mature to old stands are typically ecologically diverse, and a number of wildlife rely on the various attributes of these for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus*), American martens (*Martes americana*), brown creepers (*Certhia americana*), and winter wrens (*Troglodytes troglodytes*). The project area contains approximately 1,595 acres of mature stands (100+ years in age) of reasonably closed-canopy Douglas-fir/western larch, Douglas-fir, mixed-conifer, and ponderosa pine stands. These stands are interspersed with Douglas-fir/western larch, mixed-conifer, and Douglas-fir stands of varying ages and stocking densities within the project area.

Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or other animals that prosper in edge habitats. Currently, forested areas cover much of the project area, facilitating use by those species requiring interior forested conditions. However, the network of open roads through the project area has fragmented the forested habitats and increased human disturbance.

Alternative Effects to Mature Forested Habitats and Connectivity

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high amounts canopy cover. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. Habitat for forested interior species and old-stand-associated species, such as American marten, northern goshawk (*Accipiter gentilis*), and pileated woodpecker, would likely improve with this alternative; however, western larch, a preferred snag species, could decline in abundance over time.

- ***Direct and Indirect Effects of the Action Alternative***

  Approximately 799 acres of western larch/Douglas-fir, Douglas-fir, and mixed-conifer stands would be harvested to varying degrees. As indicated in *VEGETATION AND TIMBER STAND ANALYSIS*, 2 adjacent stands in the Pinkham Creek Section meet the DNRC old-growth definition and 14 acres are included in proposed Unit 15. Proposed treatments would lead to younger, more-open stands on approximately 799 acres, which could disrupt movement by some species requiring extensive, connected forested habitats; however, some connectivity would persist along riparian areas and through the untreated stands deferred on this entry. The resultant changes in stand age and density would likely reduce habitats for species associated with older stands, such as American marten and pileated woodpeckers, which benefited from the increases in stand ages and densities caused by modern fire suppression. In general, habitat conditions would improve for species adapted to the more open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative***

  Habitats in the analysis area are a mosaic of habitat types and age classes. Past harvesting has reduced the amount of mature forested habitats. This alternative would continue to contribute to the mature forested stands in the vicinity. No appreciable changes in overall stand age or landscape connectivity would be expected. Additionally, areas harvested in the past will start developing characteristics of the mature forest stand through time. Species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests that are presently using portions of the analysis area would be expected to continue.

- ***Cumulative Effects of the Action Alternative***

  Reductions in mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities across all ownerships. Within the general vicinity, forested habitats would still exist and landscape

connectivity would largely persist. Habitat for species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be reduced on the landscape; however, continued use by these species, if present, would be expected given the mosaic of available habitats.

➢ Snags and Coarse Woody Debris

Existing Condition

Snags and coarse woody debris are important components of the forested ecosystems. The following are 5 primary functions of deadwood in the forested ecosystems:

1) increase structural diversity,
2) alter canopy microenvironment,
3) promote biological diversity,
4) provide important habitat for wildlife, and
5) act as a storehouse for nutrient and organic matter recycling agents (*Parks and Shaw 1996*).

Snags and defective trees (partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of northern Rocky Mountain forests for wildlife species (*Heijl and Woods 1991*). The quantity, quality, and distribution of snags affect the presence and population size of many of the wildlife species utilizing these resources. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites for a variety of birds and mammals. Coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food-storage sites for several wildlife species. Small mammals, such as red-backed voles (*Cethrionomys gapperi*), to large mammals, such as black bears (*Ursus americanus*), rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their capacity to meet these life requisites. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles provide foraging sites for weasels and denning sites for Canada lynx.

During field visits, 0 to 8 variably spaced snags per acre and differing quantities of coarse woody debris were observed in the project area. The snags and coarse woody debris in the project area exhibit the range of sizes and decay classes, ranging from small to large and sound to almost fully decayed.

Alternative Effects to Snags and Coarse Woody Debris

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative***

  No direct changes in the deadwood resources would be expected. Snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. However, in the long-term, densities of shade-intolerant trees and resulting snags would decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Coarse woody

debris would persist without other disturbances influencing distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area.

- ***Direct and Indirect Effects of the Action Alternative***

  Present and future deadwood material could be reduced during timber harvesting. Several snags and snag recruits would be planned for retention within the proposed units; however, some of this material could be lost due to safety and operational concerns. On approximately 94 acres proposed for cable-based logging systems, snags would be largely removed due to human safety concerns. Based on data collected by the USFS Lolo National Forest, an estimate of snag loss during harvesting activities ranged from 50 to 100 percent (*Hillis 1993*). Recent DNRC monitoring indicates a similar loss of snags, with a greater percentage being lost in the medium-size classes than other size classes. Snag loss could continue after the project, especially along open roads in portions of the project area. Future snag quality would be enhanced with silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species. Some coarse woody debris may be lost with associated mechanized activities, and new coarse-woody-debris recruitment would be expected with the proposed activities.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative***

  Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition. Snags have been retained during some of the past harvesting on adjacent ownerships. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area.

- ***Cumulative Effects of the Action Alternative***

  Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Across the analysis area, snags have been retained during some past harvesting. Additionally, snags and coarse woody debris exist in some of the mature stands in the analysis area. The loss of snags and coarse woody debris associated with this alternative would be additive to the loss associated with past harvesting and any firewood gathering occurring in the analysis area. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area despite the reduction in availability of this resource.

FINE-FILTER ASSESSMENT

In the fine-filter analysis, individual species that are recognized to be of special concern are evaluated. These species are addressed below and include Federally "threatened" or "endangered" species, species listed as "sensitive" by DNRC, and species managed as "big game" by DFWP.

Threatened and Endangered Species

In northwestern Montana, the bald eagle, grizzly bear, and Canada lynx are classified as "Threatened" under the Endangered Species Act of 1973. Meanwhile, the gray wolf is listed as "Endangered" under this same act.

➢ **Bald Eagle *(Haliaeetus leucocephalus)***

Existing Condition

Bald eagles are diurnal raptors associated with significant bodies of water, such as rivers, lakes, and coastal zones. The bald eagle diet consists primarily of fish and waterfowl, but includes carrion, mammals, and items taken from other birds of prey. In northwestern Montana, bald eagles begin the breeding process with courtship behavior and nest building in early February; the young fledge by approximately mid-August, ending the breeding process. Preferred stand characteristics for nesting sites include large emergent trees that are within sight distances of lakes and rivers and screened from disturbance by vegetation.

Strategies to protect the bald eagle are outlined in the *Pacific States Bald Eagle Recovery Plan* (*United States Fish and Wildlife Service [USFWS] 1986*) and the *Montana Bald Eagle Management Plan* (*Montana Bald Eagle Working Group 1994*). Management direction involves identifying and protecting nesting, feeding, perching, roosting, and wintering/migration areas (*USFWS 1986, Montana Bald Eagle Working Group 1994*).

At least 5 bald eagle nests are located in the vicinity of the project area. Known nests are located at Sinclair Creek (1.5 miles from the Alkali Lake Section), Lick Creek (1.9 miles from the Alkali Lake Section), Frank Lake (2.5 miles from the Alkali Lake Section), Black Lake (1.4 miles from the Fortine Creek Section), and Murphy Lake (2.4 miles from the Fortine Creek Section). All of these nest territories have been active for at least 3 years, and have successfully produced chicks (the range of 3-year averages is 1.0 to 1.7 chicks per year). Due to the spatial arrangement of these nests in proximity to the State parcels, both the Fortine Creek and Alkali Lake parcels occur entirely in the overlapping home ranges associated with these territories. Although there has been no confirmed nesting on the State parcels, some use of the project area could occur. Since the Edna Mountain and Pinkham Creek parcels are outside of the overlapping home ranges, bald eagles will not be considered further on these parcels. The Fortine Creek parcel provides access to Fortine Creek, which could be used for foraging. Additionally, foraging areas exist in and around the Alkali Lake parcel, where numerous waterbodies and wetlands support a host of waterfowl. Both sections contain appreciable big game winter range, which can provide seasonal food sources in carrion.

Cumulative effects were analyzed using a combination of field evaluations and aerial photograph interpretations on the bald eagle home ranges around the nest locations. Factors considered within this analysis include disturbance levels and availability of large, emergent

trees with stout horizontal limbs for nests and perches. Approximately 55,853 acres are in the combined home ranges for these 5 bald eagle nests; DNRC manages approximately 959 acres, while the bulk of the land is either in private ownership (29,916 acres) or USFS-managed lands (23,137 acres).

Alternative Effects to Bald Eagles

Direct and indirect effects

- ***Direct and Indirect Effects of the No-Action Alternative to Bald Eagles***

  No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels.

- ***Direct and Indirect Effects of the Action Alternative on Bald Eagles***

  No harvesting would occur within the nest or primary-use areas. Proposed timber harvesting of approximately 320 acres in 19 units that fall within the home range would reduce forested canopy. Of this area, 145 acres on the Fortine Creek parcel have a number of emergent trees and occur in close proximity to potential foraging habitats along Fortine Creek. Operating-season restrictions (winter logging) proposed in Units 2, 3, and 4 of the Fortine Creek parcel would largely restrict operations to the nonnesting period, which would further eliminate conflicts should eagles be using the area. The remaining 175 acres proposed on the Alkali Lake Section are near foraging habitats and support some emergent trees. No operating-season restrictions are required for Unit 1 in the Fortine Creek Section or any of the units in the Alkali Lake Section; however, suggested mitigation measures of operating during the autumn or winter period would have the least potential for disturbing bald eagles using the areas (*ARM 36.11.429[1][e][ii]*). While proposed activities are occurring, eagles could be displaced; however, displacement is only expected to affect eagles during the harvesting activities and not beyond. Reducing the forested component in these stands decreases the probability of bald eagle use since disturbance would be expected to increase with increased sight distances. Leave trees could be used in the future as nest or perch trees as the stands develop around them.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Bald Eagles***

  Disturbance associated with ongoing human development and timber harvesting would be occurring within the analysis area and may likely be increased on the privately managed parcels. Emergent trees exist on USFS and privately managed parcels on portions of the home ranges, although clearing and development have already reduced the availability of these features within the privately managed portions of the home ranges. Concurrently, no other DNRC activities are planned that would increase human disturbance, development, recreation, timber harvesting, or firewood gathering within the home ranges.

- ***Cumulative Effects of the Action Alternative on Bald Eagles***

  The proposed activities on 320 acres would be expected to have minor effects on the larger home ranges. No other DNRC activities are planned within the home ranges. Therefore, modification of eagle habitat

would not be expected beyond the effects discussed above. Continued recreational use of the lakes and ponds in the vicinity could affect nesting eagles. Continued development on privately owned parcels would likely reduce availability of large, emergent trees for nesting and perching while increasing levels of human disturbance within the home ranges. Potential nesting and perching trees would be expected to persist in the analysis area on USFS-managed parcels and, to a lesser degree, on privately managed parcels. Continued use of the nesting territories would be expected.

➢ Grizzly Bear (*Ursus arctos*)

Existing Condition

The project area lies outside of the grizzly bear recovery zones, but would be within 'occupied' habitat, which was identified by grizzly bear researchers and managers as areas that are having increased grizzly bear sightings and encounters. Habitats for grizzly bears generally follow available food while maintaining isolation from humans. Preferred grizzly bear habitats are meadows, low elevation riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. Within the project area, primary habitat components include big game winter range and low-elevation riparian areas.

Managing human access would be a major factor in management for grizzly bear habitat. Open-road densities in the project area are high (4.06 miles per square mile; the range for individual parcels are 1.33 to 8.36 miles per square mile). Additionally, open-road densities in the vicinity have been reported above suitable thresholds (the Pinkham Creek drainage is 2.27 miles per square mile; *USDA Forest Service 2001*). Cumulative effects were analyzed on a 47,683-acre area that approximated a female grizzly bear home range. Within this analysis area, the majority of lands are either USFS-managed lands (23,802 acres) or privately owned lands (20,687 acres). Hiding cover would be available in both the project and analysis areas. Some use of the analysis area by grizzly bears would be likely, and several sightings of grizzly bears occur in the analysis area each year.

Alternative Effects to Grizzly Bears

Direct and indirect effects

- ***Direct and Indirect Effects of the No-Action Alternative on Grizzly Bears***

  No direct effects to grizzly bears would be expected. Displacement and disturbance would be similar to present conditions. No changes in road densities or hiding cover would be anticipated. Over time, as succession advances, foraging habitats could decline.

- ***Direct and Indirect Effects of the Action Alternative on Grizzly Bears***

  Grizzly bears could be directly affected through increased road traffic, noise, and human activity, and indirectly affected by altering the amount of hiding cover and forage resources. Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on nearly all 799 acres with the proposed harvesting. Hiding cover would be especially important along open roads and in areas that receive human disturbance; both are factors in the project area. Losses of hiding cover would be mitigated by the relatively

small size of the proposed units (only 3 units are greater than 40 acres). Hiding cover in the harvested units would be expected to regenerate in 5 to 10 years. Short-term forage production would be expected to increase with harvesting and its associated site preparation.

Road densities during the project activities would be temporarily elevated above current levels. In the long-term, the minor changes in road status would have marginal effect on the open-road densities and, subsequently, would have marginally beneficial effects to grizzly bears, although road densities in the project area would still be rather high (3.10 miles per square mile; the range for individual parcels is 1.23 to 5.89 miles per square mile).

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Grizzly Bears***

  Motorized access to the area and hiding cover would remain unchanged. Reductions in hiding cover associated with USFS harvesting within the Camp 32 Fire perimeter would further reduce hiding cover in the near term. In the long term, forest succession would continue and may reduce food sources, but may increase the amount of hiding cover in the analysis area. Level of use by grizzly bears in the future would be similar to present levels.

- ***Cumulative Effects of the Action Alternative on Grizzly Bears***

  The increased use of road systems during the proposed project would temporarily increase human disturbance to grizzly bears within this portion of the analysis area. Open-road densities would temporarily increase at the project level and then would be slightly lower after completion; at the analysis-area level, negligible changes to open-road densities would occur during or after the proposed activities. Reductions in hiding cover would be additive to the reductions due to past harvesting on adjacent ownerships and planned harvesting within the Camp 32 Fire perimeter on USFS lands; however, hiding cover exists within the analysis area. Early successional stages of vegetation occurring on harvest units would provide foraging opportunities that do not exist in some mature stands. Continued use of the analysis area would be anticipated at the present levels, roughly.

➢ **Gray Wolf (*Canus lupus*)**

Existing Condition

The Murphy Lake wolf pack regularly uses an area that includes the Edna Mountain, Fortine Creek, and Alkali Creek sections. The 3 components of wolf habitat are: 1) a sufficient, year-round source of big game and alternative prey, 2) suitable and somewhat secluded denning and rendezvous sites, and 3) sufficient space with minimal exposure to humans (*USFWS 1987*). Wolves are opportunistic predators of deer and elk, which are both known to use the project area.

Typically, wolves in Montana den in late April. Wolves are most vulnerable to human disturbance at den and rendezvous sites. No den or rendezvous sites occur in the project area; however, den and rendezvous sites have been documented as close as 4 and 5 miles, respectively. Additional rendezvous sites likely exist in the vicinity and, potentially, in the project area; use of rendezvous sites can be somewhat

short-lived and, in any given year, utilization of numerous rendezvous sites is common for wolves. Landscape features frequently associated with these sites that are common in portions of the project area include areas with big game winter range, year-round big game habitats, hiding cover, numerous meadows and other openings, and are generally on gentle terrain. Wolves may be using the project area for hunting, breeding, and other life requirements.

Cumulative effects were analyzed on the portion of the Murphy Lake Pack 2004 home range that falls within the United States. The home range of this pack includes lands in Canada; however, for the cumulative effects analysis we will only focus on the 146,039 acres (approximately 85 percent of the Minimum Convex Polygon home range for 2004) that fall within the United States. Considerable big game winter range, year-round big game habitats, numerous meadows and other openings near water, and areas on gentle terrain exist in the home range. DNRC manages, roughly, 5,767 acres within this home-range area; the majority of the home range occurs on lands managed by USFS (65,522 acres, approximately 45 percent) and private ownerships (72,865 acres, approximately 50 percent).

Alternative Effects to Gray Wolves

Direct and indirect effects

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

  Disturbance to wolves would not increase. No changes in white-tailed deer habitat would be expected during the short-term; therefore, no changes in wolf prey would be anticipated. Wolf use of the project area would be expected to continue at current levels.

- ***Direct and Indirect Effects of the Action Alternative on Gray Wolves***

  Wolves using the area could be disturbed by harvesting activities and are most sensitive at den and rendezvous sites. No den or rendezvous sites are known in the project area; however, given the proximity to these known features, either den or rendezvous sites could appear in the project area during the duration of the proposed project. Should either of these features be documented in the project area, activities would be halted until wolves vacated the area or activities were deemed to not conflict with wolf use (*ARM 36.11.430[1][a]* and *[b]*). After harvesting activities, wolf use of the project area for potential denning and rendezvous sites would likely revert to preharvest levels. In the short term, the proposed harvest units would be expected to lead to a decrease in winter thermal cover and an increase in big game forage. The reduction in thermal cover could result in local decreases in big game abundance during the winter months, which could alter wolf use of the project area.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Gray Wolves***

  White-tailed deer winter range would not be affected and substantive change in white-tailed deer population, distribution, or habitat use would not be anticipated. Levels of human disturbance would be expected to remain similar to present levels. No appreciable effect to known denning and rendezvous sites would be expected. No other DNRC forest-management

activities are proposed within the Murphy Lake Pack home range. No substantive changes in big game use and, subsequently, gray wolf use of the home range would be expected.

- ***Cumulative Effects of the Action Alternative on Gray Wolves***

  Some slight shifts of big game use could occur. Reductions in cover may cause slight decreases in use by deer and elk; however, no appreciable changes would be expected within the analysis area. No appreciable effects to known denning and rendezvous sites would be expected. Landscape connectivity would largely persist at roughly present levels. Reductions in cover within the project area would be additive to existing openings from past timber-harvesting activities. Human-disturbance levels would be expected to revert to levels similar to current levels after the proposed harvesting and roads would again be closed. Wolves would be expected to continue using the home range in the long term.

➢ **Canada Lynx (*Lynx canadensis*)**

Existing Condition

Canada lynx are associated with subalpine fir forests generally between 4,000 to 7,000 feet in elevation in western Montana (*Ruediger et al. 2000*). The project area ranges from approximately 2,760 to 4,280 feet in elevation and is dominated by Douglas-fir/western larch, mixed-conifers, and ponderosa pine. Lynx habitat in western Montana consists primarily of young coniferous forests with plentiful snowshoe hares, mature subalpine fir/Engelmann spruce stands with abundant coarse woody debris for denning and cover for kittens, and densely forested cover for travel and security. Additionally, the mature forests provide habitat for red squirrels, an alternative prey source for lynx. Historically, high intensity, stand-replacing fires of long fire intervals (40 to 200 years) within continuous forests of lodgepole pine, subalpine fir, and Engelmann spruce maintained a mosaic of ideal snowshoe hare and lynx habitat.

Lynx are poor competitors with other predators and are rarely found on ungulate winter ranges, presumably because low snow loads allow use of the area by many other predators, such as bobcats, coyotes, and mountain lions. These predators are able to outcompete and prey upon lynx (*Buskirk et al. 2000*). Since the majority of the project area has been identified by DFWP as deer and elk winter range (see *Big Game Winter Range* section) and is dominated by habitat characteristics not used by lynx, use of the area by lynx would not be expected and no direct, indirect, or cumulative effects would be anticipated under either alternative. Therefore, Canada lynx will no longer be considered in this document.

Sensitive Species

Existing Condition

When conducting forest-management activities, DNRC is required to give special consideration to habitat requirements of several sensitive species. These species are sensitive to human activities, have special habitat requirements that might be altered by timber management, or might become listed under the Federal Endangered Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for

ensuring that the primary goal of maintaining healthy and diverse forests would be met.

A search of the MNHP database documented common loons, harlequin ducks, flammulated owls, and Columbian sharp-tailed grouse within 4 miles of the project area. *TABLE III- ?? - LISTED SENSITIVE SPECIES FOR NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THE OLD HIGHWAY TIMBER SALE PROJECT* shows how each sensitive species was either included in the following analysis or removed from further analysis because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE III-10 - LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROPOSED PROJECT

SPECIES	DETERMINATION - BASIS
Black-backed woodpecker	No further analysis conducted - Although, roughly 16 acres of the Pinkham Creek Section burned in 2005 as part of the Camp 32 Fire, burn severity and patch size on State ownership would not be sufficient to support even a pair of black-backed woodpeckers.
Coeur d'Alene salamander	No further analysis conducted - No moist talus or streamside talus habitat occurs in the project area.
Columbian sharp-tailed grouse	No further analysis conducted - Although 1 of 2 remnant populations in Montana exists in the vicinity of the project area, no activities are proposed under either alternative that would affect these habitats.
Common loon	No further analysis conducted - Loons have nested on several lakes in the vicinity of the project area, including Glen Lake, Frank Lake, Marl Lake, Loon Lake, and Lake Koocanusa. No activities are proposed under either alternative within 500 feet of these lakes.
Fisher	*Included* - Potential fisher foraging and denning habitat occurs in the project area.
Flammulated owl	*Included* - Suitable dry ponderosa pine habitats occur within the project area.
Harlequin duck	No further analysis conducted - Harlequin ducks have been documented on Grave Creek; however, neither alternative includes activities that would affect these habitats.
Northern bog lemming	No further analysis conducted - No suitable sphagnum bogs or fens occur in the project area.
Peregrine falcon	No further analysis conducted - No suitable cliffs/rock outcrops occur in the project area.
Pileated woodpecker	*Included* - Western larch/Douglas-fir, ponderosa pine, and mixed-conifer habitats occur in the project area.
Townsend's big-eared bat	No further analysis conducted - No caves or mine tunnels occur in the project area.

Sensitive Species Assessed

➢ Fisher *(Martes pennanti)*

Existing Condition

In the Rocky Mountains, fishers appear to prefer late-successional moist coniferous forests (*Jones 1991*). Such areas typically contain large live trees, snags, and logs, which are used for resting and denning sites, and dense canopy cover, which would be important for snow intercept (*Jones 1991*). Fishers have also been noted to avoid large openings, nonforested habitats, and shrub-seedling stands. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining a network of travel corridors. Modeling fisher habitats using SLI data generated an estimate of 914 acres of fisher foraging, resting, and denning habitat across all 4 sections in the project area (*Heinemeyer and Jones 1994*). The project area ranges from 2,760 to 4,280 feet in elevation, with approximately 2.6 miles of perennial streams. Riparian habitats are concentrated along Fortine and Pinkham creeks. However, habitats along Fortine Creek are disconnected from other forested habitats and are likely unused by fisher. Additionally, potential fisher habitats may be found in conjunction with a number of intermittent streams and wetlands in the project area.

Cumulative effects were analyzed on the same analysis area used in the grizzly bear section using a combination of field evaluation and aerial photograph interpretation. Factors considered included the level of human disturbance and harvesting and connectivity along riparian habitats on adjacent ownerships. The planning units of KNF that include the project area contains appreciable potential habitat (*USDA Forest Service 2002*).

Alternative Effects to Fishers

Direct and indirect effects

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

  No direct effects to fishers would be expected under this alternative. Habitats that are conducive to fisher denning and travel may improve due to increased tree growth and canopy closure; however, foraging opportunities may decline due to the lack of diversity in habitat such as edge and younger age-class stands. Human disturbance and potential trapping mortality would expect to remain similar to current levels.

- ***Direct and Indirect Effects of the Action Alternative on Fishers***

  Trace amounts of riparian habitats would be included in the proposed units along Pinkham Creek, while proposed harvesting within the riparian areas along Fortine Creek would have negligible effects since little or no use is anticipated due to isolation. Approximately 341 of the 914 acres of fisher habitats in the project area would be treated. The majority of this acreage is presently in a western larch/Douglas-fir covertype on the Alkali Lake, Pinkham Creek, and Edna Mountain parcels. Proposed treatments in the majority of these areas include regeneration-type treatments, which would likely create stands too open for appreciable fisher use. Again, however, these areas are largely away from riparian areas where fishers are more commonly found, so minimal effects would be anticipated. Unit layout would maintain landscape connectivity within the project area. A minor decrease in human

disturbance and potential trapping mortality may be realized with the proposed road-management plan.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Fishers***

  Negligible direct and indirect effects are anticipated. Cumulatively, no additional changes in fisher habitats would be anticipated.

- ***Cumulative Effects of the Action Alternative on Fishers***

  Roughly 341 acres of largely upland western larch/Douglas-fir types would be harvested. These reductions would be additive to the losses associated with past timber harvesting in the vicinity on all ownerships. Unit layout would maintain landscape connectivity within the vicinity. Since alterations to preferred fisher habitats in riparian areas would be minimal (5.1 acres affected), no appreciable changes to landscape-level riparian habitats would be expected; within the analysis area, roughly 92.7 percent of the preferred fisher habitats in the riparian areas would remain well stocked (*ARM 36.11.440[1][b][I]*). A minor decrease in human disturbance and potential trapping mortality would be realized with the proposed road management plan; however, road management actions would not affect access on adjacent ownerships.

➢ **Flammulated Owls *(Otus flammeolus)***

Existing Condition

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States and are secondary cavity nesters. Flammulated owls usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12- to 25-inch dbh aspen, ponderosa pine, or Douglas-fir. Potential habitats of ponderosa pine and Douglas-fir/western larch are largely concentrated on the Pinkham Creek Section and, to lesser degrees, the Alkali Lake and Fortine Creek sections. Tree densities within these sections have increased due to modern fire suppression and lack of continued timber stand management, and highly suitable habitat for flammulated owls is likely limited.

Cumulative effects were analyzed using a combination of field evaluation and aerial photograph interpretation. Factors considered included the amount of open, mature stands of ponderosa pine and amount of dense, mixed-conifer stands on adjacent ownerships. The planning units of KNF that include the project area contains appreciable potential habitat (*USDA Forest Service 2002*).

Alternative Effects to Flammulated Owls

Direct and indirect effects

- ***Direct and Indirect Effects of the No-Action Alternative on Flammulated Owls***

  No changes to the existing conditions on DNRC ownership would be expected. In the long term, stands once dominated by ponderosa pine and Douglas-fir would continue to be converted to Douglas-fir stands through succession, become densely stocked, and exist at high risk to insects, diseases, and stand-replacement fires. Thus, habitat sustainability and quality for flammulated owls would continue to decline.

- ***Direct and Indirect Effects of the Action Alternative on Flammulated Owls***

  Flammulated owls are tolerant of human disturbance (*McCallum 1994*); however, the elevated disturbance levels associated with harvesting could negatively impact flammulated owls. Proposed timber harvesting in flammulated owl habitats would open the canopy while favoring ponderosa pine, western larch, and Douglas-fir. The more open stand conditions, retention of fire-adapted tree species, and maintenance of snags would improve flammulated owl habitats, and, therefore, would provide a slight benefit to flammulated owls.

Cumulative effects

- ***Cumulative Effects of No-Action Alternative A on Flammulated Owls***

  Untreated stands in the vicinity would be expected to continue developing a closed canopy and become denser. However, adjacent ownerships that have been treated and areas that have been burned in the Camp 32 fire probably enhanced habitat conditions for flammulated owls. Proposed harvesting on USFS lands within the Camp 32 Fire perimeter may improve flammulated owl habitats in the vicinity by creating more-open stands that are representative of historic conditions. Elsewhere on adjacent ownerships, some stands will continue to mature and move toward dense stands of Douglas-fir, which would not benefit flammulated owls. No increase in flammulated owl habitat would be expected.

- ***Cumulative Effects of the Action Alternative on Flammulated Owls***

  Cumulatively, the minor improvement in flammulated owl habitats associated with the proposed treatment would be additive to improvements from harvesting on adjacent ownerships, including harvesting within the Camp 32 Fire perimeter. Elsewhere on adjacent ownerships, some stands will continue to mature and move toward dense stands of Douglas-fir, which would not benefit flammulated owls.

➢ **Pileated Woodpecker *(Dryocopus pileatus)***

Existing Condition

Pileated woodpeckers excavate some of the largest cavities of any woodpecker. The cavities are frequently used in subsequent years by many other species of birds and mammals. Preferred nest trees are western larch, ponderosa pine, black cottonwood, and quaking aspen, usually 20 inches dbh and larger. The feeding- and nesting-habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests. Removal of large western larch and ponderosa pine by past timber-harvesting activities has reduced the quality of habitat for pileated woodpeckers. Large live and dead trees are less common than would occur naturally due to these past timber-harvesting activities. Some black cottonwood occurs within some of the riparian areas in the project area. Large western larch, cottonwood, and ponderosa pine exist within the project area, which may be suitable nesting sites, and existing Douglas-fir, western larch, ponderosa pine, and grand fir are likely providing foraging habitats.

Potential pileated woodpecker nesting habitat was identified by locating in the SLI database stands over 100 years old with more than 100 square feet basal area per acre, more than 40-

percent canopy cover, and below 5,000 feet in elevation. In the project area, potential pileated woodpecker nesting habitat exists on approximately 577 acres. Younger-aged stands might provide feeding or lower quality nesting habitat. During field visits, many feeding sites and 0 to 10 snags per acre were observed in the project area.

Cumulative effects were analyzed using a combination of field evaluation and aerial photograph interpretation. Factors considered included the degree of harvesting and the amount of continuous forest on adjacent ownerships. The planning units of KNF that include the project area contains appreciable habitat and pileated woodpeckers are relatively common (*USDA Forest Service 2002*).

Alternative Effects to Pileated Woodpeckers

Direct and indirect effects

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

  No direct effects would be anticipated. Shade-intolerant trees would continue to grow and die over time, providing nesting and foraging habitats. As these trees die, replacement shade-intolerant trees would be underrepresented in the stand unless other disturbances influence the stands, allowing for their regeneration. Additionally, through time, few trees would attain the size required for pileated woodpeckers due to the high stocking densities in portions of the project area. Therefore, a reduction in suitable nesting trees would be likely over time. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time, and then decline.

- ***Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers***

  Pileated woodpeckers tend to be tolerant of human activities (*Bull and Jackson 1995*), but might be temporarily displaced by the proposed harvesting. Elements of the forest structure important for nesting would be retained, including snags, coarse woody debris, numerous leave trees, and snag recruits (*ARM 36.11.439[1][b]*). Of the 577 acres of pileated woodpecker nesting habitat in the project area, 299 acres are proposed for treatment, with the majority existing in the western larch/Douglas-fir types. Proposed treatments would partially to largely remove the midstory and overstory, which would reduce pileated nesting habitat on the 299 acres. After the proposed harvesting, most of the 799 harvested acres within the project area would be too open to be considered pileated woodpecker habitat. Silvicultural prescriptions that include the retention and recruitment of shade-intolerant tree species would benefit pileated woodpeckers in the distant future by providing nesting, roosting, and foraging habitats.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers***

  Western larch, Douglas-fir, and ponderosa pine trees would continue to grow and die over time in the project area, providing foraging and, to a degree, nesting habitats. Stands elsewhere in the vicinity vary in age and covertype, with stands representing the spectrum in age classes and a variety of covertypes. On a portion of these parcels, pileated woodpecker habitats have been a

consideration with retention of some mature western larch and ponderosa pine and some snags. Proposed harvesting by USFS within the Camp 32 Fire perimeter may further reduce pileated woodpecker habitats in the vicinity.

No other DNRC projects are planned in the vicinity in the near future. Continued use of the landscape by pileated woodpeckers would be anticipated.

- ***Cumulative Effects of the Action Alternative on Pileated Woodpeckers***

  Under this alternative, reductions in pileated woodpecker habitat would be expected. Several existing snags, coarse woody debris, and some potential nesting trees would be retained within the project area; however, future recruitment of these attributes may be reduced by the proposed activities. No other DNRC projects are planned in the vicinity in the near future. The loss of pileated woodpecker habitats associated with the proposed harvesting would be additive to habitat losses associated with past harvesting on all ownerships in the analysis area, including USFS harvesting within the Camp 32 Fire perimeter; continued use of the landscape would be expected. Additionally, continued maturation of stands in the analysis area would improve pileated woodpecker habitats.

BIG GAME

Big Game Winter Range

Existing Condition

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

DFWP identified the entire project area as moose winter range and delineated much of the 2,056-acre project area as elk and white-tailed deer winter ranges (96 percent and 84 percent, respectively). Additionally 267 acres of the Pinkham Creek Section were identified as mule deer winter range. The winter range in the project area is part of the contiguous 170,362-acre white-tailed deer winter range. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity of the project area. The landscape is a mosaic of stands of differing ages; some stands in the vicinity are providing thermal cover, while others have been recently harvested and are not contributing to winter range; and still yet others were harvested some time ago and are just beginning to provide some of the components facilitating big game winter use.

Cumulative effects were analyzed on the contiguous 170,362-acre white-tailed deer winter range using a

combination of field evaluation and aerial photograph interpretation. Within the winter range, considerable amounts of human development and agricultural clearing have altered the capacity of the winter range. Additionally, recent timber harvesting on private ownerships and, to a lesser degree, USFS-managed lands has reduced, at least temporarily, winter-range habitats. Portions of the winter range are included in the DNRC Point of Rocks Timber Sale Project, where prescriptions call for the removal of roughly 917 acres of winter range. Across the winter range, there are still forested stands on USFS, State, and private ownerships that are providing thermal cover and snow intercept for big game.

Alternative Effects to Big Game Winter Range

Direct and indirect effects

- ***Direct and Indirect Effects of the No-Action Alternative on Big Game Winter Range***

  Big game thermal cover in the project area would not be altered in the near term. Existing stands would continue to provide thermal cover for big game. In the longer-term, continued succession could reduce forage production while increasing thermal cover.

- ***Direct and Indirect Effects of the Action Alternative on Big Game Winter Range***

  Some displacement would be expected as a result of the proposed harvesting operations, particularly if conducted in the winter. Thermal cover for big game would be removed with the canopy removal on approximately 650 acres of the winter range. Some pockets of thermal cover would likely exist within these units after treatment, but most of the existing thermal cover in the units would be removed. Additionally, roughly 1,092 acres of winter range in the project area outside of the units would not be harvested and should continue functioning similarly to the present. Proposed harvesting could stimulate browse production, which would benefit big game using the winter range. Proposed activities would not prevent big game movement through the area.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Big Game Winter Range***

  No changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover would be expected to continue providing this resource. The Point of Rocks Timber Sale Project will reduce the winter range function by harvesting roughly 917 acres of the winter range. Continued forest management and development on other ownerships would likely reduce winter-range values, while continued succession would gradually improve portions of the winter range harvested in the past. Continued use of the winter range by big game would be expected.

- ***Cumulative Effects of the Action Alternative on Big Game Winter Range***

  Thermal cover would be largely removed from approximately 650 acres out of the 170,362-acre (0.4 percent) winter range. However, the effect of this removal would be expected to be somewhat greater as the winter range includes roughly 40 percent of open habitats that do not provide thermal cover and snow intercept. Across the winter range, considerable disturbance and development has further reduced winter-range function. This reduction in thermal cover and snow intercept would be additive to past reductions on private, USFS, and DNRC ownerships from forest management and fire. Continued use of the winter range by big game would be expected;

however, continued degradation of the larger winter range could ultimately compromise the big game populations that depend upon this resource.

Elk Security

Existing Condition

Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during the hunting season (*Hillis et al. 1991*). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and subsequent decrease in hunter opportunity.

Much of the acreage in the project area is within close proximity to open roads. Areas that are within 0.5 mile of an open road do not provide security habitat. Within the 2,056-acre project area, no patches meet the distance, cover, and size requirements of elk security alone.

Cumulative effects to elk security were analyzed on Hunting District 101 (372,000 acres) using a combination of field evaluations and aerial photograph interpretations. Within the district, extensive road access facilitates recreational hunting. Security habitat is present at the hunting district level; however, the network of open roads coupled with ongoing habitat management has compromised elk security habitat. Hiding cover is abundant in the hunting district, which benefits elk and other big game species.

Alternative Effects to Elk Security

Direct and indirect effects

- ***Direct and Indirect Effects of the No-Action Alternative on Elk Security***

  Elk security cover would continue to be absent from the project area. Hiding cover would persist and, potentially, improve with advancing succession. No alterations in cover would occur that would increase elk vulnerability during the hunting season. No changes would be anticipated in disturbance and potential hunting mortality.

- ***Direct and Indirect Effects of the Action Alternative on Elk Security***

  No changes in elk security cover would be expected since security cover does not exist within the project area. Restricted roads opened for logging would remain restricted to public motorized use, and proposed road restrictions would slightly reduce the overall open-road densities slightly; therefore, minimal effects to elk vulnerability or hunter access would be anticipated. Timber harvesting would reduce hiding cover across the 799 acres in the units. However, the proposed openings would be relatively small (only 3 units greater than 40 acres) and would be interspersed with unharvested, retention areas. This layout would lessen the effects to big game hiding cover and big game survival.

Cumulative effects

- ***Cumulative Effects of the No-Action Alternative on Elk Security***

  No changes would be anticipated in elk security cover or hiding cover. Past harvesting and road building in the hunting district reduced elk security habitats and increased human access.

- ***Cumulative Effects of the Action Alternative on Elk Security***

  Negligible impacts to big game survival would be anticipated. No changes in elk security cover would be expected. A reduction in hiding cover caused by the proposed harvest would be additive to the harvesting that has occurred across the hunting district, including USFS harvesting with the Camp 32 Fire perimeter. Maintaining road restrictions and the proposed road management plan could benefit big game survival while slightly reducing human disturbance.

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APPENDIX A
STIPULATIONS AND SPECIFICATIONS

Stipulations and specifications for the Action Alternative was identified or designed to prevent or reduce potential effects to resources considered in this analysis. In part, stipulations and specifications are a direct result of issue identification and resource concerns. This section is organized by resource.

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

The following stipulations and specifications would be incorporated into the Action Alternative to mitigate potential effects to resources.

AIR QUALITY

- To prevent individual or cumulative effects during burning operations, burning will be done in compliance with the Montana Airshed Group reporting regulations and burning restrictions imposed in Airshed 1 and Impact Zone A. This will provide for burning during acceptable ventilation and dispersion conditions.
- Excavator, landing, and roadwork debris will be piled clean to allow trouble-free ignition during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be covered to reduce dispersed (unentrained) smoke. Covered piles are drier, ignite easier, burn hotter, and extinguish sooner.
- In order to reduce smoke production, large woody debris will be left on site to minimize the number of burn piles.
- Depending on the seasonal conditions and level of public traffic, dust-abatement application may be required on some road segments.

AESTHETICS

- Damaged residual vegetation will be slashed.
- Landings will be limited in size and number and be located away from main roads when possible.
- Disturbed sites along road right-of-ways will be grass seeded.

ARCHAEOLOGY

- A contract clause provides for suspending operations if cultural resources were discovered; DNRC's archeologist will be consulted and operations may only resume as directed by the Forest Officer.
- If cultural resources were discovered, the Confederated Salish-Kootenai Tribe will be notified, as requested.

ROAD MANAGEMENT

New roads and roads that have been newly reconstructed may be seasonally restricted with gates when soils and road surfaces are most susceptible to rutting.

SOILS

➢ ***SOIL COMPACTION***

- Logging equipment will not operate off forest roads unless:
  - soil moisture is less than 20 percent,
  - soil is frozen to a depth that would support machine operations, or
  - soil is snow-covered to a depth that would prevent compaction, rutting, or displacement.
- Existing skid trails and landings will be used where their design is consistent with prescribed treatments and meets current BMP guidelines.
- Designated skid trails will be required where moist soils or short steep pitches (less than 300 feet) cannot be accessed by other logging systems. This will reduce the number of skid trails and the potential for erosion.
- The density of skid trails in a harvest area will not exceed 20 percent of the total area in a cutting unit.

➢ ***SOIL DISPLACEMENT***

- Conventional ground-based skidding equipment will not be operated on steep slopes (greater than 40 percent). Soft-tracked yarders are suitable on slopes up to 55 percent with less impact than conventional tractor skidding. Cable yarding will be used on steeper slopes.
- Piling and scarification will be completed with a dozer where slopes are gentle enough to permit. Steeper slopes will have slash treatment and site preparation done with an excavator or will be broadcast burned.

➢ ***EROSION***

- Ground skidding machinery will be required to be equipped with winchline to limit equipment operation on steeper slopes.
- Roads used by the purchaser will be reshaped and the ditches redefined following use to reduce surface erosion.
- Drain dips and gravel will be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.
- Some road sections will be repaired to upgrade the roads to design standards that reduce erosion potential and maintenance needs.
- The prompt and timely application of certified weed-free grass seed and fertilizer will be applied to all newly constructed road surfaces and cut-and-fill slopes. These applications will also be applied to any existing disturbed cut-and-fill slopes and landings immediately adjacent to open roads. These measures will stabilize soils and reduce or prevent noxious weed establishment, to include:
  - seeding all cuts and fills on disturbed roads concurrently with construction, and
  - seeding the surfaces of all roads where motorized use is to be restricted.
- Based on ground and weather conditions, water bars, logging-slash barriers, and, in some cases, temporary culverts will be installed on skid trails where erosion is anticipated, as directed by the forest officer. These erosion-control features would be periodically inspected and maintained throughout the contract period or extensions thereof.

VEGETATION

➢ ***SNAG RETENTION***

- Where available, 2 snags and 2 trees (snag recruits), 21 inches dbh or greater per acre will be retained.
- High-quality wildlife trees/snags, such as large, broken-topped western larch, will be designated for retention.

➢ ***NOXIOUS WEED MANAGEMENT***

- All tracked and wheeled equipment will be cleaned of noxious weeds prior to beginning project operations. The forest officer will inspect equipment periodically during project implementation.
- Prompt vegetation seeding of disturbed roadside sites will be required; a native grass seed mix seed will be used. Roads that are used and closed as part of this proposal will be reshaped and reseeded.
- Herbicide weed spraying may be implemented on roads that are abandoned following the timber sale project

➢ ***FUELS MANAGEMENT***

- Within 1,000 feet of residences, the High Standard specifications of the State Hazard Reduction Law will be met. In part, 90 percent of the logging slash along the perimeter of harvest units will be piled and burned.
- Ten to 15 tons of large woody debris will be retained on the forest floor following site preparation.

WATERSHED AND FISHERIES

- Harvesting will not occur within 100 feet of Pinkham Creek.
- Along Fortine Creek, a 100-foot Riparian Management Zone would have limited harvesting and maintain a majority of the shrubs and submerchantable trees.
- Planned erosion-control measures include:
  - grade breaks on roads and skid trails,
  - surface water-diverting mechanisms on roads,
  - slash-filter windrows, and
  - grass seeding.
- Details for these control measures will be included in *ATTACHMENT B* of the *TIMBER SALE AGREEMENT*.
- Brush will be removed from existing road prisms to allow for effective road maintenance. Road maintenance will reduce sediment delivery.
- The contractor will be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.) that may affect water quality.
- Leaking equipment will not be permitted to operate at stream-crossing construction sites.
- The BMP audit process will continue. This sale will likely be reviewed in an internal audit and may be chosen at random as a State-wide audit site.

WILDLIFE

- Cease all operations if a threatened or endangered species is encountered. Consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species *(ARM 36.11.428 through 36.11.435)*.
- Minimize disturbance in the bald eagle home ranges by operating in units within the combined home ranges during the nonnesting period (August 15 through February 1).
- Reclose roads and skid trails that were opened with the proposed activities to reduce the potential

for unauthorized motor vehicle use.

- Using signs or other measures, restrict public access on restricted roads that were opened with the proposed activities.
- Use a combination of topography, group retention, roadside vegetation, and smaller unit sizes to reduce views into harvest units.
- Retain forested corridors to maintain landscape connectivity and patches of dense vegetation to provide security cover.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- Retain forested corridors to maintain landscape connectivity and patches of dense vegetation, when possible, to provide security cover.
- Manage for snags, snag recruits, and coarse woody debris according to *ARM 36.11.411* through *36.11.414*; in particular, favor western larch and ponderosa pine.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads.

APPENDIX B
GLOSSARY

Administrative road use
Road use that is restricted to DNRC personnel and contractors or for purposes such as monitoring, forest improvement, fire control, hazard reduction, etc.

Airshed
An area defined by a certain set of air conditions; typically, a mountain valley in which air movement is constrained by natural conditions such as topography.

Appropriate conditions
Describes the set of forest conditions determined by DNRC to best meet the SFLMP objectives. The 4 main components useful for describing an appropriate mix of conditions are covertype proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands (size, shape, location, etc.), all assessed across the landscape.

Bald eagle primary-use area
An area where it is assumed that 75 percent of the foraging, resting, and associated behaviors occur.

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

Best Management Practices (BMPs)
Guidelines to direct forest activities, such as logging and road construction, for the protection of soils and water quality.

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

Board foot
144 cubic inches of wood that is equivalent to a piece of lumber 1 inch thick by 1 foot wide by 1 foot long.

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

Canopy closure
The percentage of a given area covered by the crowns, or canopies, of trees.

Cavity
A hollow excavated in trees by birds or other animals. Cavities are used for roosting and reproduction by many birds and mammals.

Coarse down woody material
Dead trees within a forest stand that have fallen and begun decomposing on the forest floor.

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

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

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

Core area
See *Security habitat (grizzly bears)*.

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

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

Crown cover or crown closure
The percentage of a given area covered by the crowns of trees

Crown scorch
The portion of the tree crown that has been scorched.

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

Cutting units
Areas of timber proposed for harvesting.

Cumulative effect
The impact on the environment that results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor actions, but collectively they may compound the effect of the actions.

Direct effect
Effects on the environment that occur at the same time and place as the initial cause or action.

Ditch relief
A method of draining water from roads using ditches and corrugated metal pipe. The pipe is placed just under the surface of the road.

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

Drain dip
A graded depression built into a road to divert water and prevent soil erosion.

Ecosystem
An interacting system of living organisms and the land and water that make up their environment; the home place of all living things, including humans.

Environmental effects
The impacts or effects of a project on the natural and human environment.

Equivalent clearcut acres (ECA)
This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area.

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

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

Remaining ECA - The calculated amount of harvesting that may occur without substantially increasing the risk of causing detrimental effects to the stability of the stream channel.

Evaportranspiration
A combination of 2 physical processes in the environment: evaporation is the loss of moisture into the atmosphere from the soil and bodies of water (lakes, river, etc.); transpiration is the process where moisture is lost through the surfaces of plants and trees into the atmosphere. Both are the result of heating by the sun, and the combination of the 2 is how moisture is cycled back into the atmosphere.

Excavator piling
The piling of logging residue using an excavator.

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

Forage
All browse and nonwoody plants available to wildlife for grazing.

Forest improvement
The establishment and growing of trees after a site has been harvested. Associated activities include:

- site preparation, planting, survival checks, regeneration surveys, and stand thinnings;
- road maintenance;
- resource monitoring;
- noxious-weed management; and
- right-of-way acquisition on a State forest.

Fragmentation (forest)
A reduction of connectivity and an increase in sharp stand edges resulting when large contiguous areas of forest with similar age and structural character are interrupted through disturbance (stand-replacement fire, timber harvesting, etc.)

Habitat
The place where a plant or animal naturally or normally lives and grows.

Habitat type
The place or type of site where a plant or animal naturally or normally lives and grows.

Hazard reduction
The reduction of fire hazard by processing logging residue with methods such as separation, removal, scattering, lopping, crushing, piling and burning, broadcast burning, burying, and chipping.

Hiding cover
Vegetation capable of hiding some specified portion of a standing adult mammal from human view at a distance of 200 feet.

Historical forest condition
The condition of the forest prior to settlement by Europeans.

Homogeneous
Of uniform structure or composition throughout.

Indirect Effects
Secondary effects that occur in locations other than the initial action or significantly later in time.

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

Interdisciplinary team (ID Team)
A team of resource specialists brought together to analyze the effects of a project on the environment.

Landscape
An area of land with interacting ecosystems.

Meter
A measurement equaling 39.37 inches.

Mitigation measure
An action or policy designed to reduce or prevent detrimental effects.

Moving-window analysis
A computer-based method that, in this EA, is used to quantify the area influenced by roads in a study area. Starting with the pixel in the upper left corner of the computerized subunit map, the computer calculates how many miles of road exist within a 1-square-mile "window" around that pixel. It moves to the next pixel and repeats the process until the road density is calculated in a 1-square-mile

area around every pixel in the study area. The number and percentage of pixels in the study area that fall into different road-density classes are then calculated by the computer. Based on research studying the effects of roads on grizzly bears, the effects of open roads are measured by the percentage of pixels in the study area that have at least 1.0 mile of open road in the surrounding 1-square-mile window. The effects of total roads (open, gated, barricaded, bermed, but not brushed, etc.) are measured by the percentage of pixels in the study area that have at least 2 miles of open or restricted roads in the surrounding 1-square-mile window.

Multistoried stands
Timber stands with 2 or more distinct stories.

Nest site area (bald eagle)
The area in which human activity or development may stimulate abandonment of the breeding area, affect successful completion of the nesting cycle, or reduce productivity. It is either mapped for a specific nest based on field data, or, if that is impossible, it is defined as the area within a 1/4-mile radius of all nest sites in the breeding area that have been active within 5 years.

No-action alternative
The option of maintaining the status quo and continuing present management activities; the proposed project would not be implemented.

Nonforested area
A naturally occurring area where trees do not establish over the long term, such as a bog, natural meadow, avalanche chute, and alpine areas.

Old growth
For this analysis, old growth is defined as stands that meet the minimum criteria (number of trees per acre that have a minimum dbh and a minimum age) for a given site (old-growth group from habitat type). These minimums can be found in the *Green et al* *Old Growth Forest Types of the Northern Region* (see *APPENDIX A - REFERENCES)*.

Overstory
The level of the forest canopy including the crowns of dominant, codominant, and intermediate trees.

Patch
A discrete area of forest connected to other discrete forest areas by relatively narrow corridors; an ecosystem element (such as vegetation) that is relatively homogeneous internally, but differs from what surrounds it.

Potential nesting habitat (bald eagle)
Sometimes referred to as 'suitable nesting habitat,' areas that have no history of occupancy by breeding bald eagles, but contain the potential to do so.

Project file
A public record of the analysis process, including all documents that form the basis for the project analysis. The project file for the Dog/Meadow Timber Sale project Ea is located at the Stillwater State Forest office near Olney, Montana.

Redds
The spawning ground or nest of various fish species.

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

Residual stand
Trees that remain standing following any cutting operation.

Road-construction activities
In general, the term 'road construction activities' refers to all the activities conducted while building new roads, reconstructing existing roads, and obliterating roads. These activities may include any or all of the following:

- road construction;
- right-of-way clearing;
- excavation of cut/fill material;
- installation of road-surface and ditch-drainage features;
- installation of culverts at stream crossings;
- burning right-of-way slash;
- hauling and installation of borrow material; and
- blading and shaping road surfaces.

Road improvements
Construction projects on an existing road to improve ease of travel, safety, drainage, and water quality.

Saplings
Trees 1 to 4 inches in diameter at breast height.

Sawtimber trees
Trees with a minimum dbh of 9 inches.

Scarification
The mechanized gouging and ripping of surface vegetation and letter to expose mineral soil and enhance the establishment of natural regeneration.

Scoping
The process of determining the extent of the environmental assessment task. Scoping includes public involvement to learn which issues and concerns should be addressed and the depth of assessment that will be required. It also includes a review of other factors such as laws, policies, actions by other landowners, and jurisdictions of other agencies that may affect the extent of assessment needed.

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

Security habitat (grizzly bears)
An area of a minimum of 2,500 acres that is at least .3 miles from trails or roads with motorized travel and high-intensity nonmotorized use during the nondenning period.

Seedlings
Live trees less that 1 inch dbh.

Sediment
In bodies of water, solid material, mineral or organic, that is suspended and transported or deposited.

Sediment yield
The amount of sediment that is carried to streams.

Seral
Refers to a biotic community that is in a developmental, transitional stage in ecological succession.

Shade intolerant
Describes the tree species that generally can only reproduce and grow in the open or where the overstory is broken and allows sufficient sunlight to penetrate. Often these are seral species that get replaced by more shade-tolerant species during succession. In Stillwater State Forest, shade-intolerant species generally include ponderosa pine, western larch, Douglas-fir, western white pine, and lodgepole pine.

Shade tolerant
Describes tree species that can reproduce and grow under the canopy in poor sunlight conditions. These species replace less shade-tolerant species during succession. In Stillwater State Forest, shade-tolerant species generally include subalpine fir, grand fir, Douglas-fir, Engelmann spruce, and western red cedar.

Siltation
The process of very fine particles of soil (silt) settling. This may occur in streams or from runoff. An example would be the silt build-up left after a puddle evaporates.

Silviculture
The art and science of managing the establishment, composition, and growth of forests to accomplish specific objectives.

Site preparation
A hand or mechanized manipulation of a harvested site to enhance the success of regeneration. Treatments are intended to modify the soil, litter, and vegetation to create microclimate conditions conducive to the establishment and growth of desired tree species.

Slash
Branches, tree tops, and cull trees left on the ground following a harvest.

Snag
A standing dead tree or the remaining portion of a broken-off tree. Snags may provide feeding and/or nesting sites for wildlife.

Snow intercept
The action of trees and other plants in catching falling snow and preventing it from reaching the ground.

Spur roads
Low standard roads, constructed to meet minimum requirements for harvest-related traffic.

Stand
An aggregation of trees occupying a specific area that are sufficiently uniform in composition, age arrangement, and condition so as to be distinguishable from the adjoining forest.

Stand density
Number of trees per acre.

Stocking
The degree of occupancy of land by trees as measured by basal area or number of trees and as compared to a stocking standard, which is an estimate of either the basal area or number of trees per acre required to fully use the growth potential of the land.

Stream gradient
The slope of a stream along its course, usually expressed in percentage, indicating the amount of drop per 100 feet.

Stumpage
The value of standing trees in the forest. Sometimes used to mean the commercial value of standing trees.

Substrate scoring
Rating of streambed particle sizes.

Succession
The natural series of replacement of one plant (and animal) community by another over time in the absence of disturbance.

Suppressed
The condition of a tree characterized by a low-growth rate and low vigor due to competition.

Temporary road
Roads built to the minimal standards necessary to prevent impacts to water quality and provide a safe and efficient route to remove logs from the timber sale area. Following logging operations, reclamation would incorporate the following concepts to discourage future motorized use of the roads:

- Segments near the beginning of the new temporary road systems would be reshaped to their natural contours and reclaimed for approximately 200 feet by grass seeding and strewing slash and debris.
- The reclamation of the remaining road would include a combination of ripping or mechanically loosening the surface soils on the road, removing culverts or bridges that were installed, spreading forest debris along portions of the road, and allowing the surface to revegetate naturally.

Texture
A term used in visual assessments indicating distinctive or identifying features of the landscape, depending on distance.

Thermal cover
For white-tailed deer, thermal cover has 70 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

For elk and mule deer, thermal cover has 50 percent or more coniferous canopy closure at least 20 feet above the ground, generally requiring trees to be 40 feet or taller.

Timber-harvesting activities
Refers to all the activities conducted to facilitate timber removal before, during, and after the timber is removed. These activities may include any or all of the following:

- felling standing trees and bucking these trees into logs;
- skidding logs to a landing;
- processing, sorting, and loading logs onto trucks at the landing;
- hauling logs by truck to a mill;
- slashing and sanitizing residual vegetation damaged during logging;
- machine piling logging slash;
- burning logging slash;
- scarifying and preparing the site for planting; and
- planting trees.

Transaction evidence equation
Multivariant regression based on past sales and market variables.

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

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

Ungulates
Hoofed animals, such as mule deer, white-tailed deer, elk, and moose, that are mostly herbivorous and many are horned or antlered.

Vigor
The degree of health and growth of a tree or stand of trees.

Watershed
The region or area drained by a river or other body of water.

Water yield
The average annual runoff for a particular watershed expressed in acre-feet.

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

Windthrow
A tree pushed over by wind. Windthrows (blowdowns) are common among shallow-rooted species and in areas where cutting or natural disturbances have reduced the density of a stand so that individual trees remain unprotected from the force of the wind.

ACRONYMS

ARM	Administrative Rules of Montana
BMP	Best Management Practices
CMP	Corrugated metal pipe
dbh	diameter at breast height
DEQ	Montana Department of Environmental Quality
DFWP	Department of Fish, Wildlife and Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FI	Forest Improvement
FNF	Flathead National Forest
FRTA	Federal Roads and Trails Act
mbf	thousand board feet
MCA	Montana Codes Annotated
MEPA	Montana Environmental Protection Agency
mmbf	million board feet
MNHP	Montanan Natural Heritage Program
NCDE	Northern Continental Divide Ecosystem
NWLO	Northwestern Land Office
pfi	peak flow increase
RMZ	Riparian Management Zone
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
TRUP	Temporary Road Use Permit
UKSR	Upper Kootenai Subbasin Review
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

ID Team	Interdisciplinary Team
Land Board	Montana Board of Land Commissioners
124 Permit	Stream protection Act Permit
318 Authorization	Authorization A—Short-term Exemption from Montana's Surface Water Quality Standards

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