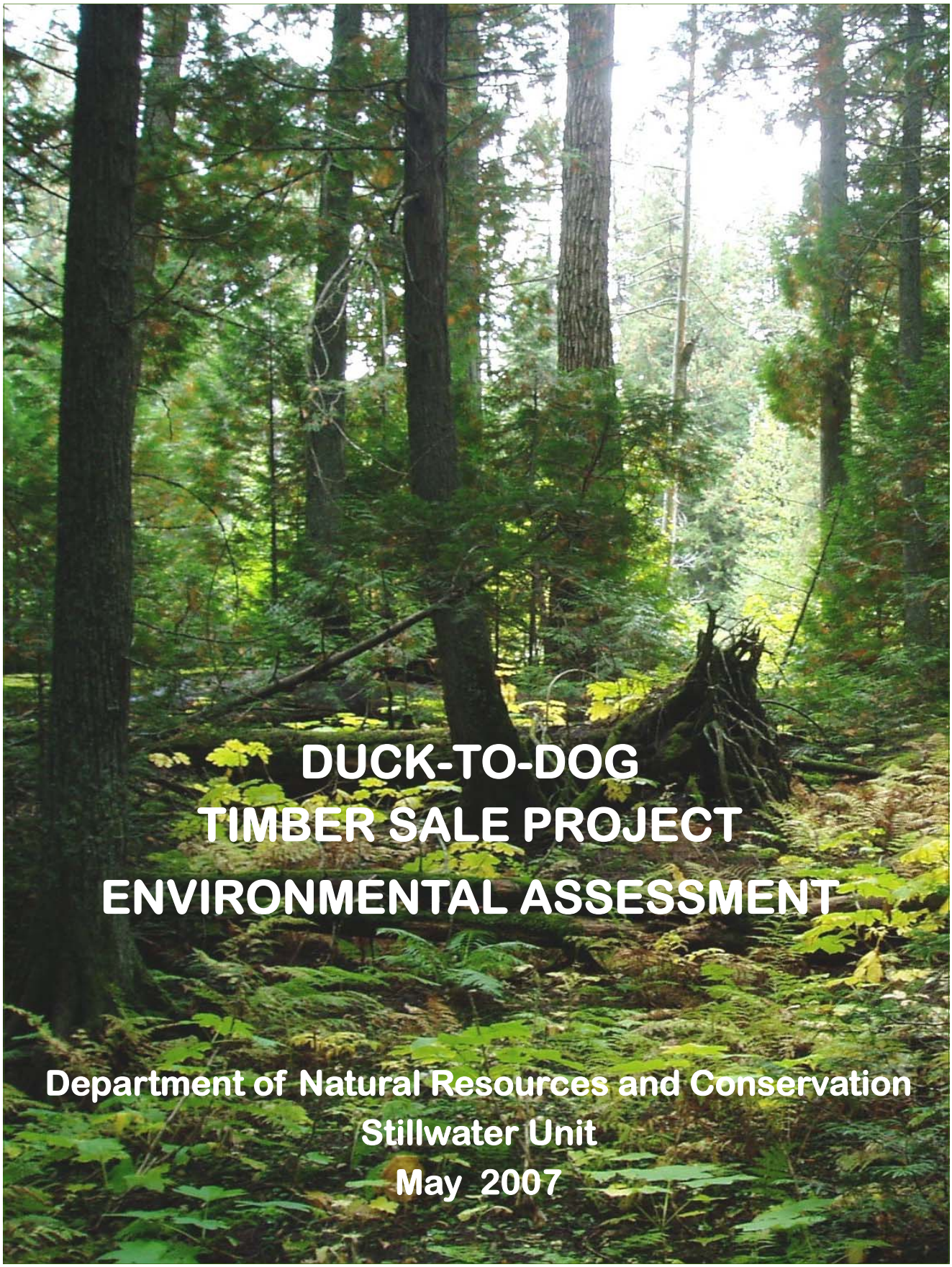
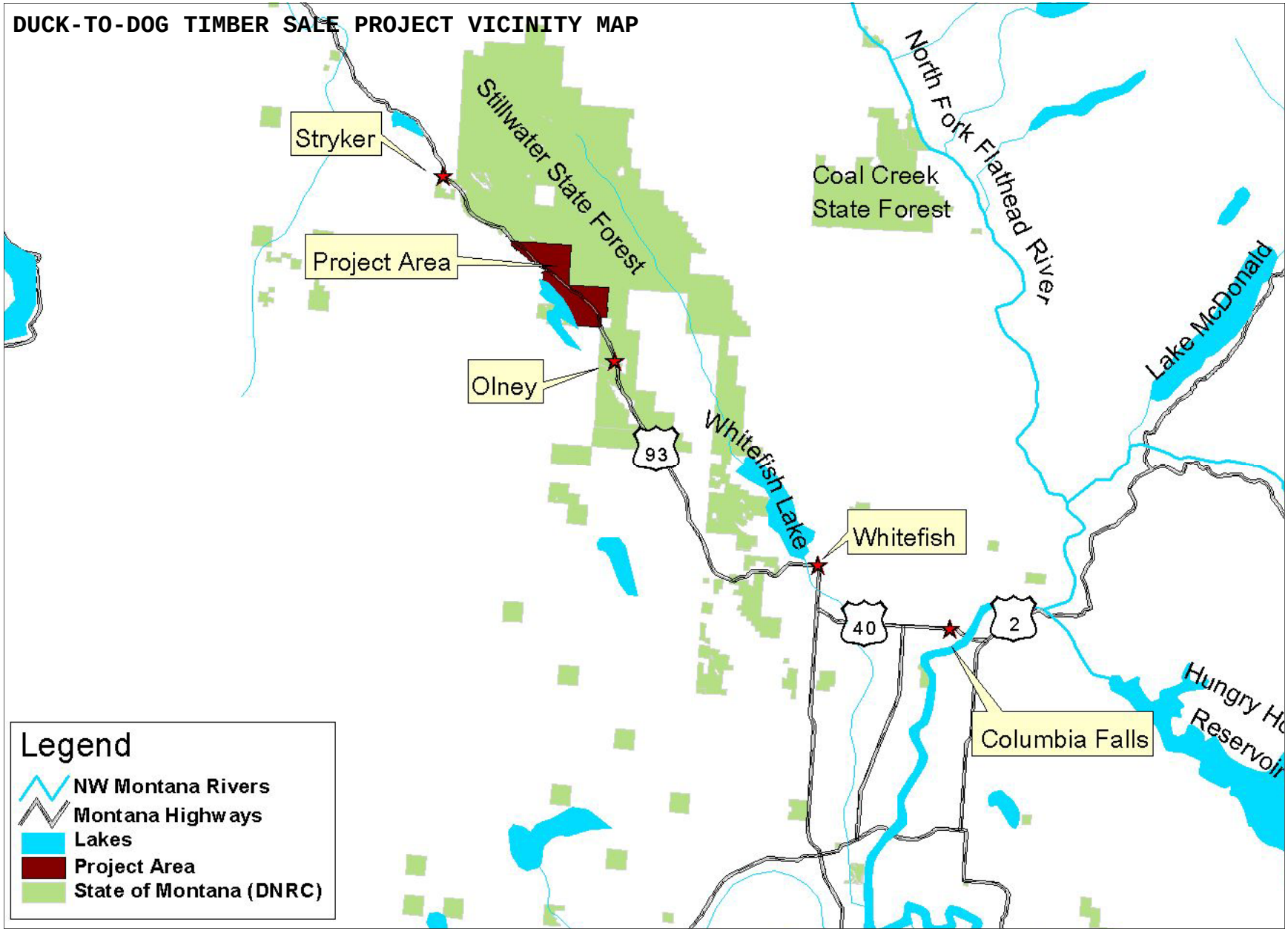


DUCK-TO-DOG TIMBER SALE PROJECT ENVIRONMENTAL ASSESSMENT

Department of Natural Resources and Conservation
Stillwater Unit
May 2007


DUCK-TO-DOG TIMBER SALE PROJECT VICINITY MAP
Stryker
Project Area
Olney
Stillwater State Forest
Coal Creek
State Forest
North Fork Flathead River
Lake McDonald
Whitefish Lake
Whitefish
93
40
2
Columbia Falls
Hungry Ho
Reservoir
Legend
NW Montana Rivers
Montana Highways
Lakes
Project Area
State of Montana (DNRC)

FINDING

PROPOSED DUCK-TO-DOG TIMBER SALE PROJECT

STILLWATER STATE FOREST

An Interdisciplinary Team (ID Team) has completed the Environmental Assessment (EA) for the proposed Duck-To-Dog Timber Sale Project.

The project area is located on 11 sections of State land in Flathead County (see *VICINITY MAP* [inside front cover] for their general locations). Specifically, the project is located in Sections 14, 23, 24, 25, and 36, in T33N, R24W, and Sections 30, 31, and 32, in T33N, R23W. Revenue generated from these lands would benefit the Common Schools, Public building, and Agricultural College trusts.

After a thorough review of the EA, project file, public correspondence, Montana statutes, *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.
- The Action Alternative proposes to:
  - Improve the long-term productivity of the timber stands by increasing vigor, reducing the incidence of insect 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]).
  - Reduce the potential of wildfires in the wildland urban interface between Fort Steele Road and the Burlington Northern/Santa Fe railroad tracks, in areas adjacent to Highway 93, and to other lands and homesteads.
  - Harvest 5 to 7 MMbf of sawtimber to generate revenue for the appropriate school trusts. The sale 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 public access to Dog Lake on the east side.
  - Maintain options for sustained revenue to the school trusts and provide for additional benefits by completing site improvements on existing roads to improve drainage, water quality, and safety.

I have selected the Action Alternative with the following requirements and reasons:

- Mitigations and specifications identified in the EA will be implemented as prescribed.
- The Action Alternative meets

the *PURPOSE OF PROPOSED ACTION, (page I-1)* and *PROPOSED OBJECTIVES (page I-2);* the specific project objectives are listed on *page I-2* of the *EA.*

- 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, 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 adopted *Administrative Rules for Forest Management* (*ARM 36.11.401* through *450*). This project is designed in accordance with these Rules.
- The proposed timber sale project contributes to the harvest level mandated by State Statute (*Montana Codes Annotated [MCA] 77-5-222).*
- DNRC is required to salvage timber damaged by insects, diseases, fires, or wind before it loses value to decay, provided such harvesting is economically warranted (*MCA 77-5-207*).
- The analyses of identified issues did not reveal information to persuade the Department to choose the No-Action Alternative prior to this decision.
- The Action Alternative includes activities to address concerns expressed by the public and local government entities with jurisdiction; these include, but are not limited to, the following:
  - The project does not harvest in identified old-growth stands. (Page I-7)
  - The project is designed to not harvest where sensitive plants exist within wetland complexes.
  - An adequate number of snags and snag recruits will remain in the area to provide for important wildlife habitat and down woody debris to maintain soil productivity. (Pages III-34 and 44)
  - The estimated total timber-dollar revenue to the State is $1,584,866. (Page III-37)
  - Haul routes will meet Best Management Practices (BMPs); improvement to access and safety will be made by relocating a highway approach.
  - The risk of large, intensive, stand-replacement wildfires will be reduced on State lands. (Page III-8)
  - Water quality and fisheries habitat would be protected. (Pages III-11 through 31)

  Refer to *STIPULATIONS AND SPECIFICATIONS* for a list of common mitigations applied to timber sale projects.

2. SIGNIFICANCE OF IMPACTS

For the following reasons, I find that implementing 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 I find 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 May 2003, DNRC adopted 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 important 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)?

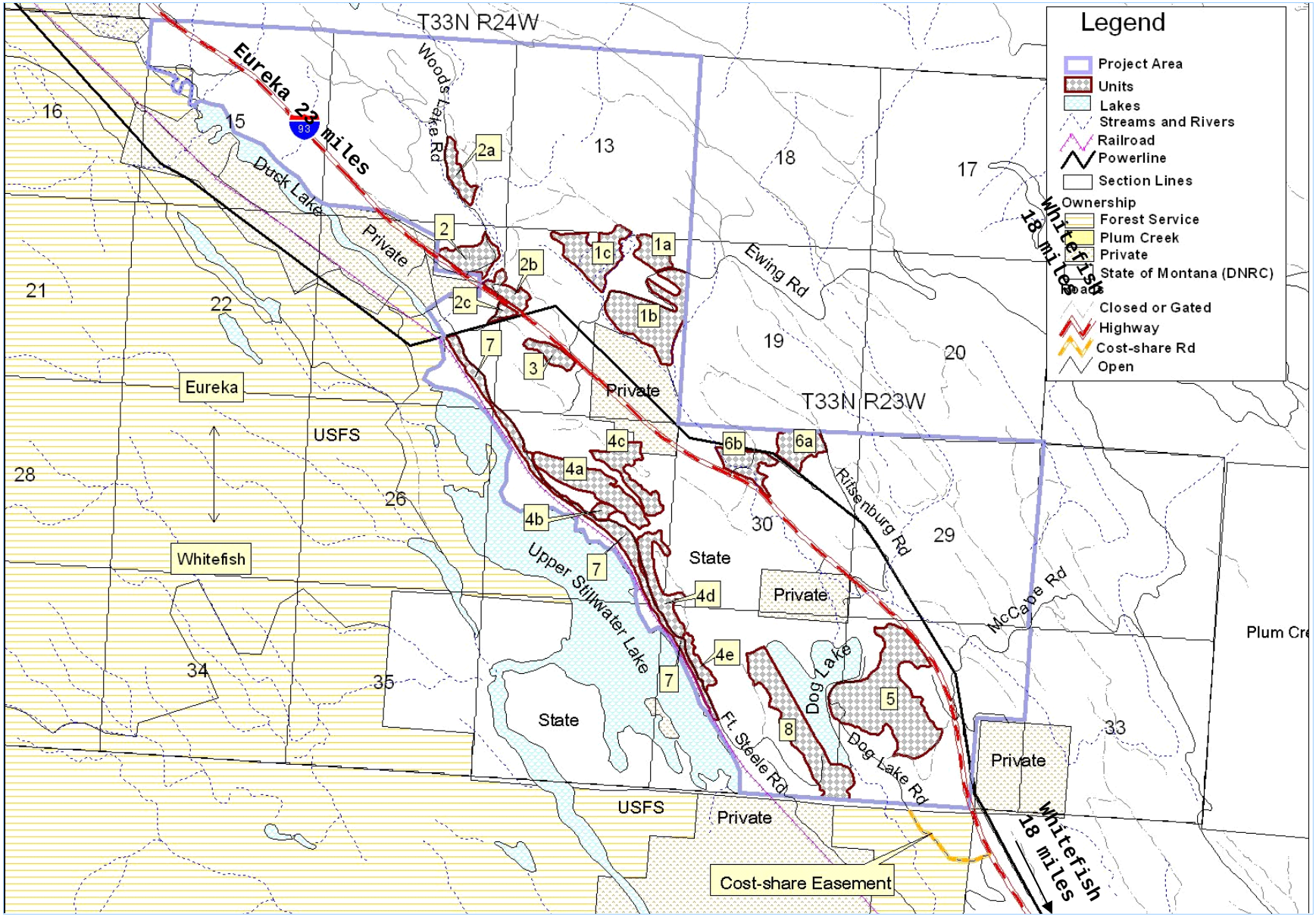
Based on the following considerations, I find that an EIS does not need to be prepared:

- 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 Duck-to-Dog 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

Unit Manager
Stillwater State Forest
May 14, 2007

HAARVEST UNIT MAP



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Chapter I – Purpose and Need

CHAPTER I
PURPOSE AND NEED

INTRODUCTION TO PROPOSED ACTION

The Department of Natural Resources and Conservation (DNRC), Stillwater Unit, is proposing the Duck-to-Dog Timber Sale Project. The 11 sections of State land in this timber sale project are managed to provide revenue over time to the Common School, Public Buildings, and Montana State University Second Grant beneficiaries (see *VICINITY MAP* [inside front cover] for general locations). Specifically, the project is located in Sections 14, 23, 24, 25, and 36, in T33N, R24W, and Sections 30, 31, and 32, in T33N, R23W.

Two alternatives, an action and a no-action alternative, are proposed. If the action alternative to harvest timber were selected, an estimated 5 to 7 million board feet (MMbf) of timber would be harvested from approximately 650 acres. Harvesting would be accomplished using a variety of silvicultural treatments. The type of treatment selected for each stand would depend on the existing condition and the desired future condition for that particular stand. Existing roads, along with short spur roads built for temporary use, would access the proposed harvest units. These spur roads would be built to minimum standards and would be reclaimed after harvesting activities are completed. Two segments of road would be relocated to meet Best Management Practices (BMPs) and facilitate timber harvesting; the relocations would also improve highway-access safety and better facilitate future recreational access to Dog Lake. Additionally, the action alternative would gain permanent access on USFS Road 10355 for the State. Ditches and surface drainage would be added, segments of road graveled, and needed culverts installed to improve existing roads in the project area. All stream crossings on access roads would be examined to ensure compliance with BMPs; needed improvements would be made.

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. On March 13, 2003, DNRC adopted the *Forest Management Rules* (*Administrative Rules of Montana [ARM] 36.11.401 through 450*). The *SFLMP* outlines the management philosophy, and the proposal will be implemented according to the *Forest Management 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 *Forest Management Rules*, DNRC has set the following specific project objectives:

- Harvest 5 to 7 MMbf of sawtimber to generate revenue for the appropriate school trusts. The sale 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 the 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*]).
- Reduce the potential of high intensity wildfires in the wildland urban interface between the Burlington Northern/Santa Fe railroad tracks and Fort Steele Road and in areas adjacent to Highway 93 and other lands and homesteads.
- Improve public access to Dog Lake on the east side.
- Under the *Federal Road Cost-Share Program*, DNRC proposes to obtain right-of-way on USFS Road 10355.
- Maintain options for sustained revenue to the school trusts and provide for additional benefits 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 public officials and citizens before decisions are made and actions are taken. *MEPA* requires the State government to consider environmental impacts in its decision-making 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 is given opportunity to express their comments or concerns about the possible impacts of the project.

In June 2006, DNRC solicited public participation on the Duck-to-Dog Timber Sale Proposal by placing notices in the Olney Post Office and weekly Tobacco Valley News and Whitefish Pilot newspapers. The Initial Proposal, including maps, was sent to adjacent landowners and individuals, agencies, industry representatives, and other organizations that had expressed interest in the management activities of Stillwater State Forest.

The public comment period for the initial project proposal was open for 30 days. A total of 4 responses

were received. The concerns identified through the public scoping were summarized and used to further refine the project.

INTERDISCIPLINARY TEAM (ID TEAM)

The ID Team is comprised of DNRC's wildlife and fisheries biologists, hydrologist, and several foresters. Early in 2006, the ID Team 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 resolving access issues. These concerns 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 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 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.

UNITED STATES FOREST SERVICE (USFS)

Commercial log hauling on USFS-owned roads requires a Temporary Road Use Permit (TRUP) from the USFS Tally Lake Ranger District.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS (DFWP)

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.

MONTANA DEPARTMENT TRANSPORTATION (DOT)

A Driveway Approach Permit issued by DOT is required for new road approaches onto State highways.

ISSUES AND CONCERNS

Throughout the scoping process, resource specialists of DNRC and other agencies and the public raised concerns about the project's potential impacts on the environment. These concerns were considered by DNRC during the development of the project alternatives (see *CHAPTER II - ALTERNATIVES*). A summary of the issues addressed in this EA are presented by resource in *TABLE I-1 – SUMMARY AND TRACKING OF ISSUES AND CONCERNS FROM PUBLIC COMMENTS.*

TABLE I-1—SUMMARIZATION 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 temporarily increase fire hazards from logging slash.	Pages II-10 and 11; pages III-7 through 9
	Insect infestations and disease infections have had varying levels of negative effect on stand health within the project area. Timber harvesting and the treatment of slash have the potential to improve these circumstances.	Page II-10 and III-6 and 7
	Timber harvesting in stands of old-growth timber may affect the amount and distribution of old growth remaining on Stillwater Unit.	Dismissed - Page I-7
	Disturbances from timber harvesting and the potential increases and/or decreases in water levels could have an effect on sensitive plants within the proposed harvest units.	Dismissed - Page I-7
	Soil disturbances and logging equipment could increase the amount and distribution of noxious weeds in the project area.	Pages II-11, III-9 and 10, and S&S-1
	Disturbances from timber harvesting could increase root diseases and insect infestations in remaining trees.	Pages II-10 and III-6 and 7
Fisheries	Actions related to the proposed timber sale may adversely affect fish populations and fish habitats (channel forms, stream temperature, and connectivity) within the Rock Creek, Upper Dog Creek, and Lower Dog Creek watersheds.	Pages II-14 and III-19 through 23
Water quality and water yield – sediment delivery	Timber harvesting and related activities, such as road construction, can lead to increased fine sediment production and delivery to streams. The construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and amounts of large woody material.	Pages II-11 and 12, pages III-27 through 30, and S&S-2

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Water quality and water yield – sediment delivery (continued)	Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal because the removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition.	Page II-12, III-27 through 30, and S&S-2
Soils	Actions related to the proposed timber sale may lead to compaction, displacement, and/or erosion.	Pages II-13, III-33 through 35, and S&S-2 and 3
Air Quality	Actions related to the proposed timber sale may lead to increased dust for residences in the vicinity of Olney and Radnor.	Page S&S-1; dismissed - Page I-7
Economics	State lands are managed to provide revenue over time to various State beneficiaries. The proposed action would generate revenue for Common Schools, Public Buildings, and Montana State University Second Grant. The economic analysis is one criteria used by the decisionmaker as guidance for formulating a decision.	Pages II-15 and III-38
Wildlife	Timber harvesting could remove important structure and canopy cover used by fishers, thereby reducing fisher habitat in the area.	Pages II-18, III-61 and 62, and S&S-4
	Timber harvesting and road construction could displace grizzly bears from important habitats and/or reduce grizzly bear security by decreasing hiding cover and visual screening.	Pages II-16 and 17, III-49 through 51, and S&S-3 and 4
	Timber harvesting could remove snags and snag-recruitment trees needed by pileated woodpeckers and other wildlife species, resulting in decreased habitat availability for these species.	Pages II-15, 16, and 19; III-44, 45, 54 57, 61 through 65; and S&S-4

RESOURCE AREA	CONCERN OR ISSUE	WHERE ADDRESSED IN EA PACKAGE
Wildlife (continued)	Timber harvesting and road management could disrupt white-tailed deer migration to their winter range.	Pages II-20; III-66 and 67; S&S-4
	Timber harvesting could disrupt connectivity of habitats used by forest-dwelling species.	Pages II-15; III-41 through 43; and S&S-4
	Unrestricted motorized access could lead to avoidance of adjacent habitats and predispose important habitat features (snags, coarse woody debris, etc.) to removal.	Pages II-15,16; III-44, 45, 49 through 51, 67, and 68
	Timber harvesting could reduce the amount and quality of old-growth habitat, thereby reducing habitat for old-growth-associated species.	Dismissed - Page I-7
	Timber harvesting could remove lynx habitat.	Pages II-17, 18; III-54 through 57; S&S-3
	Timber harvesting could improve habitat conditions, but could also result in the reduction of important habitat components for flammulated owls.	Dismissed - Page I-7
	Disturbance associated with timber harvesting and associated activities could reduce available nesting habitats by displacing adult loons from traditional nesting sites and/or decrease nesting success through disruption of incubation or nest abandonment	Pages II-19; III-58 through 60; S&S-4
	Timber harvesting could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.	Pages II-16; III-46, 47
	Timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.	Pages II-17; III-52, 53

ISSUES OUTSIDE THE SCOPE OF THE PROJECT

RECREATION

DNRC has approached DFWP about the possibility of improving recreational access on the east side of Dog Lake. Although any potential improvements made in the future are beyond the scope of this EA, a portion of Dog Lake Road would be relocated during this project in order to facilitate log hauling and meet BMPs; the road would potentially provide access for future recreational improvements.

A concern that Dog Lake would be fished out should recreational improvements be made was expressed by the public. Since future recreational improvements are outside the scope of this EA, so are the potential impacts those improvements could create.

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 could increase on each road system for a 3-month period; 7 to 10 trucks of logs could be hauled per day during full production. Depending on the season of harvest and weather conditions, road dust could become a problem. In cases where the DNRC Forest Officer and/or USFS engineers feel the dust level is unacceptable, dust abatement, such as magnesium chloride, on roads could be required during the dusty periods. Logging trucks would not be traveling through the towns of Radnor or Olney; therefore, dust created by harvesting activities would not affect the residents.

SENSITIVE PLANTS

The Montana Natural Heritage Program indicates that no known populations of federal- or State-listed species of concern are within the project area.

OLD GROWTH

DNRC's definition of old growth is those stands having the minimum number of trees per acre that have a minimum diameter and minimum age for a given site. These minimums are listed in Old Growth Forest Types of the Northern Region sensitive plants compatibility. Within the Stillwater Unit Analysis Area, *STW 2006 Stand Level Inventory (SLI)* data was reviewed. Models within the SLI identify stands that have the potential of meeting the DNRC old-growth definition. Within proposed project areas, field verification is conducted with either reconnaissance surveys or plot surveys. Information gathered would update or change SLI data as habitat types, live trees per acre, age of overstory, number and size of snags, etc.

Using SLI data, no potential old growth was identified in the Duck-to-Dog Timber Sale Project area; the nonpresence of old growth was confirmed with field reconnaissance.

ARCHAEOLOGY

The project area has been inspected for cultural resources by DNRC archaeologists; therefore, further investigation is not deemed necessary. A contract clause provides for suspended operations if cultural resources were discovered; operations may only resume as directed by the forest officer (see *STIPULATIONS AND SPECIFICATIONS*).

Chapter II – Alternatives

CHAPTER II
ALTERNATIVES

INTRODUCTION

This chapter describes the two alternatives for the Duck-to-Dog Timber Sale Project and summarizes the predicted effects of implementing each alternative. *TABLE II-2 - SUMMARY OF THE ENVIRONMENTAL EFFECTS* summarizes predicted effects from the detailed environmental analysis in *CHAPTER III – ENVIRONMENTAL EFFECTS.*

DEVELOPMENT OF ALTERNATIVES

The Duck-to-Dog Timber Sale Project area was proposed for a timber sale project in the fall of 2004. The project area was identified for timber harvesting primarily because of the need to reduce fuel loads and stocking densities on State lands in the vicinity of the private residences and adjacent to the Burlington Northern-Santa Fe Railroad and Highway 93 rights-of-way. The Duck-to-Dog Timber Sale Project area encompasses 5,199 acres of State trust lands.

Timber-stand management and harvesting recommendations were developed by analysis of *Stand Level Inventory (SLI)* data and conducting walk-through exams and internal discussions. Full descriptions of the No-Action and Action alternatives and a map for the action alternative are included.

Two primary criteria were used to prioritize stands for treatment:

- Several relatively large patches of overstocked stands are present. These areas have low growth rates and substantial mortality and decay frequencies. Tree mortality in these areas has resulted in heavy fuel loading and creating areas that are at high risk for high-intensity, stand-replacement wildfires. The first objective is to reduce fuel hazards within the Olney/Radnor rural interface.
- On a landscape level, the Stillwater State Forest was dominated by western larch, western white pine, lodgepole pine, and Douglas-fir. Years of fire suppression and selective logging have led to overstocked stands of shade-tolerant species such as subalpine fir, Engelmann spruce, and grand fir. The shade-tolerant species that currently dominate these areas are highly susceptible to stem rots and their associated loss of value as wood products. Additionally, these species are more susceptible to mortality during a wildfire. The second objective is to reduce stocking densities and move species composition toward historic covertypes.

After identifying the project area, this project was included in the Northwestern Land Office (NWLO) 2003 timber sale proposals. The ID Team members began work on the project in the spring/summer of 2005. The role of an ID team is to summarize issues and concerns, develop and define management options, and, in reference to issues, analyze predicted and potential impacts of a proposal on the human and natural environment.

Throughout 2005 and 2006, ID Team members and other DNRC personnel were involved in field reconnaissance and data collection in the project area. Information was collected on:

- existing roads to determine needs to improve surface drainage, ditch relief, stream crossings, and safety features;

- timber-stand characteristics, old-growth characteristics, noxious weeds, and sensitive plants;
- the type, size, and location of insect and disease problems;
- specific and general watershed characteristics; and
- wildlife habitat.

Field data was used in defining the project and analyzing the alternatives and their potential effects. Using this information within the framework of the *SFLMP* and *Forest Management Rules*, an initial proposal was developed. The initial proposal began the public scoping period.

Within the context of public comments, continuing field reconnaissance, and specific resource concerns, the ID Team considered the need or benefit of additional alternative development. The ID Team determined that the issues directly related to proposed actions could be addressed through minor changes in the project design and/or mitigation. Based on the determination of the ID Team, issues and concerns did not drive further alternative development. The ID Team developed an action proposal within the framework of the *SFLMP* and *Forest Management Rules*.

ALTERNATIVE DESCRIPTIONS

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

- ***No-Action Alternative***

  Under the No-Action Alternative, no timber harvesting, improvements to existing roads or stream crossings on access roads, or revenue generation for the appropriate school trusts would take place in the Duck-to-Dog Timber Sale Project area at this time. Winter recreation would continue to occur under commercial permits. Salvage logging, firewood gathering, recreational use, fire suppression, noxious-weed control, additional requests for permits and easements, and other ongoing management requests may occur. Roads may be maintained when funding is available and equipment is in the area. Nonpoint source sediment delivery (which is sediment that cannot be traced back to a single origin or source) from roads in violation of BMPs may occur. Seasonal road closures may be installed to protect water quality and investments in road maintenance. Natural events, such as plant succession, tree mortality due to insect infestations and disease infections, windthrow, down fuel accumulation, in-growth of ladder fuels, and wildfires, would continue to occur. Future proposed management activities, including timber harvesting, would go through the appropriate environmental analyses before implementation.

  The No-Action Alternative can 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.

- ***Action Alternative***

  The ID Team developed strategies for harvesting timber within the framework of the *SFLMP*. Opportunities for harvesting timber are identified based on current and desired timber-stand conditions. Proposed treatments were developed that would, in the long-term, move timber-stand conditions toward desired age classes, species compositions, structures, and stocking densities. Proposed treatments would also maintain long-term site productivity, thereby ensuring the long-term capability of trust lands to produce revenue for the trust.

Proposed unit locations and cost-share and existing roads are shown in *FIGURE II–1 – PROJECT AREA MAP FOR THE ACTION ALTERNATIVE*. The 2 relocated segments of road are not shown, but are located in Units 2A and 5.

Operating on existing open and restricted-use roads to access harvest units would minimize impacts to soil, water quality, and wildlife habitat and reduce the sale's road development costs. Two access roads would be relocated:

- On the east side of Dog Lake in Unit 5, the 1,000-foot segment to be relocated would better facilitate log hauling, and, thereby, improve access to the lake.
- The second relocated segment is 600 feet in length and provides safe access onto Highway 93, south of Radnor.

Additionally, 3 short temporary spur roads are proposed. These temporary roads would be reclaimed to reduce road maintenance costs and prevent motorized use after completing harvesting activities.

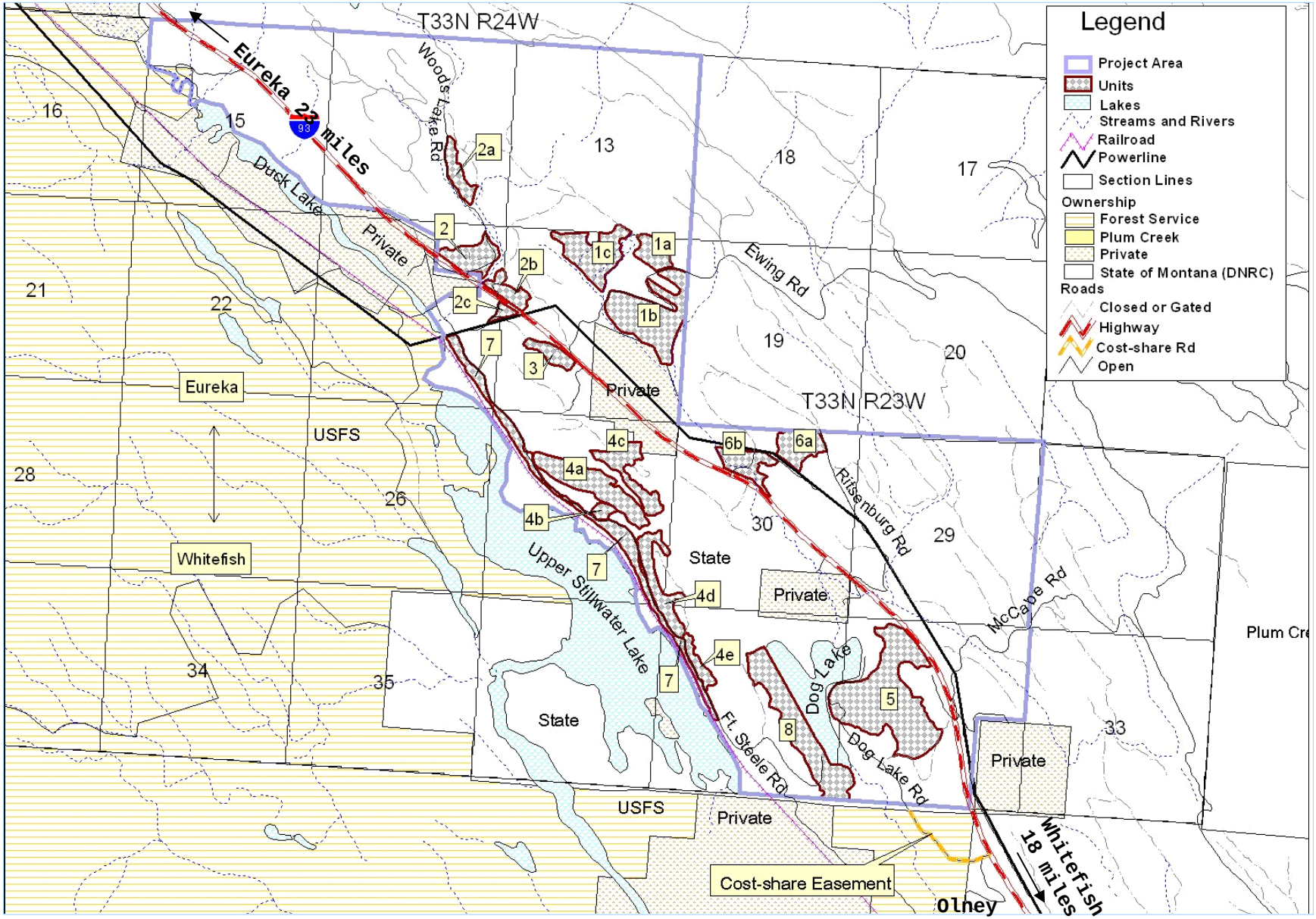
The main access road to harvest units east of Dog Lake is owned by USFS. Road 10355 begins at the junction of Highway 93 and runs through USFS ownership in Section 1, T32, R24. Under the *Federal Road Cost-Share Program*, DNRC proposes to purchase rights-of-way on USFS Road 10355.

Surveys of existing roads have been conducted in the Duck-to-Dog Timber Sale Project area to identify erosion and surface-drainage problems that could be improved to prevent sediment delivery to streams. In the proposed timber sale project area, sediment-delivery reduction and the implementation of BMPs would be accomplished through a road-development package. Improvements would include installation of road and ditch drainage features, graveling and grading road surfaces, and using slash filters and sediment fences near stream crossings and culverts. Fish movement would be improved by replacing a culvert with a culvert that enables fish passage. Additionally, a second culvert would be removed on a road that would be permanently closed, restoring the stream to free flow.

Under the Action Alternative, timber harvesting in the Duck-to-Dog Sale Timber Sale Project area would occur primarily in:

- areas with a high potential of man-caused ignitions. These include areas within the Olney/ Radnor urban interface, recreational sites, and stands situated adjacent to or nearby the railroad tracks and U.S. Highway 93.
- densely stocked, mature, mixed-conifer stands with species compositions dominated by shade-tolerant species.
- areas where the removal of tree species susceptible to root rot and bark beetles, such as Douglas-fir, subalpine fir, and grand fir in stands showing evidence of Armillaria root disease and/or western balsam fir beetle mortality, would allow the sawlog volume to be recovered from these trees prior to deterioration. This would open the site for introduction of a less susceptible species mix. With the reintroduction of less susceptible, seral species, such as western larch, ponderosa pine, and western white pine, damage due to disease would be reduced.
- Areas where the health and vigor of forest stands would be improved by reducing the stand density through thinning, favoring western larch and Douglas-fir, and salvaging trees

FIGURE II-1 – PROJECT AREA MAP FOR THE ACTION ALTERNATIVE



attacked by insects and diseases.

The stipulations and specifications designed to protect resources during harvesting and road-improvement activities are forms of mitigation measures that would be applied to the Action Alternative (see *STIPULATIONS AND SPECIFICATIONS*). These stipulations and specifications are incorporated into the Timber Sale or Site-Preparation contracts and are enforced during contract administration. Mitigation measures designed to reduce impacts on a particular resource are also discussed in *CHAPTER III - EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS.*

Under this alternative, approximately 5 to 7 MMbf would be harvested from an estimated 650 acres. A description of the harvest and silvicultural prescriptions proposed under this alternative is explained in *TABLE II-1 - PROPOSED SILVICULTURAL TREATMENTS BY UNIT FOR THE ACTION ALTERNATIVE* and provides details on the treatment methods, acreages, and volumes associated with the harvest areas.

PROPOSED SILVICULTURAL TREATMENTS

If the Action Alternative were chosen, several types of harvest treatments (silvicultural prescriptions) would be used to meet the described management objectives. A variation of silvicultural prescriptions across the landscape would emulate the effects of mixed-severity fires.

Preferred species for retention would be disease-free western white pine, western larch, Douglas-fir, western red cedar, and ponderosa pine.

For prescriptions specifying reserve trees, reserve trees would remain individually or in clumps within the harvest unit. Reserve trees would include seedtrees, existing snags, vigorous trees of various age classes, and large seral trees that have a high potential to become future cavity-nesting sites. To provide for structural and species diversity, small clumps of younger trees would also be retained as reserve trees.

In Streamside Management Zones (SMZs), limited harvesting may occur in compliance with the Montana SMZ law. Depending on an area's timber and hydrologic characteristics, harvesting in SMZs would be determined on a case-by-case basis. Many of the SMZs along perennial streams in the project area have been designated as wildlife-linkage corridors for fishers; therefore, no timber harvesting would occur in these corridors under this project.

The proposed silvicultural treatments would leave approximately 10 to 15 tons per acre of coarse woody debris (greater than 3 inches diameter) in harvest units following site preparation and hazard reduction.

Where available, 2 snags and 2 live recruitment trees greater than 21 inches diameter at breast height (dbh) per acre would be left as wildlife trees. If 2 snags cannot be found, up to 4 live recruitment trees of the next largest size class would be left.

Silvicultural treatments that would be applied to each harvest unit are specified in *TABLE II-1 - PROPOSED SILVICULTURAL TREATMENTS BY UNIT FOR THE ACTION ALTERNATIVE*. The following are descriptions of the silvicultural prescriptions proposed under the Action Alternative:

- Seedtree with reserves - Six to 10 large western larch, Douglas-fir, and/or western white pine seedtrees per acre, individually and in clumps, would provide seed sources, cavity-nesting sites, and for future snags. Reserve-tree selection is described above.
- Commercial thin – A partial

harvest of a stand of trees for economic gain and growth acceleration of the retained trees. Forty to sixty percent of the existing overstory would be harvested to reduce the stocking density and improve growth rates and vigor. The residual stand would consist of the most vigorous and, generally, largest diameter trees currently on site. Seral species (western larch, western white pine, and Douglas-fir) would be the favored leave trees in the stand.

- Improvement harvest – Cuts made to improve the form, quality, health, or wildlife potential of the remaining stand.
- Clearcut with reserves – The removal, in a single cutting, of most or all trees. Clearcutting most nearly matches the role formerly played by forest fires and is often considered the optimum method for regenerating lodgepole pine. Clearcutting would occur only in lodgepole-dominated stands. Where available, some residual trees would be retained as reserve and snag-recruitment trees.
- Combination treatment (seedtree with reserves, commercial thin, and/or improvement harvest) – This treatment would vary across a harvest unit, depending on stand conditions. Varying the prescription across the unit would help break up openings and create shapes that are more irregular to emulate the variation of natural disturbances across the landscape.

TABLE II-1 PROPOSED SILVICULTURAL TREATMENTS BY UNIT NUMBER FOR THE ACTION ALTERNATIVE **(Note: Acreages and volume may change based on final field work and unit layout.)**

UNIT NUMBER	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION AND HAZARD REDUCTION	METHOD OF REGENERATION IN AREAS BEING REGENERATED
1a	17	Seedtree with reserves	Tractor	238	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
1b	90	Seedtree with reserves	Tractor	840	Excavator pile and scarify; burn piles	Plant with western white pine
1c	44	Seedtree with reserves, winter logging required	Tractor	526	Whole tree skid to landing; slash; scalp	Plant western white pine and western larch
2	25	Seedtree with reserves	Tractor	250	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
2a	10	Seedtree with reserves	Tractor	70	Excavator pile and scarify; slash; burn piles	Plant western white pine
2b	18	Seedtree with reserves	Tractor	180	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
2c	5	Seedtree with reserves	Tractor	35	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
3	13	Seedtree with reserves	Tractor	65	Excavator pile and scarify; slash; burn piles	Plant western larch
4a	49	Seedtree with reserves, winter logging required	Tractor	440	Whole tree skid to landing; excavator pile and scarify (50 percent of unit); slash (50 percent of unit)	Plant western white pine

UNIT NUMBER	ACRES	TREATMENT	YARDING METHOD	HARVEST VOLUME (MBF)	SITE PREPARATION AND HAZARD REDUCTION	METHOD OF REGENERATION IN AREAS BEING REGENERATED
4b	5	Clearcut with reserves	Tractor	35	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
4c	29	Seedtree with reserves	Tractor	290	Excavator pile and scarify; slash; burn piles	Plant western white pine
4d	30	Improvement harvest	Tractor	150	Whole-tree skid	Fully stocked
4e	10	Seedtree with reserves	Tractor	70	Excavator pile and scarify; slash; burn piles	Plant with ponderosa pine
5	130	Improvement harvest	Tractor	1,230	Excavator pile and scarify; slash; burn piles	Plant with western white pine
6a	25	Seedtree with reserves	Tractor	350	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
6b	20	Seedtree with reserves	Tractor	140	Excavator pile and scarify; slash; burn piles	Rely on natural regeneration
7	60	Seedtree with reserves and commercial thin	Tractor	360	Excavator pile and scarify; burn piles	Fully stocked
8	57	Seedtree with reserves	Tractor	456	Excavator pile and scarify; burn piles	Plant with western white pine
	20	Commercial thin	Tractor	100	Whole tree skid to landing	Fully stocked

Total estimated volume: 5,825 Mbf
Total estimated acreage: 657

TABLE II-2 - SUMMARY OF ENVIRONMENTAL EFFECTS

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION		
Age class	***No-Action Alternative***	
	No changes would be expected.	Other forest-management actions on Stillwater State Forest would increase the amount of area in the 0-to-39-year age class by decreasing the percent of area from other age classes.
	Action Alternative	
	Approximately 5 acres of 40-to-99-year-old stands would be converted to 0-to-39-year-old stands, and 130 acres would be converted from the 150-plus stands to 0-to-39-year-old stands. Forest structure would be changed on approximately 650 acres.	Cumulative effects would be the same as under the No-Action Alternative.
Covertype	***No-Action Alternative***	
	No changes would be expected.	Other timber sale forest-management actions on Stillwater State Forest would increase the amount of western white pine and western larch/Douglas-fir covertypes by reducing mixed-conifer, subalpine fir, and lodgepole pine covertypes.
	Action Alternative	
	Approximately 205 acres of the mixed conifer, 73 acres of the western larch/Douglas-fir, and 110 acres of the subalpine fir covertypes would be converted to a western white pine covertype. Approximately 122 acres of the mixed-conifer covertype would be converted to a western larch/Douglas-fir covertype. Approximately 10 acres of the western larch/ Douglas-fir covertype would be converted to a ponderosa pine covertype. Approximately 125 acres of the western larch/ Douglas-fir covertype would remain the same.	Cumulative effects would be the same as under the No-Action Alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION (continued)		
Insects and diseases	***No-Action Alternative***	
	An increase in mortality due to the balsam fir beetle and *Armillaria* root disease is likely. The indirect effects of this would be the loss of sawlog value and an increase in fuels and wildfire potential.	Insect populations across the landscape would rise or fall based on natural disturbance events or climatic conditions.
	Action Alternative	
	Insect infestations and disease infections have decreased stand health in many of the stands within the project area. White pine blister rust has caused a high level of mortality in western white pine. The balsam bark beetle in conjunction with *Armillaria* root disease has caused pockets of mortality within subalpine fir and Engelmann spruce stands. Mortality rates have led to an increase in available fuels, thus indirectly increasing the potential of high-intensity wildfires. Timber harvesting and slash treatment would improve these conditions. In addition, harvesting would reduce the amount of trees susceptible to the balsam fir beetle by more than 450 acres. Approximately 400 acres would be planted with blister-rust-resistant western white pine seedlings.	Insect and disease populations would rise or fall based on natural disturbances or climatic conditions, and western larch regeneration would be promoted and managed for the long term, thereby improving resistance to insect and disease problems.
Forest fuels	***No-Action Alternative***	
	High levels of ladder fuels, down woody fuels, and high amounts of trees per acre would remain. The risk of high-intensity wildfires would remain higher than in the Action Alternative.	The reduction of fuels through logging practices in adjacent stands has reduced the potential of high-intensity wildfires.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
VEGETATION (continued)		
Forest fuels (continued)	***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.	The location of the proposed units, fuels reduction within harvest areas, and improved access to harvest units should decrease the potential for high intensity wildfires spreading onto adjoining private properties.
Noxious weeds	***No-Action Alternative***	
	Recreationalists using the project area would continue to introduce and spread weed seeds. No revenue would be collected to fund the noxious-weed program.	If funding remains available, weed spraying would reduce the current weed populations. Monitoring weed populations would continue as DNRC personnel travel the forest.
	Action Alternative	
	New infestations of noxious weeds and infestations of weeds not listed by Flathead County as noxious, such as woolly mullen, are likely to increase. Mitigations, such as weed spraying and equipment washing, should reduce potential for infestations within the forest.	If funding remains available, weed spraying would reduce the current weed populations. As surveys and the administration of postharvest activities occur within the project areas, monitoring of weed populations would continue.
HYDROLOGY		
Sediment Delivery	***No-Action Alternative***	
	No direct effects. Indirect effects would be an increased risk of erosion and sediment transport from upland road segments that do not meet applicable BMPs.	All existing sources of erosion and sediment transport from upland road segments would continue to recover or degrade as dictated by natural and preexisting conditions until a source of funding becomes available for repair.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
HYDROLOGY (continued)		
Sediment delivery (continued)	***Action Alternative***	
	Erosion control and BMPs would be improved on approximately 7.0 miles of existing road. The risk of sediment delivery to streams would be very low as a result of the proposed timber-harvesting activities. The removal of an existing culvert and a temporary stream crossing would generate sediment to the stream during removal activities. The sediment would be minimized by implementing all applicable BMPs.	Over the long term, with the installation of more effective surface drainage and erosion-control features on the existing road system, cumulative sediment delivery to streams in the project area would be lower than existing conditions. The removal of an existing culvert and a temporary stream crossing would increase the risk of sediment delivery for 2 to 3 years after project completion due to the exposure of bare soil. This risk would decrease as sites revegetate.
Water yield	***No-Action Alternative***	
	No direct effects would take place.	Existing harvest units would continue to revegetate and move closer to premanagement levels of water use and snowpack distribution.
	Action Alternative	
	The annual water yield would increase by an estimated 0.7 percent in the Dog Creek watershed, an estimated 0.1 percent in the Stillwater River-Hellroaring watershed, and an estimated 0.4 percent in the Rock Creek watershed. These levels of water–yield increase would not be sufficient to create unstable channels.	The removal of trees would increase the water yield in the Dog creek watershed from its current level of approximately 6.7 percent over unharvested to an estimated 8.4 percent, the Stillwater River-Hellroaring watershed from its current level of approximately 1.5 percent over unharvested to an estimated 1.6 percent, and the Rock Creek watershed from its current level of approximately 3.0 percent over unharvested to an estimated 3.4 percent. A low risk of adverse cumulative impacts to water quality would occur as a result of this alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
SOILS		
Soil productivity	***No-Action Alternative***	
	No direct or indirect effects to the physical properties of soils in the project area would be expected.	Existing impacts would improve or degrade as dictated by natural or preexisting conditions.
	Action Alternative	
	Based on DNRC soil monitoring, direct impacts would be expected on up to 59 of the total 656 acres proposed for harvesting. Soil monitoring conducted on DNRC-managed lands shows that sites of similar soils harvested on Stillwater State Forest with ground-based machinery had a range of impacts from 4.6 to 9.0 percent of the acres treated (*DNRC, 2004*). This range of impacts includes operations on dry, frozen, or snow-covered soils. As a result, the extent of impacts expected would likely be similar to those reported by *Collins (DNRC,2004)*, or 4.6 to 9.0 percent of ground-based harvested acres.	Approximately 50 acres with previous timber sale operations would be entered. Cumulative effects to soils may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. Existing skid trails, where compaction has begun to ameliorate through freeze-thaw cycles and revegetation, would return to a higher level of impact due to the Action Alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to soil physical properties under this alternative would still fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP* and are well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC, 1996)*.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
FISHERIES		
Fisheries populations and habitats	***No-Action Alternative***	
	Moderate to high impacts to native fisheries populations would occur. No impacts to nonnative fisheries populations would occur. Impacts to native and nonnative fisheries habitats would range from negligible to low. Other related actions would have a low impact to native and nonnative fisheries habitats.	Future related actions that are considered part of cumulative impacts are expected low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis areas. Cumulative impacts are expected to be low beyond the collective anticipated impacts described in *DIRECT AND INDIRECT EFFECTS*.
	Action Alternative	
	No additional impacts to native and nonnative fisheries populations are expected beyond those described for the No-Action Alternative. Additional impacts to native and nonnative fisheries habitats are expected to range from negligible to low.	The collective direct and indirect impacts to native and nonnative fisheries as a result of implementing this alternative are expected to be low. Future related actions that are considered part of cumulative impacts are expected to have low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis areas. Additional cumulative impacts to native and nonnative fisheries are expected to be low beyond those described for the No-Action Alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
ECONOMICS		
	No-Action Alternative	
	Revenue for the trust would not be realized at this time. Access rights would not change, and the value of this DNRC-managed State land would remain similar to current conditions.	The deferral of harvesting would change the region where trees are harvested and volumes taken, which would impact other areas of the State.
	Action Alternative	
	An estimated 5.8 MMbf would be harvested to meet DNRC's annual sustained-yield target of 53.2 MMbf. Approximately $1,422,931 would be deposited into the appropriate trust, and approximately $113,100 would be deposited into the FI account.	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 appropriate 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 shade-tolerant tree species with high amounts of canopy cover.	Continued use by species favoring dense stands of shade-tolerant tree species and those requiring larger areas of mature forests would be expected.
	Action Alternative	
	Proposed treatments would lead to younger, more-open stands, which could disrupt movements 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 habitat quality for species that prefer dense, mature forest conditions would be reduced.	Reductions in mature forested habitats associated with this alternative would be additive to losses associated with past harvesting activities. Extensive forested habitats would still exist in the analysis area and landscape connectivity would persist.
Snags and coarse woody debris	***No-Action Alternative***	
	No direct changes in 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 contribute to coarse woody debris in the area.	Snags and snag recruits have been retained with past harvesting in the vicinity. Wildlife relying on snags and coarse woody debris would be expected to persist across the analysis area.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued)		
Snags and coarse woody debris (continued)	***Action Alternative***	
	Present and future deadwood material could be reduced. Several snags and snag recruits would be retained within the proposed units. The quality of future snags would be enhanced.	The loss of snags and coarse woody debris associated with this alternative would be additive to losses from past harvesting and firewood gathering. Wildlife relying on snags and coarse woody debris would be expected to persist.
Threatened and Endangered Species		
Bald eagle	***No-Action Alternative***	
	No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels.	Disturbance associated with ongoing timber harvesting, development, and human recreation would continue. No further changes in bald eagle habitats or disturbance levels would be expected.
	Action Alternative	
	No harvesting would occur within the nest or primary-use areas associated with the known nest locations. Some displacement of bald eagles could occur.	Disturbance associated with this alternative would be additive to those associated with ongoing human development, recreation, and timber management.
Grizzly bear	***No-Action Alternative***	
	No direct effects would be expected. No changes in road densities, hiding cover, or security core would be anticipated.	No further changes to motorized access, security and hiding cover, and spring habitat would be anticipated. In the long term, though forest succession would continue and may reduce food sources, the amount of hiding cover may increase.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued)		
Threatened and Endangered Species (continued)		
Grizzly bear (continued)	***Action Alternative***	
	Disturbance could increase with harvesting and associated human access. Grizzly bears could be affected directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. No permanent changes to the status of existing roads would occur.	Open-road densities would temporarily increase, which would be additive to road use with ongoing projects, but no long-term changes are anticipated. Reductions in hiding cover would be additive to the reductions due to past DNRC timber sales and ongoing harvesting; however, considerable hiding cover exists.
Gray wolf	***No-Action Alternative***	
	Disturbance to wolves would not increase. No changes in wolf prey availability would be expected.	No changes to wolf prey or habitat use would be anticipated. No changes in the level of human disturbance would be expected.
	Action Alternative	
	Harvesting could disturb wolves using the area. After harvesting, wolf use of the project area would likely revert to preharvest levels. Shifts in prey availability could alter wolf use of the area.	Reductions in hiding cover within the project area could shift big game use; however, no appreciable changes at the wolf pack home-range level would be anticipated. No changes to den or rendezvous sites would be anticipated.
Canada lynx	***No-Action Alternative***	
	Habitats would persist. Through time, succession would change the distribution of lynx habitats; young foraging habitats would diminish as they mature. Existing closed roads and skid trails would remain closed; no changes in human disturbance levels would be expected.	Lynx habitats would not be affected in the near term. Succession would change the distribution of lynx habitats through time, improving several categories; however, foraging habitats are expected to decline as they age. No changes in human access would be expected with this alternative.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued)		
Threatened and Endangered Species (continued)		
Canada lynx (continued)	***Action Alternative***	
	Approximately 647 acres of lynx habitats would be harvested (mostly foraging); postharvest, these habitats would be temporarily unsuitable. Forest connectivity would largely be maintained through riparian buffers and other forested habitats in the project area. No changes to human access for recreational snowmobile use, and, therefore, lynx competition, would be anticipated.	Approximately 647 acres of lynx habitats would be harvested (mostly foraging); postharvest, these habitats would be temporarily unsuitable. Forest connectivity would largely be maintained through riparian buffers and other forested habitats in the project area. No changes to human access for recreational snowmobile use, and, therefore, lynx competition, would be anticipated.
Sensitive Species		
Fisher	***No-Action 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. No changes to human disturbance and potential trapping mortality would be expected.	No changes to fisher habitats would be anticipated. Ongoing harvesting may be reducing suitable fisher habitats. The amount of the Stryker Subunit meeting structural requirements for fisher use would remain at 85 percent. Neither landscape connectivity nor road access would change.
	Action Alternative	
	Approximately 22 of the 293 acres of riparian habitats would be harvested, reducing potential riparian fisher habitats from 201 acres (96 percent) to 187 acres (93 percent) in the project area. Approximately 450 of the 2,418 acres of fisher foraging and resting habitats in the uplands would be harvested, yielding stands too open for appreciable fisher use.	Reductions in potential fisher habitats would be additive to the losses associated with past and ongoing harvesting in the area. At the Stryker Subunit level, harvesting within riparian fisher habitats would reduce available habitats from 1,090 (85 percent) acres to 1,076 (84 percent) acres. Landscape connectivity would remain intact, and human disturbance and potential trapping mortality would remain relatively unchanged.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued)		
Sensitive Species (continued)		
Pileated woodpecker	***No-Action Alternative***	
	No direct effects would be anticipated. A reduction in suitable nesting trees is likely over time. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time, and then decline.	Stands on Stillwater State Forest have frequently been managed for attributes favorable for pileated woodpecker use. Ongoing harvesting would remove potential pileated woodpecker habitats while reducing the amount of mature forests.
	Action Alternative	
	Some temporary displacement could occur. Of the 904 acres of pileated woodpecker nesting habitat in the project area, roughly 251 acres (28 percent) would be proposed for treatment, which could reduce pileated woodpecker nesting. After the proposed harvesting, most of the 650 harvested acres would be too open to be considered pileated woodpecker habitat. Silvicultural treatments designed to recruit shade-intolerant tree species would benefit pileated woodpeckers in the distant future.	Recently harvested stands within Stillwater State Forest reduced some of the pileated woodpecker habitat; ongoing harvesting is further reducing those habitats. The loss of pileated woodpecker habitats associated with the proposed harvesting would be additive to these other losses. Additionally, continued maturation of stands across Stillwater State Forest is increasing suitable pileated woodpecker habitats.
Common loon	***No-Action Alternative***	
	No changes in available nesting habitats would be anticipated. No changes to human access to the lakes would occur.	No further changes to lake access or the level of recreational use would occur. Some shoreline development could continue; however, available nesting habitats would persist.
	Action Alternative	
	No changes in nesting habitats would be anticipated. No permanent roads, road development, or harvesting would occur within 500 feet of the traditional nest sites. Increases in human use due to improved access to Dog Lake are anticipated; no changes in use of Upper Stillwater Lake would be anticipated.	No further changes to nesting habitats would be anticipated. Some shoreline disturbance could continue. No additional changes to human access or level of recreational use for either lake would occur.

RESOURCE	DIRECT AND INDIRECT EFFECTS	CUMULATIVE EFFECTS
WILDLIFE (continued)		
Big Game		
Winter range	***No-Action Alternative***	
	Big game thermal cover 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. Ongoing sales within the winter range would continue to displace wintering big game and reduce available winter-range habitats.
	Action Alternative	
	Some displacement would be anticipated. Thermal cover would be largely removed from 650 acres. Proposed harvesting could stimulate browse production for big game species.	Reductions in thermal cover would be additive to past losses. This reduction in thermal cover and snow intercept on the winter range would be additive to ongoing and past reductions across the elk winter range. Displacement would also be additive to ongoing timber sales.
Elk security	***No-Action Alternative***	
	No changes in human access or elk security cover, habitat, hiding cover, and survival would be expected.	No changes would be anticipated in human access or elk security cover, hiding cover, or survival. Security habitat in the analysis area would largely persist, and ongoing reductions in hiding cover and habitats would continue.
	Action Alternative	
	No changes in elk security cover would be expected and minimal changes in elk vulnerability or hunter access would be anticipated. Hiding cover would be reduced on 650 acres.	Negligible impacts to big game survival would be anticipated. No changes in elk security cover would be expected. Reductions in hiding cover would be additive to reductions elsewhere in the analysis area.

Chapter III – Existing Environment And Environmental Effects

CHAPTER III

EXISTING ENVIRONMENT AND ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter presents both the existing environment of the project area and potential consequences to that environment by implementing the alternatives presented in *CHAPTER II - ALTERNATIVES*. Discussions of environmental consequences form the scientific and analytical basis for comparing the alternatives. Direct, indirect, and cumulative effects are disclosed. The means by which potential adverse effects would be reduced or mitigated are also described (see *CHAPTER II - ALTERNATIVES* and *STIPULATIONS AND SPECIFICATIONS*). The proposed action alternative is limited to the specific timber harvest, fuel treatments, reforestation activities, and road maintenance in the Duck-to-Dog Timber Sale Project area, although some components are analyzed across the Stillwater State Forest landscape. The description of the affected environment under the No-Action Alternative serves, in part, as a baseline to compare changes resulting from the Action Alternative.

The analysis of effects disclosed in this document includes those occurring from the entire "scope" of the decision. Scope is defined as the range of actions, alternatives, and impacts to be considered in an environmental review. The discussions of resources and potential effects take advantage of existing information included in the SLI and other project documents. The project files for the Duck-to-Dog Timber Sale Project include all project-specific information, such as resource reports and field investigation results.

DIRECT, INDIRECT, AND CUMULATIVE EFFECTS

Direct effects are those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but would be considerable in the foreseeable future. Cumulative effects result from incremental effects of actions, when added to other past, present, and reasonably foreseeable future actions, regardless of the agency or person that undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time.

VEGETATION ANALYSIS

INTRODUCTION

This section describes the existing vegetation conditions on Stillwater Unit as a whole and within the project area specifically, and how the no-action and action alternatives would affect the various components of this resource. A number of vegetation parameters could be affected by implementation of the alternatives, so each will be analyzed. Forest covertypes, insect and disease conditions, forest fuel conditions, and noxious weeds will be discussed to facilitate the analysis of direct, indirect, and cumulative effects. Past, present, and reasonably foreseeable activities are identified and considered in the analysis of effects.

BACKGROUND

The Forest Management Rules direct DNRC to take a coarse-filter approach to biodiversity by favoring an appropriate mix of stand structures and tree species composition; this appropriate mix is described as the desired future conditions on State land (*DNRC 2003*). To implement a coarse-filter approach and meet the directive, landscape-analysis techniques were used to determine the desired future conditions, including forest covertype representation, age-class distribution, and structural characteristics.

ANALYSIS METHODS

Current stand conditions will be compared to stand conditions that DNRC considers as 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*).

To assess the existing condition and effects 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.

The Stillwater *SLI*, specifically *STW SLI_2006*, was used to assign current covertypes. Areas displaying DNRC's desired future conditions have been delineated in the Forest Management Bureau's *Desired Future Condition DATASET* and are based on ecological characteristics found in *SLI* data such as landtypes, climatic sections, habitat types, and disturbance regimes. This information is available at the Stillwater Unit office in Olney.

ANALYSIS AREA

The coarse-filter analysis will consider historic conditions from Climatic Section 333c, which represents the Upper Flathead Valley (*Lozensky 1997*). The current and desired future forest conditions will be analyzed on forested lands administered by Stillwater Unit. Stillwater Unit administers Stillwater State Forest, Coal Creek State Forest, and most of the scattered lands north of Coal Creek State Forest in Flathead County and the northeastern portion of Lincoln County.

Condition assessments of insects, diseases, and fuels and the noxious weed and sensitive plant surveys were conducted on the 8 sections in the project area.

COVERTYPES AND AGE CLASSES

EXISITING CONDITION

Covertype refers to the dominant tree species that currently occupy a forested area. *TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES…* illustrates the current forest covertypes and desired future conditions, which means those covertypes that are appropriate for the site based on the ecological characteristics described above.

Data indicates, as illustrated by *TABLE III-1 - THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES…*, that mixed-conifer and subalpine fir stands are currently overrepresented in reference to conditions that DNRC feels appropriate for the site. The current covertype distribution is based on the current percent of species mix, fire and fire-suppression history, western white pine blister rust mortality, harvest history, and local site conditions.

Many of the species that make up the mixed-conifer and subalpine fir covertypes are shade tolerant, and stand structure tends to be multistoried. The multistoried structure has resulted, in part, from the ingrowth of the shade-tolerant trees over time. Therefore, the component of shade-tolerant species increases as the interval between disturbances, such as wildfires or harvests, is lengthened.

The western larch/Douglas-fir and western white pine covertypes are currently underrepresented on the forest in reference to the appropriate covertype distribution. Western larch and western white pine are not shade tolerant and have, historically, been perpetuated through fairly intensive disturbances such as wildfires. These disturbances most often created single- and two-storied stands of primarily western larch and Douglas-fir overstories and western larch, western white pine, and Douglas-fir understories. While western larch is not shade tolerant, past silvicultural treatments have promoted multistoried western larch/Douglas-fir stands with numerous age classes represented in small groups of trees within larger stands. Additionally, white pine blister rust infection has drastically affected the western white pine covertype. In reality, the number of healthy western white pine that occupies the canopy as overstory dominants have been on the decline for several decades.

TABLE III-1 – THE CURRENT AND DESIRED FUTURE CONDITIONS OF COVERTYPES ON FORESTED LAND ADMINISTERED BY STILLWATER UNIT (BY PERCENT)

COVERTYPE	CURRENT (%)	DESIRED OR APPROPRIATE COVERTYPE (%)
Douglas-fir	3.5	1.4
Subalpine fir	25.6	16.3
Lodgepole pine	10.7	9.9
Ponderosa pine	0.8	1.7
Mixed conifer	26.1	6.5
Western larch/Douglas-fir	24.5	47.4
Western white pine	2.6	14.8
Hardwoods	3.2	3.1
Area that does not have a covertype designated in the *SLI**	4.3	

**A major portion of those stands not inventoried with a covertype are from stands that were involved in the stand-replacement fires of the Moose Fire of 2001; when data was collected in 2001 and 2002, these areas were nonstocked. Reconnaissance since the fire and salvage harvest shows that many areas are regenerating to the early successional covertypes of primarily lodgepole pine or western larch/Douglas-fir.*

VEGETATION ANALYSIS

Age-class distributions delineate another characteristic important for determining trends on a landscape level. Comparing the entire Stillwater with historical data based on the Upper Flathead Valley and *Lozensky (1997), TABLE III-2 – DISTRIBUTION OF AGE CLASSES* shows that Stillwater Unit is low in the 0-to-39-year (seedling/sapling stands) and 100-to-150-year age classes, and high in the 40-to-99-year and 150-year-plus age classes. As recognized in forest management and by the *Forest Management Rules*, age-class distributions are not static and are quite dependant on disturbances, whether those are natural or implemented by man through silvicultural practices.

A fairly clear picture of the forest conditions emerges when distributions are combined with information on covertypes as displayed in *TABLE III-3 - AGE CLASS DISTRIBUTION OF CURRENT COVERTYPES*.

As was noted in *TABLE III-2 – DISTRIBUTION OF AGE CLASSES* and *TABLE III-3 - AGE CLASS DISTRIBUTION OF CURRENT COVERTYPES,* current age-class distributions are predominately in the oldest age class and mixed-conifer and subalpine fir covertypes. The stand structure of these older age classes tend to be multistoried; this occurs when a stand has progressed through time and succession to the point that shade-tolerant species, such as grand fir, Engelmann spruce, and

TABLE III-2 – DISTRIBUTION OF AGE CLASSES

AGE CLASS	HISTORIC PERCENT IN CLIMATIC SECTION M333C	HISTORIC ESTMATES OF PERCENT ON STILLWATER UNIT	CURRENT PERCENT
0-to-39-year	36	22.8	13.6
40-to-99-year	12	17.9	22.8
100-to-150-year	22	24.7	13.8
150-year-plus	29	32.8	45.8
No age provided in SLI*			3.9

**A major portion of these stands were partially burned in the Moose Fire of 2001; SLI updates in 2001 and 2002 could not discern which age class to assign these stands.*

TABLE III-3 - AGE CLASS DISTRIBUTION OF CURRENT COVERTYPES

CURRENT COVERTYPE	AGE CLASS					
	0 TO 39 YEARS	40 TO 99 YEARS	100 TO 149 YEARS	150 YEARS AND OLDER	NO AGE DATA	TOTAL ACRES
	NUMBER OF ACRES					
Douglas-fir	97	421	576	2,372	666	4,132
Hardwoods	118	123	69	64		374
Lodgepole pine	2,571	8,594	320	407	973	12,865
Mixed conifer	3,335	6,724	4,507	15,884	353	30,805
Ponderosa pine	170	0	525	192		887
Subalpine fir	3,946	6,525	4,116	16,823	304	31.714
Western larch/ Douglas-fir	404	4,269	5,816	16,121	2,242	28,852
Western white pine	360	198	325	2,140		3,023
Nonstocked	5,069					5,069
Total acres (total %)	16,071 (13.6)	26,854 (22.8)	16,254 (13.8)	54,007 (45.8)	4,538 (3.9)	117,721

subalpine fir, are replacing a shade-intolerant overstory, such as western larch. Currently 94 percent of the area within the 150-year-plus age class is multistoried and the amount depicted in the mixed-conifer and subalpine fir covertypes is nearly 5 times higher than the desired future condition on Stillwater Unit.

ALTERNATIVE EFFECTS TO COVERTYPES AND AGE CLASSES

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Covertypes and Age Classes***

  Neither covertypes nor age-class distributions in the analysis area would be directly or indirectly affected. Over time, lacking substantial disturbances such as timber harvests or wildfires, the proportion of seedling-/sapling-sized stands would gradually decrease.

- ***Direct and Indirect Effects of the Action Alternative to Covertypes and Age Classes***

  In the area where treatment is proposed for the mixed-conifer covertype, approximately 205 acres would be converted to the western white pine covertype and 122 acres would be converted to the western larch/Douglas-fir covertype. In the area where treatment is proposed for the subalpine fir covertype, approximately 110 acres would be converted to the western white pine covertype. In the area where treatment is proposed for the western larch/Douglas-fir covertype, approximately 73 acres would be converted to the western white pine covertype, 10 acres to the ponderosa pine covertype, and 125 acres would remain the same. Most of these treatments would result in two-storied stands with primarily western larch, Douglas-fir, and western white pine in the overstory; after regeneration, western larch, western white pine, lodgepole pine, and Douglas-fir would make up the understory. Overall, the Action Alternative would move stands within the proposed project area toward desired future conditions.

  Harvest treatments would convert approximately 5 acres of the 40-to-99-year age class to the 0-to-39-year age class. Approximately 130 acres of the 150+ age class would be converted to the 0-to-39-year age class. Although age class would change on only 135 acres, structure would be expected to change within all harvest units. Based on *SLI* methodologies, when the sawtimber component of a stand has greater than 10-percent canopy coverage, the stand will be evaluated and classified with the age class of that sawtimber component; therefore, not all areas of seedtree harvests would change to the 0-to-39-year age class. Most of the stands receiving harvest treatments are multistoried stands and would be converted to single- or two-storied stands; the overstory of these two-storied stands would consist primarily of older-aged western larch, Douglas-fir, and western white pine; in 2 to 3 years, a second story of western larch, lodgepole pine, western white pine, Douglas-fir, and, in some instances, ponderosa pine would regenerate. The created openings would be typical of mixed-severity fires. The proposed action would mimic the effects of historic fire behavior, creating openings for wildlife, reducing the potential of high intensity wildfires, and regenerating stands toward desired future conditions.

Cumulative Effects

- ***Cumulative Effects of Both Alternatives to Covertypes and Age Classes***

  The cumulative effects of timber-stand management on Stillwater State Forest trend toward increasing seral covertypes in areas where recent forest-

management activities have taken place.

In addition to the changes in covertype distributions from the proposed alternative, the stands involved in the stand-replacement fires of the 2001 Moose Fire have not been inventoried. Other timber sale projects have been initiated, but have not been completed; therefore, their effects are not represented in the *STW 2006 SLI*. These projects would increase the amount of western larch/Douglas-fir covertype over the analysis area and, subsequently, reduce the amount of area in the mixed-conifer, lodgepole pine, and subalpine fir covertypes. The Stillwater State Forest precommercial thinning program thins 200 to 500 acres of sapling stands a year. These thinnings often favor the retention of western larch, western white pine, and, in some cases, Douglas-fir covertypes.

In addition to the changes in age-class distributions from the proposed alternative, other timber sale projects have been initiated, but have not been completed; therefore, their effects are not represented in the *STW 2006 SLI.* These projects and wildfires are estimated to increase the amount of area in the 0-to-39-year age class by slightly decreasing the area in older stand classes.

INSECTS AND DISEASES

EXISTING CONDITIONS

Insects and diseases are natural components of a healthy ecosystem. In most forest ecosystems, they provide food and habitat for a variety of wildlife and are the major nutrient recyclers for soils. Insects and diseases commonly cause mortality in large forested areas and can affect a number of resource values.

The Duck-to-Dog Timber Sale Project area is showing a high incidence of western balsam bark beetles and *Armillaria* root disease. In addition, dwarf mistletoe and Douglas-fir, mountain pine, and spruce bark beetles are also present.

Armillaria is caused by fungi, which live as parasites on live host tissue or on dead woody material. As parasites, the fungi cause mortality, wood decay, and growth reduction and infect and kill trees that have been already weakened by competition, other pests, or climatic factors. The fungi can also infect healthy trees, either killing them outright or predisposing them to attacks by other fungi or insects. *Armillaria* kills in a pattern of progressively expanding disease centers. These centers develop in managed or unmanaged stands and vary from small areas affecting several trees to areas of up to 1,000 acres. Within disease centers and on their expanding margins, trees in varying stages of decline are normally present. One or all species and sizes of conifers may be affected (*Morrison, 1981*).

The western balsam bark beetle is the most destructive insect pest of subalpine fir. Low populations maintain themselves in trees weakened by old age and root disease, storm-damaged trees, or slash. During periods of drought or other environmental stress, infestations can build and spread to

less susceptible stands. Cumulative mortality may reach significant levels in chronically infested stands. An estimated 35 percent of subalpine fir mortality is due directly to attack by beetles (*Bleiker et al, 2003*).

ALTERNATIVE EFFECTS

Direct and Indirect Effects

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

  Mortality from insects and diseases would likely continue and, in many cases, increase, causing loss of sawlog volume and value. Additionally, as mortality continues, the accumulation of standing and down woody debris would continue, and wildfire hazard would increase.

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

  Mortality from some insects and diseases that are currently active in the project area would likely continue. The amount of mortality would significantly decrease as older, decadent components of the timber stands are harvested and eventually replaced with young vigorous trees and species susceptible to current insect infestations and disease infections, such as subalpine fir, are reduced and replaced by more resistant species.

  Much of the sawlog volume in the project area that is most susceptible to loss of value from stem rot infection would be harvested. Some mortality from root rot could appear shortly after harvesting due to a build-up of the disease on stumps and in root systems, but the species mix being retained and regenerated by the proposed harvest would be far less susceptible to root rot.

Cumulative Effects

- ***Cumulative Effects of Both Alternatives to Insects and Diseases***

  Forest-management treatments similar to the ones proposed in this project are being proposed and initiated on Stillwater State Forest. These treatments promote regeneration and retain a diverse species mix of trees that are more vigorous and less susceptible to insect and disease attacks.

FOREST FUELS

Fire behavior, such as occurrence and intensity, can be predicted based on stand conditions such as covertype, tree species, age class, etc. *Fischer and Bradley* categorize stands into fire regime groups in the USFS General Technical Report *Fire Ecology of Western Montana Forest Habitat Types*. Within the harvest units, 3 fire regime groups exist.

EXISTING CONDITIONS

The majority of the stands in the harvest units (83 percent) are in Fire Group 11. Fire Group 9 represents 12 percent, and the remaining 5 percent is in Fire Group 7.

Fire Group 11 is typified by warm, moist grand fir, western red cedar, and western hemlock habitat types. Fuel loadings average 25 tons per acre, which exceeds that of any other fire group in western Montana (*Fischer et al. 1987*). Up to 10 species of conifers may occur in these predominantly mixed-conifer stands. Historically, forests that experienced mixed-severity fire regimes have varying densities of subalpine fir, Douglas-fir, grand fir, and western larch, depending on their location. These forests constituted a mosaic of even-aged stands resulting from stand-replacing fires interspersed with uneven-aged stands that experienced low-severity surface fires and intermittent tree regeneration (*Brown et al. 1986*). In mixed-

severity fire regimes, climate and fuels interact in a complex manner to control the frequency and severity of fires. *Arno (1980)* describes this interaction in mixed-severity fire regimes: "Under severe burning conditions, especially with strong winds, fires sometimes crowned and covered sizeable areas. When conditions moderated, fire would creep along the ground with occasional flare-ups. Often the major fires burned at several intensities in reaction to changes in stand structure, fuel loadings, topography, and weather. The result was a mosaic of fire effects on the landscape." In mixed-severity regimes, both climate and fuels (surface and ladder fuels) vary considerably and are important drivers of fire frequency and severity.

Fire Group 9 is typified by moist subalpine fir habitat types (*Fischer et al. 1987*). This fire group is a collection of subalpine fir, Engelmann spruce, lodgepole pine, and Douglas-fir. Although the habitat type and species composition differ from Fire Group 11, the fire regime is quite similar.

A small portion of the proposed project area is classified in Fire Group 7, which is defined as a cool habitat usually dominated by lodgepole pine. Douglas-fir, Engelmann spruce, and subalpine fir are also a component of this Fire Group. Fuel loadings tend to be less (approximately 15 tons per acre) than Fire Groups 9 and 11; however, the mean fire interval is much higher. Recurring low intensity wildfires thin and rejuvenate stands without doing serious damage; however, in stands that have not burned in more than 60 years, fuels can build up to hazardous levels.

Much of the standing dead and down fuels within the proposed harvest units are the result of blowdown from weather events, insects, and diseases. Despite the heavy fuel loadings that characterize these stands, fire hazard is normally low to moderate under normal weather conditions; however, Stillwater State Forest has been experiencing drought conditions for the past 10 years, which potentially sets the stage for severe, widespread fires.

ALTERNATIVE EFFECTS

Direct and Indirect Effects

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

  Stands would continue to retain ladder fuels and downed woody fuels and have very high amounts of trees per acre until a disturbance, man-caused or natural, occurs. Risks of torching and crown fires would likely increase. As trees in the recently harvested stands adjacent to the project area grow, ladder fuels would increase.

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

  Areas treated with clearcut, seedtree, and thinning treatments would retain approximately 10 to 15 tons of large woody debris following site-preparation treatments. During the first season after harvesting, the risk of wildfire may increase due to the high amount of slash loading. Although the potential for fire is always present, ladder fuels to crowns would be removed in the proposed harvest units and fuel treatments would limit the fire intensity under most circumstances. As a result, fire hazards would be substantially reduced for an extended period of time.

  The proposed harvesting would decrease the risk of wildfires spreading onto adjacent lands and homesites. The thinning and removal of forest fuels and the slash piling and burning of downed woody fuels would be expected to decrease fire intensities, which

would allow firefighters to control fires more easily.

Cumulative Effects

- ***Cumulative Effects of the No-Action and Action Alternatives to Forest Fuels***

  Past harvest history and fuel treatments have created age-class mosaics across the landscape of Stillwater State Forest. These mosaics break up the continuity of fuels and behave as fire breaks. Maintaining an age-class mosaic in conjunction with fuel-treatment projects would reduce the potential of high-intensity wildfires.

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, thus reducing the value and productivity of the land. Most noxious weeds are exotic species, originating in Eurasia (*Flathead County Weed-Management Plan*). Montana has declared 15 weeds noxious; Flathead 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. John’s-wort (*Hypericum perforatum*)
- Sulfur cinquefoil (*Potentilla recta*)
- Orange hawkweed (*Hieracium aurantiacum*)
- Oxeye daisy (*Chrysanthemum leucanthemem*)
- Hound’s-tongue (*Gynoglos sum officianle L.*)

The first 5 species listed are Category 1 weeds, which are established weeds with high disbursement; the Hound’s-tongue is a Category 2 weed, which is established, but has a moderate disbursement level. These weeds are not invading weed species new to Flathead County; new invading weed species would be listed as Category 3 weeds.

Spotted knapweed, the most widely distributed noxious weed in the project area and on Stillwater State Forest, is found in areas where ground disturbances, such as landings, skid trails, powerlines, and roadsides, occur.

ALTERNATIVE EFFECTS

Direct and Indirect Effects

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

  Additional mineral soil would not be exposed and heavy tree canopies would continue to compete with weeds; therefore, the risk of additional establishment of weed populations would not increase. Currently, the project area is used extensively for dispersed recreation, and weed seed is introduced primarily from motor vehicle use. Established infestations of noxious weeds are being addressed with an ongoing program of site-specific herbicide spraying along roads and in small areas of infestation.

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

  The proposed activities would result in an increase in ground disturbance. Mechanized equipment and ground disturbance could increase or introduce noxious weeds along roads and throughout forested areas. Weed seeds could be scattered throughout the forested areas, and the reduction of canopy and resulting disturbance from the timber-harvesting activities are expected to provide the catalyst for spread; therefore, mitigation measures to reduce this problem could include:

- washing equipment before entering the site,
- sowing grass seed on roads after harvesting has been completed, and
- applying herbicide applications along roadsides and on spots of weed outbreaks.

Cumulative Effects

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

  The open roads in the project area have traffic from dispersed recreation, forest-management activities, and other uses on a regular basis. These disturbances increase exposure to weed establishment. Over time, the weed-management program at Stillwater Unit, including cooperation with the USFS and weed department of Flathead County, has improved. If funding remains available, some large populations of weeds in the analysis area would be treated to reduce weed populations.

FISHERIES ANALYSIS

INTRODUCTION

The purpose of this fisheries analysis is to assess potential impacts to fisheries within the Duck-to-Dog Timber Sale project area as a result of the proposed project's No-Action and Action alternatives. The results of this procedural and resource-specific analysis are summarized in *CHAPTER II - ALTERNATIVES* of this EA.

This is a summary of the full analysis, which can be found within the project file.

The 21 harvest units within the project area lie primarily within 4 different subwatersheds (analysis areas) draining to Stillwater River. From north to south are the Rock Creek, Upper Dog Creek, Lower Dog Creek, and Upper Stillwater Lake watersheds (see *MAP III-1 – DUCK-TO-DOG TIMBER SALE PROJECT AND ANALYSIS AREAS*).

ANALYSIS METHODS

The existing conditions of fish populations and habitats will be described for each analysis unit under the *EXISTING CONDITIONS* section of this analysis. The *ENVIRONMENTAL EFFECTS* section will compare the existing conditions in each analysis area to the anticipated effects of the proposed No-Action and Action alternatives to determine the foreseeable impacts to associated fish populations and habitats.

Analysis methods are a function of the types and quality of data available for analysis, which varies among the different analysis areas. The analyses may either be quantitative or qualitative. The best available data for both populations and habitats will be presented separately for the Rock Creek, Upper Dog Creek, Lower Dog Creek, and Upper Stillwater Lake analysis areas.

In terms of the risk that an impact may occur, a low risk of an impact means that the impact is unlikely to occur. A moderate risk of an impact means that the impact may or may not (50/50) occur. A high risk of an impact means that the impact is likely to occur.

A very low impact means that the impact is unlikely to be detectable or measurable and is not likely to be detrimental to the resource. A low impact means that the impact is likely to be detectable or measurable, but the impact is not likely to be detrimental to the resource. A moderate impact means that the impact is likely to be detectable or measurable and is likely to be moderately detrimental to the resource. A high impact means that the impact is likely to be detectable or measurable and is likely to be highly detrimental to the resource.

Cumulative impacts are those collective impacts on the human environment of the proposed action when considered in conjunction with other past, present, and future actions related to the proposed action by location or generic type (*75-1-220, MCA*). The potential cumulative impacts to fisheries in the analysis areas are determined by assessing the collective anticipated direct and indirect impacts, other related existing actions, and future actions affecting the fish-bearing streams.

In order to adequately address the issues raised during scoping, the existing conditions and foreseeable environmental effects to fisheries in the analysis areas will be explored using the following outline of issues and subissues:

- Fisheries Populations – Presence/ Absence
- Fisheries Habitat – Channel Forms
  - Fisheries Habitat – Sediment
  - Fisheries Habitat – Flow Regimes
  - Fisheries Habitat – Large Woody Debris

- Habitat – Stream Temperature
  - Fisheries Habitat – Stream Shading
- Habitat – Connectivity
- Existing Collective Impacts and Cumulative Effects

Connectivity was analyzed using the *National Inventory and Assessment Procedure for Identifying Barriers to Aquatic Organism Passage at Road-Stream Crossings* (*Clarkin et al 2003), stream channel cross-sections, Cowan {1956) WinXSPRO (1998), and FishXing (1999*).

See *CHAPTER II – ALTERNATIVES* in this document for detailed information, specific mitigations, and road-management plans pertaining to the No-Action and Action alternatives.

ANALYSIS AREAS

In order to evaluate existing and potential impacts to fisheries within the project area, 4 different analysis areas that contain distinct fisheries distributions were initially identified. From north to south are the Rock Creek, Upper Dog Creek, Lower Dog Creek, and Upper Stillwater Lake watersheds (see *MAP III-1 – DUCK-TO-DOG TIMBER SALE PROJECT AND ANALYSIS AREAS*). The initial analysis areas were chosen because they include (1) the watersheds of fish-bearing streams or lakes and (2) the proposed harvest units and associated roads that could have foreseeable measurable or detectable impacts to those fish-bearing streams or lakes. The analysis areas are also delineated using 6th code HUC scale or smaller watershed boundaries.

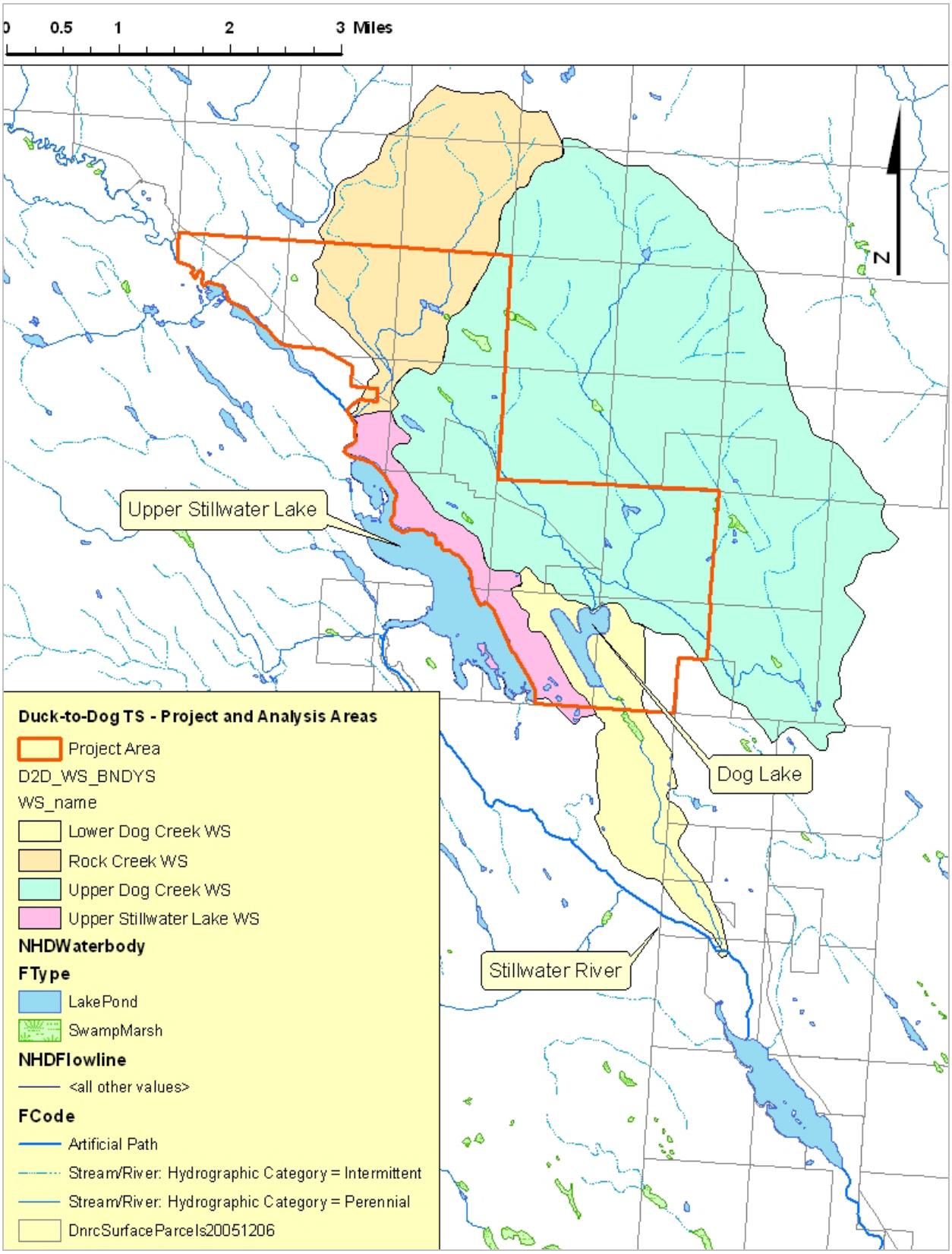
WATERBODIES DISMISSED FROM FURTHER ANALYSIS

After additional review and consideration of (1) the extent and location of the analysis areas, (2) the issues raised during scoping, (3) the extent and location of the proposed harvest units and associated roads, (4) the fisheries-related resource mitigations, and (5) the location of an existing railroad prism (*MAP III-2 – DUCK-TO-DOG TIMBER SALE PROPOSED HARVEST UNITS*), the determination was made that the assessment of potential impacts to fisheries in the Upper Stillwater Lake analysis area does not need to occur any further in this fisheries analysis. The rationale for this determination includes: (1) no known fish-bearing streams or lakes are located east of the existing railroad prism in this analysis area; (2) no known streams in the analysis area would readily facilitate the direct delivery of sediment or other materials to Upper Stillwater Lake or Stillwater River; and (3) the existing railroad prism would likely prevent any indirect delivery of sediment or other materials to Upper Stillwater Lake or Stillwater River. No potential adverse impacts associated with the proposed Action Alternative to the fisheries habitat features of large woody debris, stream temperature, or stream shading are expected in this analysis area. In conclusion, no foreseeable measurable or detectable direct, indirect, or cumulative effects to fisheries resources are expected in the Upper Stillwater Lake analysis area.

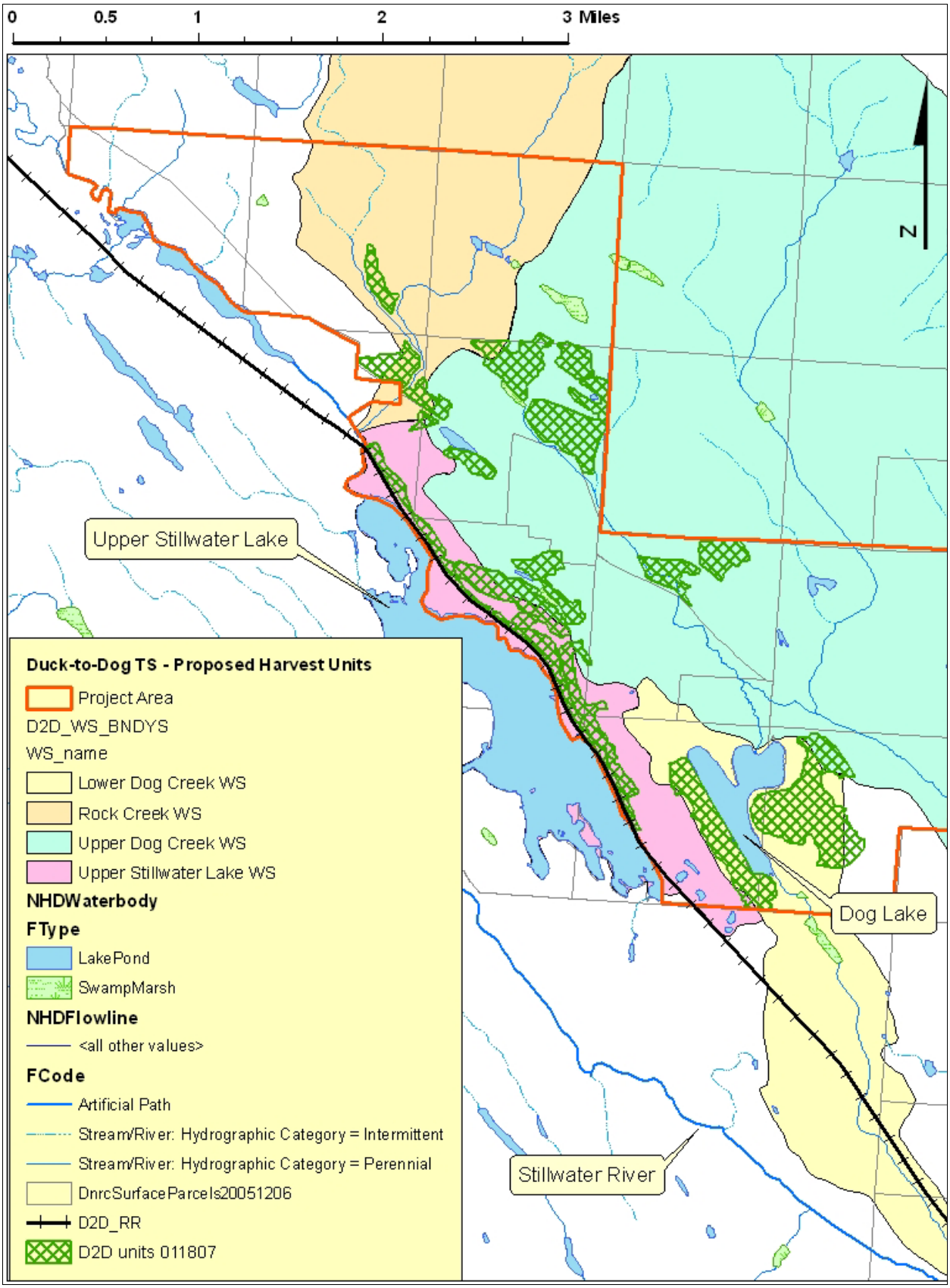
EXISTING CONDITION

The proposed Action Alternative would potentially impact the Stillwater River drainage adjacent to the project area, which includes the Rock Creek, Upper Dog Creek, Upper Stillwater Lake, and Lower Dog Creek watersheds. This drainage and its tributaries are not identified on the 1996, 2002, 2004, or 2006 Montana 303(d) lists as impaired streams and are classified as B-1 in the *Montana Surface Water Quality Standards* (*ARM 17.30.608(b)(i)*). The B-1 classification is for multiple beneficial use waters including the growth and propagation of cold-water fisheries and associated aquatic life. Among other criteria for B-1 waters, a 1 degree Fahrenheit maximum increase above the naturally occurring water

MAP III-1 – DUCK-TO-DOG TIMBER SALE PROJECT AND ANALYSIS AREAS



MAP III-2 – DUCK-TO-DOG TIMBER SALE PROPOSED HARVEST UNITS



temperature is allowed within the range of 32 to 66 degrees Fahrenheit (0 to 18.9 degrees Celsius), and no increases are allowed above naturally occurring concentrations of sediment or suspended sediment, which will harm or prove detrimental to fish or other wildlife. In regard to sediment, 'naturally occurring' includes conditions or materials present from runoff or percolation from developed land where all reasonable land, soil, and water conservation practices have been applied (*ARM 17.30.603[19]*). Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses (*ARM 17.30.603[24]*). The State has adopted Forestry BMPs through its *Non-point Source Management Plan* as the principle means of controlling non-point source pollution from silvicultural activities (*Thomas et al 1990*).

- ***ROCK CREEK ANALYSIS AREA***

  Approximately 9.1 total miles of streams (all stream types) flow through the Rock Creek analysis area. All stream reaches in this analysis area were surveyed during 2005 or 2006 to determine the presence and distribution of different fish species. (Presence/ absence survey details can be found in the project file.) Approximately 3.1 miles of these streams are fish-bearing. Nonnative eastern brook trout are found in all of the fish-bearing reaches, and westslope cutthroat trout may occasionally be found in the lowest 0.6 miles of Rock Creek. Under the presumption that all of the fish-bearing reaches were utilized to some degree as habitat by westslope cutthroat trout during presettlement, the species displacement by eastern brook trout in 2.5 miles of the stream represents a moderate risk of high impacts to existing native fisheries presence in the analysis area. No apparent impacts to nonnative fisheries presence occur in the analysis area.

  The existing conditions of channel forms in fish-bearing reaches will be addressed by evaluating the collective characteristics of sediment, flow regime, and large woody debris features.

  Considering stream morphology and type, coarse-filter surveys of the fish-bearing reaches have found that relative proportions of substrates comprising stream channel forms appear to be representative of the expected ranges of substrates that would otherwise be found in unmanaged watersheds. (Stream survey details can be found in the project file.) The *HYDROLOGY ANALYSIS* has estimated that low levels of road material are currently contributed to streams in the Rock Creek analysis area. The *HYDROLOGY ANALYSIS* has also estimated that the existing average departure in flow regime is approximately 3.0 percent above the range of naturally occurring conditions in the Rock Creek analysis area. The zone of recruitable large woody debris is defined in this project as the lateral distance from the streambank to a point equal to the average site potential tree height at 100 years for dominant and co-dominant tree species in the project area; in this case, 103 feet. (Site potential tree height sample data can be found in the project file.) An analysis of the total area of recruitable large woody debris to fish-bearing streams and the total area affected by past management activities (e.g. any timber harvesting, road construction) indicates that approximately 3.3 percent of the area of recruitable large woody debris to fish-bearing streams has been impacted to some degree by past management activities. Considering existing sediment conditions and potential road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a

moderate risk of low impacts to channel forms occurs in the analysis area.

Although many different variables affect the natural fluctuations and ranges of stream temperatures (e.g. groundwater inflows, loss of flow, stream gradient, stream width-to-depth ratio, volume), stream shading is the variable that typically has the greatest affect on stream temperatures in headwater streams and is also the variable most likely affected by management activities. For practical purposes, the zone of vegetation that is considered to have the greatest effect on stream shading in headwater streams in the project area is generally confined to the area within the lateral extent of the average site potential tree height; in this case, 103 feet. An analysis of the total vegetation zone providing stream shading to all connected fish-bearing and non-fish-bearing streams and the total area affected by past management activities (e.g. any timber harvesting, road construction) indicates that approximately 8.6 percent of the area of total vegetation zone providing stream shading has been impacted to some degree by past management activities. Based on this simple assessment, a moderate risk of low impacts to stream temperatures likely exists in the analysis area.

Connectivity is the measure of fish passage or migration potential throughout a stream system. No naturally occurring fish-passage barriers are known to occur in the analysis area. Five road-stream crossings occur within the analysis area, 4 of which have variable adverse impacts to fisheries connectivity. As adult fish are currently able to migrate through most of the road-stream crossing sites and access 94 percent of the available habitat in the analysis area, consequent impacts to spawning and various life-stage expression are likely low.

Other related existing actions within the analysis area include general harvesting, road maintenance, and site-preparation associated with the Ewing Middle Timber Sale Project (approximately 126 acres) and occasional recreational fishing. These other related existing actions are considered to have a general low impact to fisheries in the analysis area.

Considering a moderate risk of high impacts to species presence, a moderate risk of low impacts to channel forms, a moderate risk of low impacts to stream temperature, a low impact to connectivity, and a general low impact from other related actions, a moderate to high collective impact to native fisheries likely exists in the Rock Creek analysis area. An existing low collective impact to nonnative fisheries may occur.

- ***UPPER DOG CREEK ANALYSIS AREA***

Approximately 25.6 total miles of streams (all stream types) flow through the Upper Dog Creek analysis area. All stream reaches in this analysis area were surveyed during 2005 or 2006 to determine the presence and distribution of different fish species. (Presence/absence survey details can be found in the project file.) Approximately 12.0 miles of these streams are fish-bearing. Nonnative eastern brook trout are found in 11.1 miles of the fish-bearing reaches; westslope cutthroat trout are only found in the uppermost 0.9 miles of Dog Creek and in Mystery Lake. Under the presumption that all of the fish-bearing reaches were utilized to some degree as habitat by westslope cutthroat trout during presettlement, the species displacement by eastern brook trout in 11.1 miles of stream represents a moderate risk of high impacts to existing native fisheries presence in the analysis area. No apparent impacts to

nonnative fisheries presence occur in the analysis area.

The existing conditions of channel forms in fish-bearing reaches will be addressed by evaluating the collective characteristics of sediment, flow regime, and large woody debris features. Considering stream morphology and type, coarse-filter surveys of the fish-bearing reaches have found that relative proportions of substrates comprising stream channel forms appear to be representative of the expected ranges of substrates that would otherwise be found in unmanaged watersheds. (Stream survey details can be found in the project file.) The *HYDROLOGY ANALYSIS* has estimated that low levels of road material are currently contributed to streams in the Upper Dog Creek analysis area. The *HYDROLOGY ANALYSIS* has also estimated that the existing average departure in flow regime is approximately 6.7 percent above the range of naturally occurring conditions in the Upper Dog Creek watershed. An analysis of the total area of recruitable large woody debris to fish-bearing streams and the total area affected by past management activities (e.g. any timber harvesting, road construction) indicates that approximately 7.4 percent of the area of recruitable large woody debris to fish-bearing streams has been impacted to some degree by past management activities. Considering existing sediment conditions and potential road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a moderate risk of low impacts to channel forms occurs in the analysis area.

An analysis of the total vegetation zone providing stream shading to all connected fish-bearing and non-fish-bearing streams and the total area affected by past management activities (e.g. any timber harvesting, road construction) indicates that approximately 5.7 percent of the area of total vegetation zone providing stream shading has been impacted to some degree by past management activities. Based on this simple assessment, a moderate risk of low impacts to stream temperatures likely occurs in the analysis area.

One naturally occurring fish passage barrier occurs in the SE1/4SE1/4, Section 18, T33N, R23W. This fish passage barrier is a 200-foot cascade with several impassable waterfalls, which isolates upstream westslope cutthroat trout from invasion by downstream eastern brook trout. Fifteen road-stream crossings occur within the analysis area, 11 of which have variable adverse impacts to fisheries connectivity.

As adult fish are currently able to migrate through most of the road-stream crossing sites and access 93 percent of the available habitat in the analysis area, consequent impacts to spawning and various life-stage expression are likely low.

Other related existing actions within the analysis area include general harvesting, road maintenance, and site-preparation associated with the Dog North (approximately 284 acres) and Dog South (approximately 620 acres) timber sales and occasional recreational fishing. These other related existing actions are considered to have a general low impact to fisheries in the analysis area.

Considering a moderate risk of high impacts to species presence, a moderate risk of low impacts to channel forms, a moderate risk of low impacts to stream temperature, a low impact to connectivity, and a general low impact from other

related actions, a moderate to high collective impact to native fisheries likely exists in the Upper Dog Creek analysis area. An existing low collective impact to nonnative fisheries may occur.

- ***LOWER DOG CREEK ANALYSIS AREA***

Approximately 2.9 total miles of streams (all stream types) flow through the Upper Dog Creek analysis area. Dog Lake, which is connected to Dog Creek within the analysis area, is approximately 102 acres in area. All stream miles within the analysis area are fish-bearing. Nonnative eastern brook trout and occasional westslope cutthroat are found in all streams. Nonnative eastern brook and northern pike are found in Dog Lake, along with occasional westslope cutthroat trout and nonnative yellow perch. Due to some level of displacement by nonnative fish, a moderate risk of moderate impacts to existing native fisheries presence occurs in the analysis area. No apparent impacts to nonnative fisheries presence occur in the analysis area.

The existing conditions of channel forms in fish-bearing reaches will be addressed by evaluating the collective characteristics of sediment, flow regime, and large woody debris features. Considering stream morphology and type, there are no apparent features or hydrologic conditions that indicate the proportions of substrates comprising stream channel forms would not be representative of the expected ranges of substrates that would otherwise be found in unmanaged watersheds. Existing estimates of road material contributed to streams and existing average departure in flow regime is not specifically known for the Lower Dog Creek watershed; however, the anticipated values of these variables is expected to be similar to those rates found in the Rock Creek and Upper Dog Creek analysis areas. An analysis of the total area of recruitable large woody debris to fish-bearing streams and the total area affected by past management activities (e.g. timber harvesting, road construction) indicates that approximately 5.7 percent of the area of recruitable large woody debris to fish-bearing streams has been impacted to some degree by past management activities. Considering existing sediment conditions and potential road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a moderate risk of low impacts to channel forms occurs in the analysis area.

An analysis of the total vegetation zone providing stream shading to all connected fish-bearing and non-fish-bearing streams and the total area affected by past management activities (i.e. timber harvesting, road construction) indicates that approximately 5.7 percent of the area of total vegetation zone providing stream shading has been impacted to some degree by past management activities. Based on this simple assessment, a moderate risk of low impacts to stream temperatures likely exists in the analysis area.

Two road-stream crossings occur within the analysis area; neither have variable adverse impacts to fisheries connectivity. As adult and juvenile fish are currently able to access 100 percent of the available habitat in the analysis area, no impacts occur to spawning and various life-stage expressions.

Other related existing actions include occasional recreational fishing, which is considered to have a general low impact to fisheries in the analysis area.

Considering a moderate risk of moderate impacts to species presence, a moderate risk of low impacts to channel forms, a moderate risk of low impacts to stream temperature, no impacts to connectivity, and a general low impact from other related actions, a moderate collective impact to native fisheries likely exists in the Lower Dog Creek analysis area. An existing low collective impact to nonnative fisheries may occur.

ALTERNATIVE EFFECTS

➢ ***ROCK CREEK ANALYSIS AREA***

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Fisheries in the Rock Creek Analysis Area***

  No direct or indirect effects to fisheries resources would occur in the Rock Creek analysis area beyond those described in the *EXISTING CONDITIONS*.

- ***Direct and Indirect Effects of the Action Alternative to Fisheries in the Rock Creek Analysis Area***

  Examples of actions that may negatively affect native westslope cutthroat trout and other fisheries population presence or distribution in the analysis area include the introduction of other nonnative fish species, targeted fish suppression or other removal, stocking, and species introduction to previously uninhabited stream reaches. No actions associated with this alternative involve the direct or indirect manipulation of species population presence or distribution in the analysis area. Therefore, as a result of the selection of the Action Alternative, no direct and indirect impacts to native westslope cutthroat trout or other fisheries population presence or distribution are expected in the Rock Creek analysis area beyond those described in the *EXISTING CONDITIONS*.

  Effects to channel forms in fish-bearing reaches will be addressed by evaluating the collective potential impacts to sediment, flow regime, and large woody debris features. An increase in the proportion of fine substrates is an impact that would be expected to adversely affect channel forms. Short-term and long-term negligible or very minor impacts to substrates comprising stream channel forms may occur as a result of adjacent riparian or upland harvesting near fish-bearing and contributing non-fish-bearing streams. The *HYDROLOGY ANALYSIS* has estimated that low levels of road material would be contributed to streams in the Rock Creek analysis area as a result of the proposed actions. The *HYDROLOGY ANALYSIS* has also estimated that the average departure in flow regime is expected to increase approximately 0.4 percent immediately following harvesting, but would return to preharvest levels within 10 years. An analysis of the proposed actions indicates that an increase of approximately 1.6 percent of the total area of recruitable large woody debris to fish-bearing streams would be moderately impacted by riparian harvesting. Considering both negative and positive potential effects to sediment conditions and road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a moderate risk of low impacts to channel forms is expected beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to channel forms may be detectable, but are not expected to be detrimental.)

An analysis of the proposed actions indicates that a net increase of approximately 0.5 percent of the area of the total vegetation zone providing shading to fish-bearing and contributing non-fish-bearing streams would be moderately impacted by riparian harvesting. As a result, a low risk of very low impacts to stream temperatures is expected to occur in the analysis area beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to stream temperatures are not expected to be detrimental.)

The proposed actions will not affect fish passage at any road-stream crossings in the Rock Creek analysis area; therefore, no impacts to fisheries connectivity will occur beyond those described in *EXISTING CONDITIONS*.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Fisheries in the Rock Creek Analysis Area***

  Future related actions that are considered part of cumulative impacts are expected low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis area. Cumulative impacts are expected to be low beyond the collective anticipated impacts described in *EXISTING CONDITIONS*.

- ***Cumulative Effects of the Action Alternative to Fisheries in the Rock Creek Analysis Area***

  Future related actions that are considered part of cumulative impacts are expected low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis area. Considering no anticipated impacts to species presence or distribution, a moderate risk of low impacts to channel forms, a low risk of very low impacts to stream temperature, no impacts to connectivity, and a general low impact from future related actions, a moderate risk of low cumulative impacts to native fisheries is expected to occur beyond the collective impacts described in *EXISTING CONDITIONS*. A low risk of low cumulative impacts to nonnative fisheries is expected to occur. (Additional potential cumulative effects to native and nonnative fisheries are not expected to be detrimental.)

- ***UPPER DOG CREEK ANALYSIS AREA***

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Fisheries in the Upper Dog Creek Analysis Area***

  No direct or indirect effects to fisheries resources would occur in the Upper Dog Creek analysis area beyond those described in *EXISTING CONDITIONS*.

- ***Direct and Indirect Effects of the Action Alternative to Fisheries in the Upper Dog Creek Analysis Area***

  Impacts to native westslope cutthroat trout or other fisheries population presence or distribution in the Upper Dog Creek analysis area are expected to be the same as those described for the Rock Creek analysis area.

  Effects to channel forms in fish-bearing reaches will be addressed by evaluating the collective potential impacts to sediment, flow regime, and large woody debris features. An increase in the proportion of fine substrates is an impact that would be expected to adversely affect channel forms. Short-term and long-term negligible or very minor impacts to substrates comprising stream channel forms may occur as a result of adjacent riparian or upland harvesting near fish-bearing and contributing non-fish-bearing streams. The *HYDROLOGY ANALYSIS* has estimated that low levels of road material would be contributed to streams in the Upper Dog Creek analysis area as a result of the proposed actions. The *HYDROLOGY ANALYSIS* has also estimated that the average departure in flow regime is expected to increase approximately 0.7 percent immediately following harvesting, but would return to preharvest levels within 10 years. An analysis of the proposed actions indicates that an increase of approximately 12.1 percent of the total area of recruitable large woody debris to fish-bearing streams would be moderately impacted by riparian harvesting. Considering both negative and positive potential effects to sediment conditions and road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a moderate risk of low impacts to channel forms is expected beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to channel forms may be detectable, but are not expected to be detrimental.)

  An analysis of the proposed actions indicates that a net increase of approximately 8.2 percent of the area of total vegetation zone providing shading to fish-bearing and contributing non-fish-bearing streams would be moderately impacted by riparian harvesting. As a result, a moderate risk of low impacts to stream temperatures is expected to occur in the analysis area beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to stream temperatures may be detectable, but are not expected to be detrimental.)

  The proposed actions include the improvement of fish passage at 2 road-stream crossings in the Upper Dog Creek analysis area (DNRC Sites 212 and 239). These improvements will increase connectivity for juvenile fish to approximately 0.5 miles of habitat, which is considered a positive impact to fisheries in the analysis area.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Fisheries in the Upper Dog Creek Analysis Area***

  Cumulative effects are expected to be the same as those described for the Rock Creek analysis area.

- ***Cumulative Effects of the Action Alternative to Fisheries in the Upper Dog Creek Analysis Area***

  Future related actions that are considered part of cumulative impacts are expected low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis area. Considering no anticipated impacts to species presence or distribution, a moderate risk of low impacts to channel forms, a moderate risk of low impacts to stream temperature, positive impacts to connectivity, and a general low impact from future related actions, a moderate risk of low cumulative impacts to native fisheries is expected to occur beyond the collective impacts described in *EXISTING CONDITIONS*. A low risk of low cumulative impacts to nonnative fisheries is expected to occur. (Additional potential cumulative effects to native and nonnative fisheries are not expected to be detrimental.)

➢ ***LOWER DOG CREEK ANALYSIS AREA***

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative to Fisheries in the Lower Dog Creek Analysis Area***

  No direct or indirect effects to fisheries resources would occur in the Lower Dog Creek analysis area beyond those described in *EXISTING CONDITIONS*.

- ***Direct and Indirect Effects of the Action Alternative to Fisheries in the Lower Dog Creek Analysis Area***

  Impacts to native westslope cutthroat trout or other fisheries population presence or distribution in the Lower Dog Creek analysis area are expected to be the same as those described for the Rock Creek analysis area.

  Effects to channel forms in fish-bearing reaches will be addressed by evaluating the collective potential impacts to sediment, flow regime, and large woody debris features. An increase in the proportion of fine substrates is an impact that would be expected to adversely affect channel forms. Short-term and long-term negligible or very minor impacts to substrates comprising stream channel forms may occur as a result of adjacent riparian or upland harvesting near fish-bearing and contributing non-fish-bearing streams. The anticipated level of road material that would be contributed to streams in the analysis area is expected to be similar to those described in the Rock Creek and Upper Dog Creek analysis areas. The anticipated change in departure of flow regime is also expected to be similar to those described in the Rock Creek and Upper Dog Creek analysis areas. An analysis of the proposed actions indicates that an increase of approximately 9.6 percent of the total area of recruitable large woody debris to fish-bearing streams would be moderately impacted by riparian harvesting. Considering both negative and positive potential effects to sediment conditions and road erosion, flow regime, and the extent of potential impacts to large woody debris recruitment, a moderate risk of low impacts

to channel forms is expected beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to channel forms may be detectable, but are not expected to be detrimental.)

An analysis of the proposed actions indicates that a net increase of approximately 6.8 percent of the area of total vegetation zone providing shading to fish-bearing and contributing non-fish-bearing streams would be moderately impacted by riparian harvesting. As a result, a moderate risk of low impacts to stream temperatures is expected to occur in the analysis area beyond those described in *EXISTING CONDITIONS*. (Additional potential impacts to stream temperatures may be detectable, but are not expected to be detrimental.)

The proposed actions will not affect fish passage at any road-stream crossings in the Lower Dog Creek analysis area; therefore, no impacts to fisheries connectivity will occur beyond those described in *EXISTING CONDITIONS*.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative to Fisheries in the Lower Dog Creek Analysis Area***

  Cumulative effects are expected to be the same as those described for the Rock Creek analysis area.

- ***Cumulative Effects of the Action Alternative to Fisheries in the Lower Dog Creek Analysis Area***

  Future related actions that are considered part of cumulative impacts are expected low impacts to stream sediment due to adjacent road use for recreational and management purposes and occasional recreational fishing. Other future related actions, such as proposed timber sales, have not been scoped within the analysis area. Considering no anticipated impacts to species presence or distribution, a moderate risk of low impacts to channel forms, a moderate risk of low impacts to stream temperature, no impacts to connectivity, and a general low impact from future related actions, a moderate risk of low cumulative impacts to native fisheries is expected to occur beyond the collective impacts described in *EXISTING CONDITIONS*. A low risk of low cumulative impacts to nonnative fisheries is expected to occur. (Additional potential cumulative effects to native and nonnative fisheries are not expected to be detrimental.)

MITIGATIONS RELATED TO THE ACTION ALTERNATIVE

Fisheries-related resource mitigations that would be implemented with the proposed Action Alternative include:

- applying all applicable Forestry BMPs (including the SMZ Law and Rules) and Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (*ARM 36.11.425* and *36.11.426*);
- applying the SMZ Law and Rules to all non-fish-bearing streams and lakes;
- monitoring all road-stream crossings for sedimentation and deterioration of the road prism; and
- allowing equipment traffic at road-stream crossings only when road prisms have an adequate load-bearing capacity.

WATERSHED AND HYDROLOGY ANALYSIS

INTRODUCTION

SEDIMENT DELIVERY

Timber harvesting and related activities, such as road construction, can lead to impacts on water quality by increasing the production and delivery of fine sediment to streams. Construction of roads, skid trails, and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosiveness of streamflows.

WATER YIELD

Timber harvesting and associated activities can affect the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal, because the removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt, which lead to further water-yield increases. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition.

ANALYSIS METHODS

SEDIMENT DELIVERY

Methodology for analyzing sediment delivery was completed using a sediment-source inventory. All roads and stream crossings were evaluated to determine existing and potential sources of introduced sediment. In addition, in-channel sources of sediment were identified using channel-stability rating methods developed by *Pfankuch*, and through the conversion of stability rating to reach condition by stream type developed by *Rosgen (1990)*. These analyses were conducted in 2006 by a DNRC hydrologist.

WATER YIELD

The water-yield increase for the watershed in the project area was determined using the Equivalent Clearcut Area (ECA) method as outlined in *Forest Hydrology Part II (1976)*. ECA is a function of the total area roaded and harvested, percent of crown removal in harvest, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent of crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60-percent crown removed, the ECA would be approximately 60, or equivalent to a 60-acre clearcut. The relationship between crown removal and ECA is not a 1-to-1 ratio, so the percent ECA is not always the same as the percent of canopy removal. As live trees are removed, the water they 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.

In order to evaluate the watershed risk of the potential water-yield increase effectively, a threshold of concern must be established. The

stability of a stream channel is an important indicator of where a threshold of concern should be set. As water yields increase as a result of canopy removal, the amount of water flowing in a creek gradually increases. When these increases reach a certain level, the bed and banks may begin to erode. More stable streams will be able to handle larger increases in water yield before they begin to erode, while less stable streams will experience erosion at more moderate water-yield increases.

ANALYSIS AREA

SEDIMENT DELIVERY

The analysis area for sediment delivery is the Duck-to-Dog Timber Sale Project area and the proposed haul routes. The proposed project area is located mostly within the Dog Creek watershed, which is a perennial tributary to Dog Lake. Portions of the proposed project are also located within the Rock Creek watershed, which is a perennial tributary to Stillwater River. Analysis will cover stream segments within these watersheds that may be affected by the proposed project and all roads and upland sites that may contribute sediment to Dog Creek or Rock Creek.

WATER YIELD

The analysis area for water yield is the Dog Creek, Stillwater River-Hellroaring, and Rock Creek watersheds. The Dog Creek watershed covers 8,561 acres. The Stillwater River–Hellroaring watershed covers 22,673 acres. The Rock Creek watershed is a portion of the Stillwater River–Hellroaring watershed, and covers 2,214 acres. Rock Creek will be analyzed separately so that the potential effects of the proposed project are not diluted by a large watershed size. Portions of the proposed project area lie outside of these watersheds, but these areas have no defined stream channels and are very low risk of showing measurable or predictable changes in water yield.

Precipitation in the project-area watersheds ranges from 20 inches in the lower elevations to 80 inches at the ridge tops.

EXISTING CONDITIONS

REGULATORY FRAMEWORK

Montana Surface Water Quality Standards

According to *ARM 17.30.608 (1)(c)*, this portion of the Stillwater River drainage, including the Dog Creek and Rock Creek watersheds, is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases over natural turbidity. "Naturally occurring," as defined by *ARM 17.30.602 (17)*, includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of potentially impactive activities.

Designated beneficial water uses within the project area include cold-water fisheries and recreational use in the streams, wetlands, and lakes. Existing surface water rights in the Dog Creek and Rock Creek watersheds include domestic use.

Water-Quality-Limited Waterbodies

Portions of Stillwater River that are located downstream from the proposed project area are currently listed as a water-quality-limited waterbody in the *2006 303(d)* list. The *303(d)* list is compiled by the Montana Department of Environmental Quality (DEQ) as required by *Section*

303(d) of the *Federal Clean Water Act* and the *Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 Code of Federal Regulations [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. These waterbodies are then characterized as "water quality limited" and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a waterbody of a watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water-quality standards.

The *Montana Water Quality Act (MCA 75-5-701-705)* also directs the DEQ to assess the quality of State waters, insure that sufficient and credible data exists to support a *303(d)* listing and to develop TMDL for those waters identified as threatened or impaired. Under the *Montana TMDL Law*, new or expanded nonpoint-source activities affecting a listed waterbody may commence and continue provided they are conducted in accordance with all reasonable land, soil, and water conservation practices. TMDLs have not been completed for Stillwater River. DNRC will comply with the law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including BMPs and Forest Management Rules (*ARM 36.11.401* through *450*). The current listed causes of impairment in Stillwater River are:

- alteration in streamside or littoral vegetative covers,
- unknown impairment,
- nitrates,
- phosphorus (total), and
- sedimentation/siltation.

Site clearance (land development), unknown sources, and loss of riparian habitat are the probable sources for Stillwater River.

Montana SMZ Law

By the definition in *ARM 36.11.312 (3)*, the majority of the streams within the project area are Class 1 streams. Dog Creek and Rock Creek have flow for more than 6 months each year, contribute surface water to another body of water, and support fish populations. Dog Creek supports a population of eastern brook trout and westslope cutthroat trout. Rock Creek contains a population of eastern brook trout.

SEDIMENT DELIVERY

According to field reconnaissance in 2006, stream channels in the project area were rated in good condition. Project area streams were rated as B3 and B4 channels by a classification system developed *by Rosgen (1990)*. Channel types rated as "B" are typically in the 2-to-4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel bed materials in B3 and B4 types are mainly cobble and gravel. Stream channels in the project area were found to be very stable with very little movement of bed materials. Channel bottom materials are covered with moss, and no areas of down-cut channels were identified during field reconnaissance. Large woody debris was found in adequate supply to maintain channel function and stability. Little evidence of past streamside harvesting was found in the Rock Creek drainage. Where past logging had taken place in the riparian area, mainly in an unnamed tributary to Dog Creek, there appeared to be no deficiency of existing or potential downed woody material in the streams.

The existing road system in and leading to the proposed project area was reviewed for potential sources of sediment. The road system in the project area is mainly low to moderate standard, but no evidence of sediment delivery to streams was identified. Road surfaces are well vegetated and are observed to not be

delivering sediment to crossings. Much of the existing road system in the proposed project area meets applicable BMPs. Past project work has installed surface drainage on most of the existing road system, but isolated reaches of the existing road system are in need of spot BMP work to reduce risks of erosion and sediment delivery.

WATER YIELD

According to *ARM 36.11.423*, allowable water-yield increase values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low to moderate degree of risk. All allowable water-yield increases in project-area watersheds were set using a low level of risk. This means that the allowable level is a point below which water yields are unlikely to cause any measurable or detectable changes in channel stability. The allowable water-yield increase for the Dog Creek, Stillwater River-Hellroaring and Rock Creek watersheds have each been set at 12 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This water-yield increase would be reached when the ECA level in the Dog Creek watershed reaches the allowable level of 2,568, the ECA level in the Stillwater River-Hellroaring watershed reaches the allowable level of 5,668, and the ECA level in the Rock Creek watershed reaches the allowable level of 664. Timber harvesting and associated road-construction activities have taken place in and around the project area since the 1920s. These activities, combined with the vegetative recovery that has occurred, have led to an estimated 6.7-percent water-yield increase over an unharvested condition in the Dog Creek watershed, an estimated 1.5-percent water-yield increase over an unharvested condition in the Stillwater River-Hellroaring watershed, and an estimated 3.0-percent water-yield increase over an unharvested condition in the Rock Creek watershed. *TABLE III-5 – CURRENT WATER YIELD AND ECA INCREASES IN THE DUCK-TO-DOG TIMBER SALE PROJECT WATERSHEDS* summarizes the existing conditions for water yield in the project-area watersheds.

TABLE III-5 – CURRENT WATER YIELD AND ECA INCREASES IN THE DUCK TO DOG TIMBER SALE PROJECT WATERSHEDS

	DOG CREEK	STILLWATER RIVER-HELLROARING	ROCK CREEK
% WYI[1]	6.7	1.5	3.0
Allowable % WYI	12	12	12
Existing ECA[2]	1,613	835	203
Allowable ECA[2]	2,568	5,668	664
Remaining ECA[2]	956	4,833	461

[1]Water Yield Increase
[2]Equivalent Clearcut Area (expressed in acres)

ALTERNATIVE EFFECTS TO SEDIMENT DELIVERY AND WATER YIELDS

DIRECT AND INDIRECT EFFECTS

- ***Direct and Indirect Effects of the No-Action Alternative to Sediment Delivery and Water Yield***

Sediment Delivery

The No-Action Alternative would have no direct effects to sediment delivery beyond those currently occurring. Existing sources of sediment, both in-channel and out-of-channel, would continue to recover or degrade based on natural or preexisting conditions.

The indirect effects would be an increased risk of erosion and sediment transport from upland road segments that do not meet applicable BMPs. These sites would continue to pose a risk of sediment delivery to streams until other funding became available for repairs.

Water Yield

Water yield would not be directly or indirectly affected. Water quantity would not be changed from present levels.

- ***Direct and Indirect Effects of the Action Alternative to Sediment Delivery and Water Yield***

Sediment Delivery

Erosion control and BMPs would be improved on approximately 7 miles of existing road. In some cases, the addition of erosion-control measures may increase the risk of sediment delivery in the short term by creating bare soil. However, as these sites revegetate, the long-term risk of sedimentation to a stream would be reduced to levels lower than the existing condition.

The Action Alternative would replace an existing stream crossing in the proposed project area, remove and rehabilitate an existing stream crossing, and install and remove a temporary stream crossing. Each of these activities would occur on an unnamed tributary to Dog Creek. The stream-crossing culvert replacement is located in proposed Unit 6b on an unnamed tributary to Dog Creek. This crossing is located just off U.S. Highway 93 on a low standard road. The existing crossing, a 18-inch culvert, is too short. The proposed replacement would be longer in order to accommodate all applicable BMPs and have a larger diameter to allow for fish passage (see *FISHERIES ANALYSIS* for a more detailed description). The stream-crossing removal is located in proposed Unit 1c on a segment of road that is currently closed to vehicle traffic. The crossing would be brought up to applicable BMPs for the project, used to haul the proposed volume, and removed following project completion. The crossing site would have the culvert removed, the associated fill removed and hauled away from the crossing site, the banks shaped to a stable angle, and the channel armored. All applicable BMPs would be applied to the removal site upon project completion. The proposed temporary crossing would be installed in the lower reaches of proposed Unit 1c. This crossing would only be used for skidding logs during frozen or snow-covered conditions. The design would use filter fabric and logs to create a “corduroy” design that would allow water to flow through the structure, but would prevent damage to streambanks by filling the channel with log material. The channel bottom would be lined with sediment-filter fabric to catch fine sediment, and the logs would be wrapped in sediment-filter fabric to prevent fine sediment from entering the stream. Upon project completion, all logs and filter fabric would be removed from the channel and crossing approaches would have erosion-control structures installed to prevent sediment delivery. Each of these projects would generate sediment to the stream during activity. This sediment would be minimized by implementing all applicable BMPs. Risk of sediment delivery would be increased at each site for 2 to 3 years after project completion because of the exposure of bare soil. This risk would decrease as sites revegetate. The long-term risk of sediment delivery would be reduced by removal of a stream-crossing structure and its associated fill material from the active channel and flood-prone width.

The Action Alternative would have a very low risk of sediment delivery to streams as a result of proposed timber-harvesting activities. Harvesting activities are proposed on approximately 20 acres within designated SMZs. These harvesting activities would retain at least 50 percent of the

trees within the SMZ, follow all requirements of the *SMZ Law* and *ARM 36.11.425* through *427*, and have a low risk of affecting recruitment of large woody material to project-area streams. The *SMZ Law*, *ARM 36.11.425* through *427*, and all applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams.

Water Yield

The Action Alternative would increase the annual water yield in the Dog Creek watershed by an estimated 0.7 percent, in the Stillwater-Hellroaring watershed by an estimated 0.1 percent, and in the Rock Creek watershed by an estimated 0.4 percent over current levels. These levels of water-yield increase would not be sufficient to create unstable channels.

CUMULATIVE EFFECTS

- ***Cumulative Effects of the No-Action Alternative to Sediment Delivery and Water Yield***

Sediment Delivery

The cumulative effects would be very similar to those described in the *EXISTING CONDITIONS* portion of this analysis. All existing sources of erosion and sediment transport from upland road segments would continue to recover or degrade as dictated by natural and preexisting conditions until a source of funding became available to repair them. Sediment loads would remain at or near present levels.

Water Yield

No cumulative effects on water yield would occur. Existing harvest units would continue to revegetate and move closer to premanagement levels of water use and snowpack distribution.

- ***Cumulative Effects of the Action Alternative to Sediment Delivery and Water Yield***

Sediment Delivery

Cumulative effects to sediment delivery would be primarily related to roadwork. The installation and improvement of erosion-control and surface-drainage features on existing roads would also affect the cumulative sediment delivery to project-area streams. In the short term, the installation and improvement of surface drainage features would expose bare soil. This would increase the risk of sediment delivery to the streams in and around the proposed project area. The application of all applicable BMPs during this work would make increased sediment loads unlikely. Over the long term, cumulative sediment delivery to project-area streams is projected to be lower than existing conditions with the installation of more effective surface-drainage and erosion-control features on the existing road system.

The proposed stream-crossing removal and the temporary crossing on an unnamed tributary to Dog Creek in proposed Unit 1c would increase total sediment loads in the stream in the short term. These increases in sediment load would not be delivered to downstream waters due to the presence of a wetland complex that would settle out the material before delivering to Dog Creek or Dog Lake. Over the long term, the risk of increased sediment loading to the downstream wetland would be lower than the existing conditions through removal of fill material that is a potential sediment source. The stream-crossing replacement proposed near U.S. Highway 93 would increase sediment loading to Dog Creek in the short term. This sediment would be minimized through implementation of all applicable BMPs. Over the

long term, risk of sediment delivery is expected to decrease at this site due to the installation of a larger capacity pipe and by making the site better meet applicable BMPs.

Harvesting of trees within an SMZ would have a low risk of adverse cumulative effects to downed woody material in project-area streams. Tree-retention requirements of the *SMZ Law* and *Forest Management Rules* would ensure a future supply of woody material to the creeks.

None of the cumulative impacts described above are expected to adversely affect downstream beneficial uses. All activities would comply with applicable laws, *ARM 36.11.423* through *427*.

Water Yield

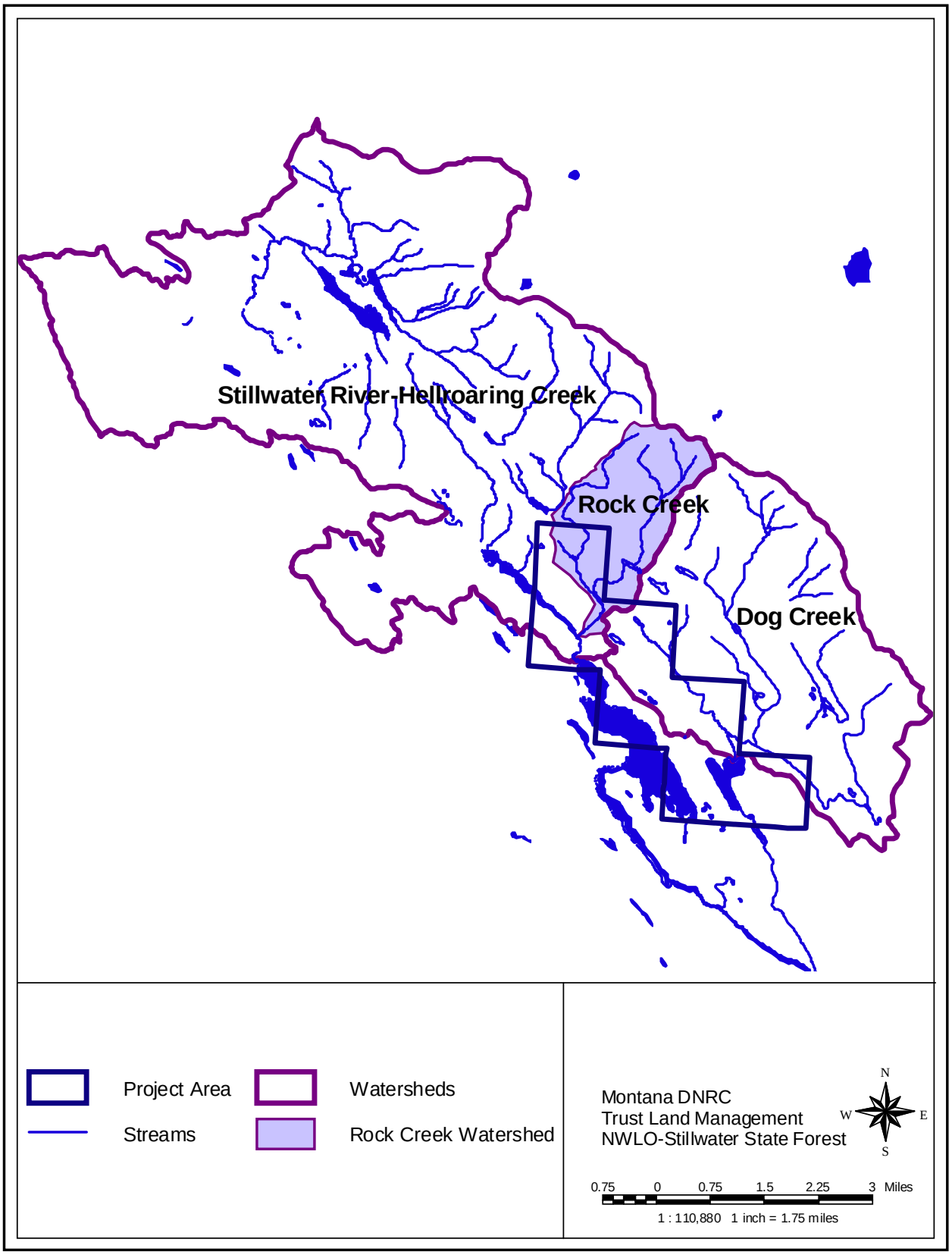
The removal of trees proposed in the Action Alternative would increase the water yield in the Dog Creek watershed from its current level of approximately 6.7 percent over unharvested to an estimated 7.4 percent. The removal of trees proposed in the Action Alternative would increase the water yield in the Stillwater River-Hellroaring watershed from its current level of approximately 1.5 percent over unharvested to an estimated 1.6 percent. The removal of trees proposed in the Action Alternative would increase the water yield in the Rock Creek watershed from its current level of approximately 3.0 percent over unharvested to an estimated 3.4 percent. These water-yield increases, and the associated ECA levels, include the impacts of all past management activities, existing and proposed roads, proposed timber harvesting, and vegetative hydrologic recovery in each watershed. The water-yield increases expected from the Action Alternative leave each project area watershed well below the established threshold of concern. There is a low risk of adverse cumulative impacts to water quality as a result of the Action Alternative. A summary of the anticipated water-yield impacts of the Action Alternative to the project-area watersheds is found in *TABLE III-6 – WATER YIELD AND ECA INCREASES IN THE DUCK-TO-DOG TIMBER SALE PROJECT AREA WATERSHEDS.*

TABLE III-6 – WATER YIELD AND ECA INCREASES IN DUCK-TO-DOG TIMBER SALE PROJECT AREA WATERSHEDS

	DOG CREEK		**STILLWATER RIVER–HELLROARING**		**ROCK CREEK**	
	ALTERNATIVE					
	NO-ACTION	**ACTION**	**NO-ACTION**	**ACTION**	**NO-ACTION**	**ACTION**
Allowable WYI	12%	12%	12%	12%	12%	12%
% WYI	6.7%	7.4%	1.5%	1.6%	3.0%	3.4%
Acres Harvested[1]	0	271	0	68	0	48
ECA Generated[2]	0	266	0	67	0	47
Total ECA[2]	1,613	1,879	835	902	203	250
Remaining ECA[2]	955	689	4,833	4,766	461	414
Allowable ECA[2]	2,568	2,568	5,668	5,668	664	664

[1] *Refers only to acres harvested within the Dog Creek, Stillwater River-Hellroaring, or Rock Creek watershed.*
[2] *Equivalent Clearcut Area (expressed in acres)*

MAP III-3 - DUCK-TO-DOG TIMBER SALE PROJECT WATERSHED MAP



SOILS ANALYSIS

INTRODUCTION

LANDFORM DESCRIPTION

The Dog Creek and Rock Creek watersheds lay within a valley formed by glaciers and river processes. The dominant soil types found in the project area are deep glacial tills derived from argillite, siltite, and limestone from the Belt Supergroup. Upper slopes and ridges are weathered bedrock scoured by glaciers.

SOIL PHYSICAL PROPERTIES

This analysis addresses the issue that timber harvesting and associated activities may affect soil conditions in the proposed project area through ground-based activities and repeated entries to previously harvested areas. Operation of ground-based machinery can displace fertile layers of topsoil, which can lead to a decrease in vegetation growth. Ground-based machinery can also lead to compaction of the upper layers of soil. Compaction decreases pore spaces in a soil, reduces its ability to absorb and retain water, and can increase runoff and overland flow. These condition can also lead to a decrease in vegetation growth.

SLOPE STABILITY

Slope stability can be affected by timber-management activities by removing stabilizing vegetation, concentrating runoff, or increasing soil moisture. The primary risk areas for slope stability problems include, but are not limited to, landtypes that are prone to soil mass movement and soils on steep slopes (generally over 60 percent.)

ANALYSIS METHODS

SOIL PHYSICAL PROPERTIES

Impacts to soil properties will be analyzed by evaluating the current levels of soil disturbance in the proposed project area based on field and aerial photo reviews of existing and proposed harvest units. The percent of area affected is determined through pace transects, measurement, aerial photo interpretation, or *Geographical Information System (GIS)* to determine skid-trail spacing and skid-trail width. From this, skid-trail density and percent of area impacted are determined. Estimated effects of proposed activities will be assessed based on findings of DNRC soil monitoring.

SLOPE STABILITY

Slope stability risk factors will be assessed by reviewing the Flathead National Forest (FNF) Land System Inventory to identify landtypes listed as high risk for mass movement. Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

ANALYSIS AREA

The analysis area for evaluating soil productivity will include DNRC-managed land within the Duck–to-Dog Timber Sale Project area. This project is located within portions of the Dog Creek and Rock Creek watersheds, and, in several areas with no identifiable surface water features, outside of these watersheds.

EXISTING CONDITIONS

SOIL PHYSICAL PROPERTIES

In the Duck-to-Dog Timber Sale Project area, DNRC has conducted timber sales since the 1920s. Timber sale records dating back to the 1950s show that approximately 3,487 acres of timber have been harvested on State trust land in the Dog Creek watershed using a combination of ground-based and cable-yarding harvest methods. Timber sale records dating back to the 1960s show that approximately 2,854 acres of timber have been harvested on State land in the

Stillwater-Hellroaring watershed (which includes Rock Creek) using a combination of ground-based and cable-yarding harvest methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Based on field review of previously harvested stands, pacing transects and GIS analysis of aerial photography show that skid trails are spaced a minimum of 50 feet apart and an average width of disturbed area is 12 feet. This spacing means that an estimated 15 percent or less of ground-based harvest areas may be impacted by existing trails. Trails are still apparent, but most are well vegetated, and past impacts are beginning to ameliorate from frost and vegetation.

SLOPE STABILITY

Landtypes in the project area vary from nearly level glacial terraces in the valley bottoms to steep valley sideslopes on ridges. The *FNF Soil Survey* identified no areas of soils at high risk for mass movements in the project area. Several areas of rock outcrops that are not suitable for timber management are within the proposed project area and would require special measures for road construction. These areas, map units 55 and 78, found in the mid- to upper-slope areas throughout the watershed. No slope failures were identified during reconnaissance in the proposed project area, and slopes are less than 60 percent. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated in the remainder of this analysis. A list of landtypes found in the proposed project area and the associated management implications is found in *TABLE III-8 – SOIL MAP UNIT DESCRIPTIONS FOR THE DUCK-TO-DOG TIMBER SALE PROJECT AREA*.

ALTERNATIVE EFFECTS TO SOILS

DIRECT AND INDIRECT EFFECTS

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

  Soil physical properties would not be directly or indirectly affected. No ground-based activity would take place, which would leave the soil in the project area unchanged from the description in the *EXISTING CONDITIONS* portion of this analysis.

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

  Soil Physical Properties

  Based on DNRC soil monitoring, direct impacts would be expected on up to 59 of the total 656 acres proposed for harvesting. Soil monitoring conducted on DNRC lands shows that sites harvested with ground-based machinery in Stillwater State Forest on similar soils had a range of impacts from 4.6 to 9.0 percent of the acres treated (*DNRC, 2004*). This range of impacts includes operations on dry soils as well as operations on frozen or snow-covered soils. As a result, the extent of impacts expected would likely be similar to those reported by *Collins (DNRC, 2004)*, or 4.6 to 9.0 percent of ground-based harvested acres.

  Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be intentionally done; these impacts are considered light and promote reforestation of the site. Minor road construction is proposed with the Action Alternative. *TABLE III-7 - SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS* summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave up to 9 percent of the proposed harvest units in an impacted condition.

TABLE III-7 – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS

DESCRIPTION OF PARAMETER	NO-ACTION ALTERNATIVE A	ACTION ALTERNATIVE B
Acres of harvesting	0	656
Acres of tractor yarding	0	656
Acres of skid trails and landings[1]	0	30 to 59
Acres of moderate impacts[2]	0	30 to 59
Percent of harvest area with impacts	0	4.6 to 9.0

[1]20 percent of ground-based area
[2]75 percent of ground-based skid trails

This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP*, and well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC, 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts, as noted in *ARM 36.11.422* and the *SFLMP (DNRC, 1996)*.

CUMULATIVE EFFECTS

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

  Soil Physical Properties

  This alternative would have no cumulative impacts to physical properties of soils in the project area. The impacts of this alternative would be similar to those described in the *EXISTING CONDITIONS* portion of this analysis. No soil would be disturbed and no reentry of past harvest units would occur. All impacts from past management activities would continue to improve or degrade as dictated by natural and preexisting conditions.

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

  Soil Physical Properties

  Approximately 50 acres with previous timber sale operations would be entered. Cumulative effects to soils may occur from repeated entries into a forest stand, where additional ground is impacted by equipment operations. Existing skid trails, where compaction has begun to ameliorate through freeze-thaw cycles and revegetation, would return to a higher level of impact due to the Action Alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to soil physical properties under the Action Alternative would still fall below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP* and are well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC, 1996)*.

  DNRC would minimize long-term soil impacts and adverse cumulative effects with the implementation of any or all of the following:

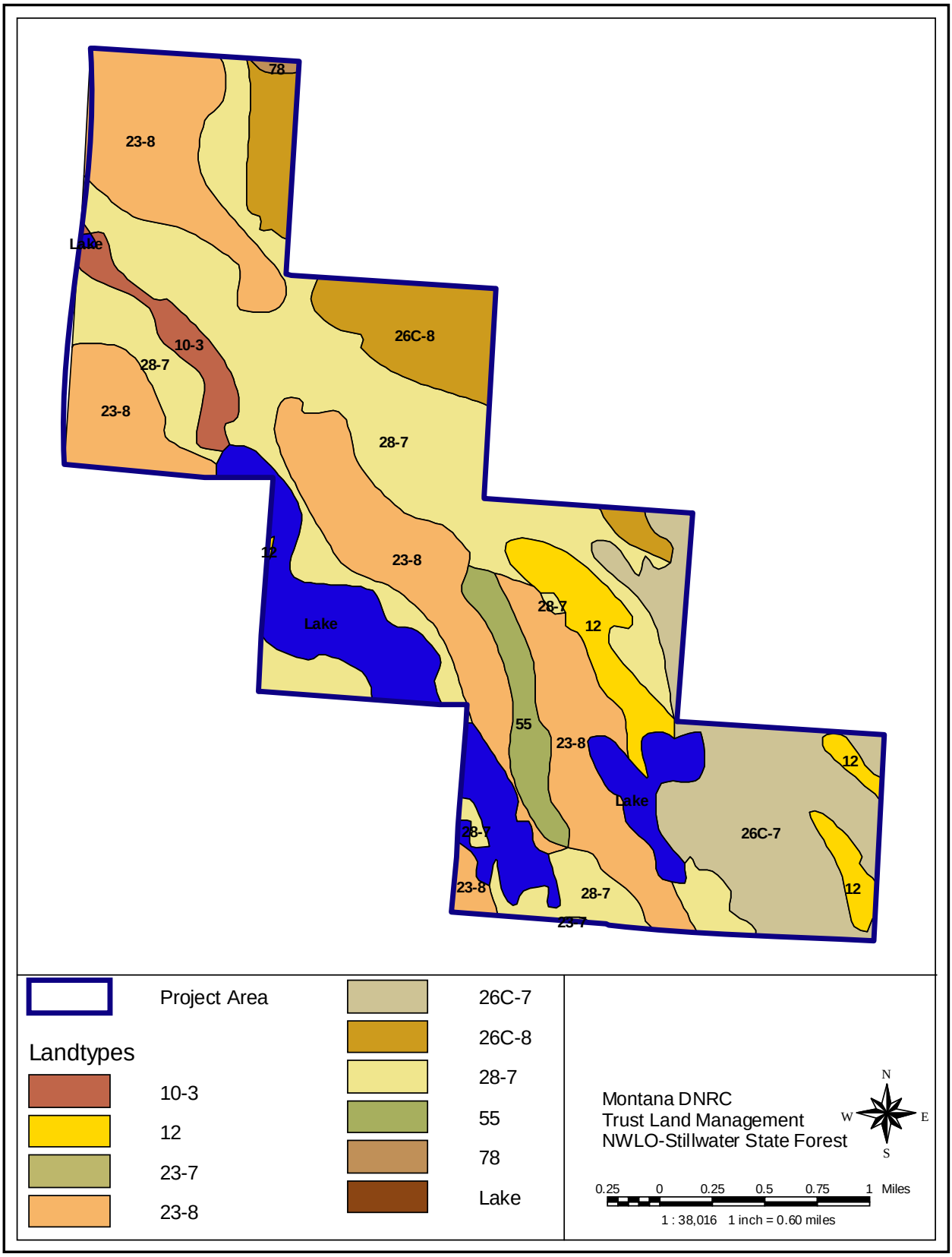
  - use of existing skid trails from past harvesting activities if they are properly located and spaced;
  - use of additional skid trails only where existing trails are unacceptable;
  - mitigations for potential direct and indirect effects with soil-moisture restrictions, season of operation, and method of harvesting; and
  - retention of a portion of coarse woody debris and fine litter for nutrient cycling.

  In previously unharvested stands, cumulative effects to soil productivity from multiple entries would be the same as those listed in the *DIRECT AND INDIRECT EFFECTS* section.

TABLE III-8 – SOIL MAP UNIT DESCRIPTIONS FOR THE DUCK-TO-DOG TIMBER SALE PROJECT AREA

MAP UNIT[1]	DESCRIPTION	SOIL DRAINAGE	ROAD LIMITATIONS	TOPSOIL DISPLACEMENT AND COMPACTION	SEEDLING ESTABLISHMENT	EROSION (BARE SURFACE)	NOTES
10-3	Alluvial Soils	Poor to well drained	Moderate to severe	Severe	Good	Low	Streamside management guides will be applied.
12	Organic depressions	Poor	Severe	Severe	Poor	Slight	Wetland soil types, avoid operation.
23-7	Glaciated mountain slopes, 0 to 20 percent	Well drained	Low	Moderate/high	Moderate - competition	Moderate	Moderate deep coarse soils reduce water and nutrients. South slopes droughty. On slopes over 35 percent, lop and scatter slash, excavator pile or broadcast burn.
23-8	Glaciated mountain slopes, 20 to 40 percent	Well drained	Low	Moderate/high	Moderate - competition	Moderate	Moderate deep coarse soils reduce water and nutrients. South slopes droughty. On slopes over 35 percent, lop and scatter slash, excavator pile or broadcast burn.
26C-7	Glacial moraines, 0 to 20 percent	Well drained	Low	Moderate (severe if wet)	Good	Low	Deep, productive soil. Topsoil depth important.
26C-8	Glacial moraines, 20 to 40 percent	Well drained	Moderate/ high	Moderate/high	Good	Moderate	Deep, productive soil. Topsoil depth important.
28-7	Glacial outwash, 0 to 20 percent	Well drained	Low	Moderate	Moderate - droughty	Low	Topsoil depth is very important.
55	Rock outcrop	Well drained	Severe	None	Poor	Low	Landtype is not suited to management.
78	Glacial trough wall, 60 to 90 percent	Well drained	Rocky, steep	High displacement	Fair, droughty	Moderate	Steep slopes, rocky soils with common rock outcrops. Cable logging recommended for slopes over 45 percent.

FIGURE III-1 - DUCK-TO-DOG TIMBER SALE PROJECT LANDTYPE MAP UNITS



ECONOMIC ANALYSIS

METHODS

The economic analysis for the timber sale proposal 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 road development, logging, hauling, and Forest Improvement (FI) payments. Stumpage prices from recent local sales were considered also as an indication of the current market. The *Montana Sawlog and Veneer Log Price Report*, based on July through September 2006 data, was used for estimating the delivered price of the logs.

Easements and access to DNRC-managed lands 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*). Stumpage prices, which are currently flat and near the long-term average, are highly dependant on the housing market, which is partially dependant on the interest rate. The economy is in a period of steady growth. Additionally, the housing market has generally been very strong; only recently have housing starts shown some weakening in the last few months. These factors have resulted in timber prices at or near historical averages. The timber prices used in this analysis attempt to recognize the current market conditions.

TABLE III-9 – COSTS AND BENEFITS ASSOCICATED WITH THE PROJECT BY ALTERNATIVE

	ALTERNATIVES	
	NO-ACTION	**ACTION**
Estimated total harvest volume (MMbf)	0	5.8
Road development costs ($/Mbf)		8.30
Estimated stumpage value ($/Mbf)		244.28
FI fee ($/Mbf)		19.50
Estimated stumpage value, FI, and development cost ($/Mbf)		272.08
Total timber-dollar value based on estimated stumpage value, FI, and road-development value, multiplied by the estimated harvest volume.	0	1,584,866
Estimated stumpage value and FI ($/Mbf)		263.78
Total revenue ($) to the State (stumpage value and FI)	0	1,536,519
Total revenue ($) to associated trusts (stumpage value)	0	1,422,931

ALTERNATIVE EFFECTS

DIRECT EFFECTS

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

  As displayed in *TABLE III-9 - 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-managed lands would not change.

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

  As displayed in *TABLE III-9 - COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE,* an estimated $1,422,931 in revenue would be deposited into the Common School, Public Buildings, and Montana State University Second Grant trusts and an estimated $113,588 would be deposited into the FI account. Approximately $48,521 of road development and maintenance work would be accomplished. An estimated $104,977, or $160 per 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 0.5 mile of road through the Federal Road Cost-Share 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.

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-managed lands 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 timber industry and employment levels. This alternative would provide some funding for the Common Schools, Public Buildings, and Montana State University Second Grant trusts. 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 would 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, Public Buildings, and Montana State University Second Grant trusts.

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 are in decline 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.

Over time, due to fire suppression, tree densities increased and shade-tolerant species, such as Douglas-fir and grand 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, reducing habitat for those wildlife species that require these components.

This analysis is designed to disclose the existing condition of the wildlife resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, the following wildlife issues were identified from internal and external comments regarding the effects of the proposed timber harvesting:

- Concern was expressed that timber harvesting could reduce forested cover, which could reduce the amount of mature forested habitats available to those species that rely upon these habitats and/or decrease the ability of some wildlife species to move through the landscape. This, in turn, could alter the ability of those species to use the area and/or successfully reproduce.
- Concern was expressed that timber harvesting could reduce snags and coarse-woody-debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.
- Concern was expressed that timber harvesting could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.
- Concern was expressed that timber harvesting and associated activities could alter cover, increase access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing the risk of human-caused mortality to bears.
- Concern was expressed that timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.
- Concern was expressed that disturbance associated with timber harvesting and associated activities could reduce available nesting habitats by displacing adult loons from traditional

nesting sites and/or decrease nesting success through disruption of incubation or nest abandonment.

- Concern was expressed that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.
- Concern was expressed that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/ or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- Concern was expressed that timber harvesting and associated activities could remove thermal cover on big game winter ranges, which could reduce the carrying capacity of the winter range.
- Concern was expressed that timber harvesting and associated activities could remove elk security habitat and increase elk vulnerability.

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.

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.

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 portions of Sections 29, 30, 31, and 32, all in T33N, R23W, and portions of Sections 13, 14, 15, 23, 24, 25, and 36, all in T33N, R24W. This area ranges from 3,200 to 4,440 feet in elevation on varying slopes. 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 any alternative.

COARSE-FILTER ASSESSMENT

MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY

Issue

Concern was expressed that timber harvesting could reduce forested cover that could reduce the amount of mature forested habitats available to those species that rely on these habitats and/or decrease the ability of some wildlife species to move through the landscape. This could alter their ability to use the area and/or successfully reproduce.

Existing Environment

Mature and old stands are essential habitat for wildlife species associated with the late seral stages of forest stand development for all or some 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 currently contains approximately 2,939 acres of mature stands (100-plus years in age) of reasonably closed-canopied Douglas-fir/western larch and mixed-conifer stands. These stands are interspersed with a variety of Douglas fir/western larch, lodgepole pine, subalpine fir, western white pine, and mixed conifer stands of varying ages and stocking densities. Within the project area, mean patch sizes for closed-canopied forests and reasonably young stands that have been harvested recently are 186.1 acres (n=18) and 28.1 acres (n=53), respectively.

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 the presence of other animals that prosper in edge habitats. Currently, connectivity across Stillwater State Forest remains relatively high with considerable forested-interior habitats and a network of riparian areas. The network of open roads through Stillwater State Forest has reduced some of the landscape-level connectivity.

Cumulative effects were analyzed on the contiguous Stillwater State Forest using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the level of harvesting, amount of densely forested habitats, and connectivity. Considerable amounts of Stillwater State Forest have been harvested in the past, reducing connectivity and interior-forested habitats. However, landscape connectivity has largely been retained and considerable forested, interior habitats exist.

Alternative Effects on Mature Forested Habitats and Connectivity

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative on Mature Forested Habitats and Connectivity***

  Forest conditions would continue to age and move toward denser stands of shade-tolerant tree species with high canopy cover. Largely, no appreciable changes to forest age, the distribution of dense canopy cover, mean patch size, or landscape connectivity would be anticipated. Under this alternative, 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, and pileated

woodpecker, would likely improve with this alternative; however, western larch, a preferred snag species, would decline in abundance over time.

- ***Direct and Indirect Effects of the Action Alternative on Mature Forested Habitats and Connectivity***

  Approximately 650 acres of western larch/Douglas-fir, mixed-conifer, and subalpine fir stands would be harvested to varying degrees. As indicated in the vegetation analysis, no stands that meet the old-growth definition are included in the proposed units; however, the majority of the stands proposed for harvesting under this alternative are mature (536 acres are 150-plus years old). Proposed treatments would lead to younger, more-open stands, which could disrupt movement by some species requiring extensive, connected forested habitats, though connectivity would persist. 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 increasing stand ages and densities caused by modern fire suppression. In the project area, mean patch size would decrease in closed-canopied forests (mean 88.5 acres [n=30], down from 186.1 acres) while the mean patch size of reasonably young stands would increase (mean 54.5 acres [n=40], up from 28.1 acres). Based upon the arrangements of these patches, the amount of edge habitats would also increase under this alternative. In general, under this alternative, 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 on Mature Forested Habitats and Connectivity***

  Habitats on Stillwater State Forest are a mosaic of habitat types and age classes. The amount of mature forested habitats has been reduced with past harvesting and ongoing harvesting associated with several timber sales (including Point of Rocks, Ewing Middle Ridge, West Fork Swift, King Bear, and Dog Meadow) is further reducing mature forested habitats. However, the general trend within Stillwater State Forest is conversion to mature forests. This alternative would continue to contribute to the mature forested stands on Stillwater State Forest. Losses of individuals and pockets of trees on the State parcel would not likely alter the overall age or landscape connectivity. Additionally, areas harvested in the past will start developing mature forest stand characteristics through time. Under this alternative, continued use of the cumulative effects analysis area would be expected by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests. Habitat for forested-interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would likely persist.

- ***Cumulative Effects of the Action Alternative on Mature Forested Habitats and Connectivity***

  Despite the general trend on Stillwater State Forest of conversion to mature forested habitats, past harvesting has reduced the amount of mature forested habitats. Reductions in mature forested habitats associated with this alternative would be additive to losses

associated with past harvesting activities and ongoing logging activities (including Point of Rocks, Ewing Middle Ridge, West Fork Swift, King Bear, Dog Meadow). Across the cumulative-effects analysis area, extensive forested habitats would still exist and landscape connectivity would persist. Habitats for forested-interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would be expected to be reduced; however, continued use of the cumulative-effects analysis area would be expected.

SNAGS AND COARSE WOODY DEBRIS

Issue

Concern was expressed that timber harvesting could reduce snags and coarse-woody-debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependant upon these resources, which could alter their survival and/or reproductive ability.

Existing Environment

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

1) increase structural diversity,
2) alter canopy microenvironment,
3) promote biological diversity,
4) provide critical 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, to large mammals, such as black bears, 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 3 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.

Cumulative effects were analyzed on the contiguous Stillwater State Forest using field evaluations and aerial photograph interpretation. Factors considered within the analysis area include the amount of past timber harvesting, number of snags and coarse woody debris, and risk level of firewood harvesting. Past harvesting on Stillwater State Forest has reduced the availability of snags and coarse woody debris; however, these resources have been considered with the more recent harvesting. Snags and coarse woody debris are frequently collected for firewood, especially near open

roads. Considerable firewood gathering has reduced snags and coarse-woody-debris densities near open roads.

Alternative Effects on Snags and Coarse Woody Debris

Direct and Indirect Effects

- ***Direct and Indirect Effects of the No-Action Alternative on Snags and Coarse Woody Debris***

  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 for cavity-nesting birds as nesting structures and foraging habitats. 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 resource.

- ***Direct and Indirect Effects of the Action Alternative on Snags and Coarse Woody Debris***

  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. Based on data collected by USFS on 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 conclusion of the project, especially along open roads. 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 on Snags and Coarse Woody Debris***

  Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered in the project area with changing species composition within the stands. Snags would persist across Stillwater State Forest, with greater numbers away from open roads and reduced numbers near open roads. Snags and snag recruits have been retained with recent harvesting across Stillwater State Forest. Wildlife relying on snags and coarse woody debris would be expected to persist across the cumulative-effects analysis area.

- ***Cumulative Effects of the Action Alternative on Snags and Coarse Woody Debris***

  Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Across Stillwater State Forest, snags and coarse woody debris are common, and past activities have placed an emphasis on retention of these landscape attributes. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past harvesting and any firewood gathering occurring in the cumulative-effects analysis area. Wildlife relying on snags and coarse woody debris are

expected to persist across the cumulative-effects analysis area.

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 Federal "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, 4 terrestrial species are classified as “threatened” or “endangered” under the Endangered Species Act of 1973. The bald eagle, grizzly bear, and Canada lynx are classified as "threatened," and the gray wolf is classified as “endangered” under this act.

- **Bald Eagle *(Haliaeetus leucocephalus)***

Issue

Concern was expressed that timber harvesting could reduce bald eagle nesting and perching habitats and/or disturb nesting bald eagles.

Existing Environment

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 nest-stand characteristics include large emergent trees that are within site 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* (*USFWS 1986*) and *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*). The project area includes Upper Stillwater Lake, which has been used repeatedly in the past by a pair of nesting bald eagles. The *Stillwater Bald Eagle Nesting Territory Site-Specific Management Guidelines: Upper Stillwater Lake (Jacobs and Kuennen 1998)* provides most of the site-specific information regarding this territory.

The delineated home range includes the areas where most of the breeding activity of an eagle pair is assumed to occur. For the Upper Stillwater Lake territory, this home range includes portions of Stillwater State Forest, FNF, and some private lands. The territory is centered on Upper Stillwater Lake, and several other lakes (Dog, Duck, Lagoni, Martin, and Finger), small wetlands, and beaver ponds are within the delineated home range. Besides typical aquatic prey items, such as fish and waterfowl, from these waterbodies, foraging opportunities for eagles within the terrestrial upland habitats include carrion, ground squirrels, and nests of other raptors. Carrion would primarily consist of white-tailed or mule deer, elk, or moose from winterkill, human-caused mortality (including highway and train mortalities), or predation activity by wolves, bears, and mountain lions.

Historically, all 5 nests associated with this territory have been located near the outlet of Upper Stillwater Lake. This nest-site area produced 27 fledglings from 1980 to 1998. One additional fledgling was produced since 1999 (*Montana Bald Eagle*

Working Group, unpublished data). However, recent monitoring has not documented use of any of these nests in the last 3 to 4 years. Since eagles have been documented in the area in each of these years, the pair may have moved their nest. At this time, the location of any potentially new nest is unknown.

Cumulative effects were analyzed using a combination of field evaluations and aerial-photograph interpretation on the bald eagle home range. Factors considered within this analysis include disturbance levels and the availability of large, emergent trees with stout horizontal limbs for nests and perches. Stillwater State Forest manages roughly 43 percent of the home range, while USFS manages approximately 37 percent, and nearly 20 percent is in private ownership. Various levels of timber harvesting, residential development, and recreation are occurring within the home range of the Upper Stillwater Lake pair.

Alternative Effects on Bald Eagles

Direct and Indirect Effects

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

  No direct or indirect effects to bald eagles would be expected. Human disturbance would continue at approximately the same levels. As a result, negligible direct or indirect effects would occur to bald eagle habitats or disturbance levels as a result of this alternative.

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

  No harvesting would occur within the nest or primary-use areas associated with the known nest locations. However, within the home range, proposed timber harvesting would reduce forested canopy on approximately 518 acres in portions of 16 units. While proposed activities are occurring, eagles could be displaced; however, displacement would only be expected to affect eagles during the proposed activities and not beyond. Operating-season restrictions (winter logging) proposed in Units 1c and 4a would largely restrict operations to the nonnesting period, which would help eliminate conflicts should eagles be using the area. No seasonal restrictions are included in the prescriptions for the remaining units (561 acres); if activities are conducted during the nesting period (February 1 through August 15), further disturbance to nesting bald eagles would be expected. Reducing the forested component in these stands decreases the probability of bald eagle use since disturbance distances would be expected to increase with increased visibility. Within the home range, prescriptions call for the retention of large snags and emergent trees that could be used in the future as nest or perch trees as the adjacent stands develop. Improved access to Dog Lake may increase recreational use and, therefore, disturbance to bald eagles. This analysis is predicated upon the known nest locations and identified nest area, primary use area, and home range; however, should a new nest be located prior to harvesting, mitigations would be implemented to ensure compliance with the *Montana Bald Eagle Management Plan*, *Habitat Guide for Bald Eagles in Northwestern Montana*, and *ARM 36.11.429*. Thus, a low to moderate risk of direct and indirect effects to bald eagle habitats and/or disturbance levels would be a result of this alternative.

Cumulative Effects

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

  Nesting bald eagles would continue to experience varying levels of disturbance from ongoing recreational use of Upper Stillwater and Dog lakes and associated campsites and other forms of dispersed recreation occurring in the area. Disturbance associated with ongoing human development (largely on the 1,654 acres in private ownership) would continue within the cumulative-effects analysis area. Emergent trees exist across ownerships in the home range. Concurrently, no other DNRC activities are planned that would increase human disturbance, development, recreation, timber harvesting, or firewood gathering within the home ranges. Ongoing work by USFS on a campground-improvement project at the north end of Upper Stillwater Lake could not only increase disturbance, but also increase recreational use and, therefore, the potential for longer-term disturbance across the home range. Collectively, a low risk of cumulative effects to bald eagle habitats and disturbance levels would occur as a result of this alternative.

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

  No other DNRC activities are planned within the bald eagle home range; therefore, modification of eagle habitats would not be expected beyond the effects discussed above. Nesting bald eagles would continue to experience varying levels of disturbance from ongoing recreational use of Upper Stillwater and Dog lakes and the associated campsites and other forms of dispersed recreation occurring in the area. Additionally, development occurring on private ownerships could also disturb eagles in this territory. Large, emergent trees suitable for nesting and perching would persist across other portions of DNRC- and USFS-managed lands and, perhaps to a lesser degree, on privately managed parcels. Continued work on the campground-improvement project by USFS could increase human disturbance due to construction and improved access for recreationalists, which could affect the eagles using the home range. Thus, a low risk of cumulative effects to bald eagle habitats and/or disturbance levels would occur as a result of this alternative.

➢ **Grizzly bear (*Ursus arctos*)**

Issue

Concern was expressed that timber harvesting and associated activities could alter cover, increase human access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing the risk of human-caused mortality to bears.

Existing Environment

Grizzly bears are generalist omnivores that use a diversity of habitats found in western Montana. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (*Mace and Waller 1997*). Forest-management activities may affect grizzly bears by altering cover and/or increasing human access to secure areas by creating roads (*Mace et al. 1997*). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in increased risk of human-caused mortality by bringing humans and bears closer together. Displacing bears from preferred

areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

Grizzly bears are known to inhabit the project area. Portions of the project area occur within the Stryker and Lazy Creek Grizzly Bear Management Subunits of the North Continental Divide Ecosystem (NCDE) Recovery Area (*USFWS 1993*); additionally portions of the project area are within "occupied" habitat, which was identified by grizzly bear researchers and managers as areas that are having increased grizzly bear sightings and encounters. Approximately 2,670 acres of the project area falls within the Stryker Subunit (2,561 DNRC-managed acres; 53 percent of DNRC-managed lands in the project area) and roughly 342 acres of the project area falls within the Lazy Creek subunit (all 342 acres are DNRC-managed lands; 7 percent of these lands are within the project area) See *TABLE III-10 - ACRES OF THE PROJECT AREA WITHIN EACH OF THE GRIZZLY BEAR RECOVERY ZONE BEAR MANAGEMENT SUBUNITS AND THE "OCCUPIED HABITAT" ZONE BY OWNERSHIP* below. Although the project area includes 342 acres in the Lazy Creek Subunit, no activities are proposed under any alternative within this subunit and no changes to grizzly bear habitats or disturbance regimes would be expected; therefore, no further analysis will be conducted for this subunit. Approximately 2,078 acres of the project area (1,946 DNRC-managed acres; 40 percent of DNRC-managed lands within the project area) occur within the "occupied habitat" area. Preferred grizzly bear habitats are meadows, 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, meadows, and pockets of spring grizzly bear habitats mostly associated with riparian areas.

Managing human access is a major factor in management for grizzly bear habitat. Presently, 15.3 miles of open roads (excluding Highway 93) are in the project area. DNRC is committed to designing projects to result in no net increase in the proportion of each subunit of a grizzly bear management unit (State trust lands only) that exceed an open-road density of 1 mile per square mile. Additionally, DNRC is committed to a no-net decrease in security core areas.

Cumulative effects were analyzed on the State portions of the Stryker Grizzly Bear Management Subunit and the adjacent areas of "occupied habitat". Factors considered within this analysis area include open-road densities (and associated human disturbance), amount of security habitat, and availability of hiding cover. The State (primarily DNRC) manages approximately 32,957 acres (81 percent) of the Stryker Subunit, while USFS manages approximately 7,661 acres (19 percent), and the remaining 192 acres are privately owned. Additionally, 3,342 acres of the main block of Stillwater State Forest that are adjacent to

TABLE III-10 - ACRES OF THE PROJECT AREA WITHIN EACH OF THE GRIZZLY BEAR RECOVERY ZONE BEAR MANAGEMENT SUBUNITS AND THE "OCCUPIED HABITAT" ZONE BY OWNERSHIP

	RECOVERY ZONE SUBUNITS		**"OCCUPIED HABITAT"**	**TOTAL**
	STRYKER	**LAZY CREEK**		
Montana DNRC	2,561	342	1,946	4,849
Private	109	0	132	241
Total	2,670	342	2,078	5,090

the Stryker Subunit are in the "occupied habitat" area and are included in the cumulative-effects analysis area.

A moving-windows analysis (*Ake 1994*) was conducted to determine road densities and security core areas within the Stryker Grizzly Bear Management Subunit, and within the "occupied habitat" area, simple linear road densities were calculated. Open-road densities in both the subunit and the State-managed portion of the subunit are below the 1996 thresholds (*Note:* 1996 baselines have been modified from what was previously reported to better represent conditions in 1996). Within the "occupied habitat" area, open-road densities (excluding Highway 93) are approximately 1.89 miles per square mile. No security core exists in the project area and no blocks within the project area contribute to security core outside the project area. Approximately 20,630 acres of security core exist in the Stryker Subunit, which is at 1996 baseline levels of 50 percent of the subunit. Meanwhile, no security core exists within the "occupied habitat" portion of the cumulative-effects analysis area. Extensive hiding cover exists within the project area, Stryker Subunit, and "occupied habitat" area.

Alternative Effects on 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 security core, road densities, or hiding cover would be anticipated. Thus, no direct or indirect effects to grizzly bear habitats, security areas, or disturbance levels are anticipated with this alternative.

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

  Under this alternative, disturbance would increase due to harvesting and associated human access. This alternative could affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or move from the area. These disturbances would only be present during harvesting operations; thus, season of disturbance is important in addressing impacts to grizzly bears. Some units under this alternative would be harvested during the winter, which would result in no direct effects to grizzly bears since no known den sites are in the vicinity. Secondarily, some activities would be proposed for summer and fall when the probability of bears using the area is low and reduced direct disturbance to grizzly bears would be anticipated. Meanwhile other areas would be harvested along open roads where disturbance from the open road has already reduced habitat quality.

  Timber harvesting may reduce the habitat quality within the proposed units. The project area occurs in marginal spring grizzly bear habitat. The effects of timber harvesting on grizzly bears are not conclusive. Therefore, speculation on the effects of this particular project on spring habitat is difficult; however, the effects probably

range from neutral to slightly negative. Forage production is anticipated to increase with harvesting and associated site preparation.

Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced by 650 acres with the proposed harvesting. Hiding cover is especially important along open roads and in areas that receive human disturbance. Increased sight distances through the units adjacent to open roads would increase grizzly bear disturbance levels. However, hiding cover in the harvested units is expected to regenerate in 5 to 10 years. Security core would not be entered or altered with this alternative.

No permanent changes to the status of existing roads would occur. Many units in the Stryker Grizzly Bear Subunit would be harvested from open roads (Units 1a and portions of 1b, 2a, 2b, 6a, and 6b), and, thus, would not alter open-road densities. Additionally, open-road densities would remain unchanged in the subunit since use of restricted roads is proposed only for the denning period. The temporary road accessing portions of Unit 1b would likely be used for more than 30 days; however, given the short length and the location in relation to other open roads, negligible increases in disturbance from open roads would be anticipated for the duration of the project. Since the units in the “occupied habitat” portion of the cumulative-effects analysis area west of Highway 93 (Units 2c, 3, 4a, 4b, 4c, 4d, 4e, 5, 7, and 8) are outside of the recovery zone, no timing restrictions would be required, but activities avoiding the spring period would be beneficial. Thus, minor direct or indirect effects to grizzly bear disturbance levels, habitats, or security areas are anticipated with this alternative.

Cumulative Effects

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

  Motorized access to the area, security and hiding cover, and spring habitat would all remain unchanged. In the long term, forest succession would continue and may reduce food sources, but may increase the amount of hiding cover in the subunit. Disturbance to grizzly bears, reductions in hiding cover, and habitat modifications associated with ongoing harvesting (Dog Meadow, Ewing Middle Ridge, and Point of Rocks timber sale projects) would be influencing grizzly bears in the subunit. Mitigations designed to minimize the effects to grizzly bears were included in each of these projects when they were established. No further cumulative effects to grizzly bears would be anticipated with this alternative.

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

  Increased use of road systems during the proposed project may temporarily increase human disturbance to grizzly bears within this portion of the Stryker Subunit. Long-term open-road densities would not increase due to the proposed activities, with temporary increases elevating the densities to 35.5 percent, which is still below the 1996 thresholds, and then reverting back to lower levels after completion of the proposed activities (*TABLE III-11 - OPEN-ROAD DENSITIES IN THE STRYKER SUBUNIT, DNRC-MANAGED PORTIONS OF THE STRYKER SUBUNIT, AND THE “OCCUPIED HABITAT” PORTION OF*

TABLE III-11 - OPEN-ROAD DENSITIES IN THE STRYKER SUBUNIT, DNRC-MANAGED PORTIONS OF THE STRYKER SUBUNIT, AND THE "OCCUPIED HABITAT" PORTION OF THE CUMULATIVE EFFECTS ANALYSIS AREA

ANALYSIS UNIT	BASELINE LEVELS (1996)	EXISTING CONDITION (2004)	NO-ACTION ALTERNATIVE	ACTION ALTERNATIVE	AFTER PROJECTS
Stryker Subunit - All Ownerships	37.7%	33.9%	33.9%	33.9%	33.4%
Stryker Subunit- DNRC-managed lands	40.1%	35.3%	35.3%	35.5%	34.8%
"Occupied Habitat" (mile per square mile)	N/A	1.89	1.89	2.24	1.89

THE CUMULATIVE EFFECTS ANALYSIS AREA). Further decreases in open-road densities are expected with the completion of the Ewing Middle Ridge Timber Sale Project in the near future. In this portion of the cumulative-effects analysis area, open-road densities would increase from 1.89 miles per square mile to 2.24 mile per square mile during the project duration, and then revert to approximately current levels. Reductions in hiding cover would be additive to the reductions due to past DNRC timber sales and ongoing harvesting (the Ewing Middle Ridge, Point of Rocks, and Dog Meadow timber sale projects); however, considerable hiding cover exists within this subunit. Early successional stages of vegetation occurring on harvest units would provide foraging opportunities that do not exist in some mature stands. Continued use of Stillwater State Forest by grizzly bears would be anticipated. Thus, minor further cumulative effects to grizzly bear habitats, security areas, or disturbance levels would be anticipated with this alternative.

- **Gray wolf (*Canus lupus*)**

Issue

Concern was expressed that timber harvesting and associated activities could displace gray wolves from important habitats, particularly denning and rendezvous sites, and/or alter prey availability.

Existing Environment

Gray wolves are a wide-ranging, mobile species. Adequate habitat for wolves consists of areas with available prey and minimal human disturbance. Wolves prey primarily on white-tailed deer and, to a lesser extent, elk and moose in northwestern Montana (*Kunkel et al. 1999*). Typically, wolves in Montana den in late April. Wolves are most vulnerable to human disturbance at den and rendezvous sites. The combination of cover, human disturbance, and prey availability likely influences wolves.

The project area is 5 miles from the Murphy Lake Wolf Pack area and 3 miles away from the Lazy Creek Wolf Pack area. Wolf prey species and hiding cover are rather abundant within the project area. No known den or rendezvous sites are in the vicinity, and landscape features frequently associated with these sites are not abundant in the vicinity of the project area. Wolves may be using the vicinity of the project area for hunting, breeding, and other life requirements.

Cumulative effects were analyzed on the contiguous Stillwater State Forest using field evaluations and a review of mapped habitats. Factors considered include available habitats and levels of human disturbance. Within Stillwater State Forest, considerable winter range exists, as well as numerous meadows and other openings near water and in gentle terrain. Although documentation of wolves having dens or rendezvous sites on Stillwater State Forest is limited, suitable habitat exists. Human activity, generally in the form of dispersed and locally concentrated recreation, ranges from high along Upper Whitefish Road and within the Upper Whitefish Lake campground to low along the high elevations of the Whitefish Divide and Stryker Ridge areas.

Alternative Effects on 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. Thus, no risk of direct or indirect effects to gray wolves would be expected as a result of this alternative.

- ***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. After harvesting activities, wolf use of the project area for 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 winter thermal cover could result in local decreases in abundance during the winter months, which could alter wolf use of the project area. Thus, negligible direct and indirect effects to gray wolves would be expected as a result of this alternative.

Cumulative Effects

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

  White-tailed deer winter range would not be affected and substantive changes in white-tailed deer population, distribution, or habitat use would be not anticipated. Levels of human disturbance would be expected to remain similar to present levels. Ongoing timber sales on Stillwater State Forest may cause shifts in white-tailed deer use and, subsequently, gray wolf use of the cumulative effects analysis area; however, no changes would be anticipated that would alter levels of gray wolf use of Stillwater State Forest. Thus, no further cumulative effects to gray wolves would be anticipated with this alternative.

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

  Since the expected effects of this project on wolves would be minor, cumulative effects could also be minor. Some slight shifts of big game use could occur. Reductions in cover could cause slight decreases in use by deer and elk; however, no appreciable changes would be expected within the cumulative-effects analysis area. Travel corridors along riparian areas and through unharvested stands would maintain connectivity with surrounding forested habitats. Reductions in cover within the

project area would be additive to existing openings from past timber-harvesting activities. The effect of this reduction would still only be minor to wolves due to low levels of expected wolf use. Human-disturbance levels would be expected to revert to levels similar to current levels after proposed harvesting activities are completed and roads would again be closed. No substantive change in wolf use of Stillwater State Forest would be expected; wolves would continue to use Stillwater State Forest and adjacent areas in the long term. Thus, negligible cumulative effects to gray wolves would be anticipated with this alternative.

- **Canada lynx (*Lynx canadensis*)**

Issue

Concern was expressed that timber harvesting and associated activities could remove canopy closure or alter stand conditions, which could result in the reduction or modification of habitat components leading to decreased ability for the area to support lynx.

Existing Environment

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 3,200 to 4,440 feet in elevation and is dominated by Douglas-fir/western larch and mixed conifers. 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.

To assess lynx habitat, DNRC's SLI data were used to map specific habitat classes used by lynx. Other parameters (stand age, canopy cover, amounts of coarse woody debris) were used in modeling the availability of specific types of lynx habitat in the area (i.e. denning, forage, other, temporarily not available). The following are criteria used to define each specific type of lynx habitat:

- *Young forage* consists of regenerating stands (tree heights greater than 6 feet with a sawtimber crown density less that 40 percent) in a well-stocked condition.
- *Mature forage* includes all mature, moderate, or well-stocked sawtimber stands in lynx habitats with moderate to highly stocked coniferous understories.
- *Denning* habitat consists of mature stands with a high abundance of coarse woody debris.
- *Temporary unsuitable habitat* includes all stands of seedlings, poorly stocked sapling stands, any stands with less than 40 percent canopy closure, stands recently precommercially thinned, recent clearcuts, and recent stand-replacement burns that are likely to develop future habitat characteristics important to lynx through forest succession.
- *Other habitat* includes any forestlands in lynx habitats that do not meet the definition of young forage, mature forage,

denning, or temporary non-habitat, but serve to provide cover to facilitate movement and acquisition of alternative prey species.

Approximately 3,862 acres of lynx habitat occur in the project area; much of this habitat was identified as forested travel/other and mature foraging habitats, with lesser amounts of denning and temporarily not available habitats (*TABLE III-12 - ACRES OF LYNX HABITATS IN THE PROJECT AREA AND STRYKER SUBUNIT AND "OCCUPIED HABITAT" PORTIONS OF THE CUMULATIVE EFFECTS ANALYSIS AREA AND THE PROPORTION EACH SUITABLE CLASS REPRESENTS OUT OF ALL SUITABLE LYNX HABITATS*).

Cumulative effects were analyzed on the same area used for the grizzly bear cumulative-effects analysis area (per *ARM 36.11.435 [7][a]* and *[b]*). Factors considered within each analysis area include level of human disturbance; amount of the analysis area in denning, foraging, and unsuitable habitats; and landscape connectivity. Currently foraging habitats dominate the Stryker Subunit with lesser amounts of the other suitable habitats, while the "occupied habitat" portion of the cumulative-effects analysis area is dominated by mature foraging and forested travel habitats (*TABLE III-12 - ACRES OF LYNX HABITATS…)*. *ARM 36.11.435 [7][a]* and *[b]* require a minimum of 5 percent and 10 percent of the lynx habitats in a bear management subunit to be in denning and foraging habitats, respectively. Currently, the Stryker Subunit exceeds the minimum thresholds for both foraging and denning habitat requirements (*TABLE III-12 - ACRES OF LYNX HABITATS IN THE PROJECT AREA…*). The "occupied habitat" area is outside of the recovery zone for grizzly bears and, therefore, has also been separated in this analysis for consistency.

Alternative Effects to Canada Lynx

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

  Timber stands would continue to age, die, and gradually move toward shade-tolerant tree species. The existing stands of continuous forested habitats could facilitate lynx movement. Habitats would persist in the project area, except for the maturation of some of the forested travel and temporary non-lynx habitats into some of the other suitable lynx habitat

TABLE III-12 - ACRES OF LYNX HABITATS IN THE PROJECT AREA AND STRYKER SUBUNIT AND "OCCUPIED HABITAT" PORTIONS OF THE CUMULATIVE EFFECTS ANALYSIS AREA AND THE PROPORTION EACH SUITABLE CLASS REPRESENTS OUT OF ALL SUITABLE LYNX HABITATS

	PROJECT AREA		CUMULATIVE EFFECTS ANALYSIS AREA	
LYNX HABITAT	STRYKER SUBUNIT	OCCUPIED HABITAT	STRYKER SUBUNIT	OCCUPIED HABITAT
Denning	68 3%	108 6%	4,255 17%	108 5%
Foraging	666 30%	794 48%	4,213 17%	1,096 48%
Forested travel	989 45%	631 38%	11,349 45%	937 41%
Temporary non-Lynx habitats	479 22%	126 8%	5,230 21%	126 6%
Total lynx habitats	2,203	1,659	25,048	2,267
Permanently unsuitable	353	248	7,719	903
Total analysis area	2,506	1,907	32,766	3,171

classes. Young foraging habitats would diminish in the project area as they mature. Existing closed roads and skid trails would remain closed; no changes in human-disturbance levels would be expected. Thus, no direct or indirect effects to lynx would be anticipated with this alternative.

- ***Direct and Indirect Effects of the Action Alternative on Canada Lynx***

  Approximately 647 acres of lynx habitats would be harvested with this alternative, with slightly more being harvested in the "occupied habitat" portion than in the Stryker Subunit (*TABLE III-13 - ACRES OF LYNX HABITATS AFFECTED, RESULTING ACRES OF LYNX HABITATS AFTER EACH ALTERNATIVE, AND PROPORTION EACH SUITABLE HABITAT REPRESENTS OUT OF ALL SUITABLE LYNX HABITATS, BY ALTERNATIVE, IN THE STRYKER SUBUNIT AND "OCCUPIED HABITAT" PORTIONS OF THE CUMULATIVE EFFECTS ANALYSIS AREA*). Of these acres, the majority of the lynx habitats are foraging and forested travel/other habitats, with a minor denning component; after the proposed harvesting, these habitats would move into temporary non-lynx habitats until tree seedlings and shrubs recover and begin providing habitats for snowshoe hares. This habitat is only a phase and would gradually outgrow usefulness to snowshoe hares in 10 to 20 years. Forest connectivity around the openings created with this alternative would largely be maintained through riparian buffers and other forested habitats in the project area not altered with this alternative. Snowmobiles may enable other predators to access higher elevations, potentially increasing competition for available prey; however, no changes to human access for recreational

TABLE III-13 - ACRES OF LYNX HABITATS AFFECTED, RESULTING ACRES OF LYNX HABITATS AFTER EACH ALTERNATIVE, AND PROPORTION EACH SUITABLE HABITAT REPRESENTS OUT OF ALL SUITABLE LYNX HABITATS, BY ALTERNATIVE, IN THE STRYKER SUBUNIT AND "OCCUPIED HABITAT" PORTIONS OF THE CUMULATIVE EFFECTS ANALYSIS AREA

LYNX HABITAT		NO-ACTION ALTERNATIVE		ACTION ALTERNATIVE	
		STRYKER SUBUNIT	OCCUPIED HABITAT	STRYKER SUBUNIT	OCCUPIED HABITAT
Denning	Project-level change Acres posttreatment Percent of lynx habitats	0 4,255 17%	0 108 5%	0 4,255 17%	-6 102 4%
Foraging	Project-level change Acres posttreatment Percent of lynx habitats	0 4,213 17%	0 1,096 48%	-202 4,011 16%	-272 824 36%
Forested travel	Project-level change Acres posttreatment Percent of lynx habitats	0 11,349 45%	0 937 41%	-36 11,313 45%	-131 806 36%
Temporary non-lynx habitats	Project-level change Acres posttreatment Percent of lynx habitats	0 5,230 21%	0 126 6%	+238 5,468 22%	+409 535 24%
Total lynx habitats	Project-level change Acres posttreatment Percent of lynx habitats	0 24,048 -	0 2,267 -	0 25,048 -	0 2,267 -
Permanently unsuitable	-	7,719	903	7,719	903
Total analysis area	-	32,766	3,171	32,766	3,171

snowmobile use, and, therefore, lynx competition, would be anticipated. Thus, minor direct or indirect effects to lynx habitats and/or competition would be anticipated with this alternative.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative on Canada Lynx***

  Lynx habitats would not be affected in the near-term. Within the cumulative-effects analysis area, the mosaic of habitats would be expected to continue providing snowshoe hare habitats intermixed with mature forested stands that facilitate travel and foraging. Denning habitats would also persist in the cumulative effects analysis area (*TABLE III-13 - ACRES OF LYNX HABITATS AFFECTED, RESULTING ACRES OF LYNX HABITATS…*). Within the next 2 decades, some of the forested travel and temporary non-lynx habitats would be expected to develop into some of the other lynx habitat categories. Denning habitat would be expected to persist in the absence of timber harvesting or catastrophic events, reducing habitat quality. A majority of the lynx denning and foraging habitats in the Stryker Grizzly Bear Management Subunit is in the Stryker Ridge area and upper reaches of Fitzsimmons and Russky basins. No further reductions in foraging or denning habitat are currently under proposal within this subunit. Ongoing harvesting with the Ewing Middle Ridge Timber Sale Project is expected to have negligible effects on lynx habitats; additionally, no effects to lynx habitats are expected from the ongoing Point of Rocks and Dog Meadow timber sale projects. Foraging habitats within the Stryker Subunit are expected to decline through time as young foraging areas age. No changes in human access would be expected with this alternative; therefore, no changes in competition with lynx would be anticipated. Thus, no further cumulative effects to lynx would be anticipated with this alternative.

- ***Cumulative Effects of the Action Alternative on Canada Lynx***

  Within the cumulative-effects analysis area, considerable lynx habitats would continue to persist. Reductions in mature foraging and, to a minor degree, denning habitats in the proposed units would not be expected to appreciably alter lynx use of the cumulative effects analysis area. Following harvesting, sufficient denning and foraging habitats would persist (*TABLE III-13 - ACRES OF LYNX HABITATS AFFECTED, RESULTING ACRES OF LYNX HABITATS…*) to meet DNRC's requirements for these habitat attributes (*ARM 36.11.435 [7][a]* and *[b]*) in the Stryker Subunit and in the "occupied habitat" area (*ARM 36.11.435 [8][a]* and *[b]*). Within the next 2 decades, some of the forested travel and temporary non-lynx habitats would be expected to develop into some of the other suitable lynx habitat categories. Denning habitat would be expected to persist in the absence of timber harvesting or catastrophic events reducing habitat quality. A majority of the lynx denning and foraging habitat in the Stryker Grizzly Bear Management Subunit is in the Stryker Ridge area and the upper reaches of Fitzsimmons and Russky basins. No further reductions in foraging or denning habitat are currently under proposal within this subunit. Ongoing harvesting with the Ewing Middle Ridge Timber Sale Project is expected to have negligible effects on lynx habitats; additionally, no

effects to lynx habitats are expected from the ongoing Point of Rocks and Dog Meadow timber sale projects. Foraging habitats within the Stryker Subunit are expected to decline through time as young foraging areas age. No changes in human access would be expected with this alternative; therefore, no changes in competition with lynx would be anticipated. Thus, negligible cumulative effects to lynx would be anticipated under this alternative.

SENSITIVE SPECIES

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 is met.

A search of the MNHP Database documented common loons, northern bog lemmings, harlequin ducks, and Townsend's big-eared bats in the vicinity of the project area. *TABLE III-14 – LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROPOSED 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-14 – 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 – No recently (less than 5 years) burned areas are in the project area; thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
Coeur d'Alene salamander	No further analysis conducted – No moist talus or streamside talus habitat occurs in the project area; thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
Columbian sharp-tailed grouse	No further analysis conducted – No suitable grassland communities occur in the project area; thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
Common loon	*Included* – Loons have nested on several lakes (Bull, Fish, Dog, and Upper Stillwater) in the vicinity of the project area.
Fisher	*Included* – Potential fisher habitat occurs in the project area.
Flammulated owl	No further analysis conducted – No suitable dry ponderosa pine habitats occur within the project area; thus, no direct, indirect, or cumulative effects to flammulated owls would be expected to occur as a result of either alternative.

WILDLIFE ANALYSIS

SPECIES	DETERMINATION - BASIS
Harlequin duck	No further analysis conducted – No suitable high-gradient stream or river habitats occur in the project area; however, harlequin ducks have been documented 5-plus miles away on Swift Creek. No direct, indirect, or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming	No further analysis conducted – No suitable sphagnum bogs or fens occur in the project area; however, northern bog lemmings have been documented approximately 4 miles away on adjacent USFS ownership. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon	No further analysis conducted – A cliff/rock outcrop complex is within the project area; however, no sightings have been documented in the area, and the cliff complex is likely too small for peregrine falcon use. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker	*Included* – Western larch/Douglas-fir, western white pine, cottonwood, and mixed-conifer habitats occur in the project area.
Townsend's big-eared bat	No further analysis conducted – DNRC is unaware of any mines or caves within the project area or close vicinity that would be suitable for use by Townsend's big-eared bats. However, Townsend’s big-eared bats have been documented 4 miles away on adjacent USFS ownership. Thus, no direct, indirect, or cumulative effects to Townsend's big-eared bats would be anticipated as a result of either alternative.

Sensitive Species Assessed

- **Common loon *(Gavia immer)***

Issue

Concern was expressed that disturbance associated with timber harvesting and associated activities could reduce available nesting habitats by displacing adults from traditional nesting sites and/or decrease nesting success through disruption of incubation or nest abandonment.

Existing Environment

The common loon is a large and mainly aquatic bird that preys largely on fish, but will also consume frogs, salamanders, snails, leeches, and aquatic insects. Loons are rather sensitive to human disturbance and are usually associated with waterbodies that have lower levels of human disturbance. Nests can be located on small islands, partially submerged logs, or on floating mats of herbaceous vegetation. Loons are poorly adapted to living out of the water; therefore, nests are generally located where they can slip directly from the nest into the water.

The southern edge of the loon’s breeding range extends into the United States across many of the eastern states and into the Rocky Mountains. The original extent of the population is unknown, although populations have declined with the settlement of the west. Currently, the total Montana population consists of approximately 60 successfully breeding pairs and approximately

200 birds. Chick production in Montana has ranged between 33 and 51 chicks.

Several lakes are in the vicinity are large enough for loon nesting, including Upper Stillwater, Dog, Bull, Fish, and Dickey lakes. Within the project area, several loon territories have been used regularly by nesting loons, including up to 3 territories on Upper Stillwater Lake and another on Dog Lake. Chick production on these territories has been varied, and productivity in the last 7 years has averaged 0.5 to 0.57 chicks per year per territory. In general, besides the direct loss of nesting and nursery habitat, loon reproduction tends to be most seriously affected by disturbance by recreationists.

Cumulative effects were analyzed on the project area since loons are almost exclusively dependent upon water; although loons can fly to other lakes to forage, whether these loons use any other waterbodies for foraging is unknown. Factors considered include level of shoreline disturbance, level of recreational pressure on the lakes, and available nesting habitats. Presently, dispersed campsites and open roads along portions of Upper Stillwater and Dog lakes are the principle forms of human disturbance that may be affecting loons in the cumulative-effects analysis area. Moderate levels of recreational use occur on Upper Stillwater Lake, while Dog Lake receives a lower level of recreational use largely due to poor road access and its smaller size. Nesting habitats on both lakes exist, and an artificial platform has been installed on Upper Stillwater Lake to augment existing nesting habitats.

Alternative Effects on Common Loons

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

  No timber harvesting or salvage activities are proposed under this alternative. No changes in available nesting habitats would be anticipated. Access to Dog Lake would remain unimproved and use would continue at relatively low levels. No changes in access to Upper Stillwater Lake would occur. Thus, no direct or indirect effects to loon disturbance levels would be anticipated under this alternative.

- ***Direct and Indirect Effects of the Action Alternative on Common Loons***

  Proposed harvesting operations in the uplands would not be expected to alter available nesting habitats and would employ techniques to reduce sediment delivery into the lakes by restricting mechanical operations within 50 feet of the lakeshores. No permanent roads, developments, or harvesting would occur within 500 feet of the traditional nest sites. Since portions of Units 5 and 8 would be within 500 feet of Dog Lake and portions of Units 4d, 4e, and 7 would be within 500 feet of Upper Stillwater Lake, additional mitigation measures would be developed prior to harvesting should one of these pairs move their nest to a location that is closer to these units. Predicted increases in human use associated with improved access would increase potential for human disturbance that could disrupt nesting activities on Dog Lake. No changes to human access to Upper Stillwater Lake would be anticipated with this alternative. Thus, negligible direct or indirect effects to loon disturbance levels would be

anticipated under this alternative.

Cumulative Effects

- ***Cumulative Effects of the No-Action Alternative on Common Loons***

  No other DNRC projects are occurring or are proposed within the cumulative-effects analysis area. No changes to lake access or the level of recreational use would occur. Work would continue on the proposed USFS campground-improvement project on the north end of Upper Stillwater Lake, which could increase human disturbance on the lake and, subsequently, affect nesting loons on the various territories on the lake. Shoreline disturbance would not change, and available nesting habitats would persist. Thus, no further cumulative effects to loon disturbance levels would be anticipated under this alternative.

- ***Cumulative Effects of the Action Alternative on Common Loons***

  No other DNRC projects are occurring or are proposed within the cumulative effects analysis area. Work would continue on the proposed USFS campground-improvement project on the north end of Upper Stillwater Lake, which could increase human disturbance on the lake and, subsequently, affect nesting loons on the various territories on the lake. No additional changes to human access or level of recreational use for either lake would occur. Thus, negligible cumulative effects to loon disturbance levels would be anticipated under this alternative.

➢ **Fisher *(Martes pennanti)***

Issue

Concern was expressed that timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.

Existing Environment

Fishers are generalist predators that prey upon a variety of small mammals and birds, along with snowshoe hares and porcupines. Fishers use a variety of successional stages and are typically found below 6,000 feet in elevation. In the Rocky Mountains, fishers appear to prefer late-successional coniferous forests for resting sites and tend to use areas within 150 feet of water disproportionately more than their availability on the landscape (*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 is important for snow intercept (*Jones 1991*). Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

The project area ranges from 3,200 to 4,440 feet in elevation, with nearly 12 miles of perennial streams and roughly 2 miles of intermittent streams. DNRC manages preferred fisher covertypes within 100 feet of class 1 and 50 feet of class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density (*ARM 36.11.440[1][b][i]*). Approximately 293 acres are in the riparian areas along the 12 miles of class 1 and 2 miles of class 2 streams in the project area. Modeling fisher habitats using SLI

data generated an estimate of 2,611 acres of fisher foraging, resting, denning, and travel habitats in the upland and riparian areas (2,410 acres and 201 acres, respectively) in the project area (*Heinemeyer and Jones 1994*). Within the riparian areas, roughly 96 percent of the preferred fisher covertypes (201 of 209 acres) are moderately or well-stocked and likely supports the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity.

Cumulative effects were analyzed on the State portions of the Stryker Grizzly Bear Management Subunit and the areas of "occupied habitat" in State ownership in the vicinity using field evaluations and mapping potential habitats. Factors considered within this analysis area include amounts of suitable fisher habitats and the level of riparian harvesting that has occurred. Within the cumulative effects analysis area, roughly 2,254 acres are within 100 feet of the 80 miles of class 1 streams and 50 feet of the 60 miles of class 2 streams. Within the riparian habitats, roughly 86 percent (1,175 of 1,374 acres) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats. However, since *ARM 36.11.440(1)(a)* requires analysis by grizzly bear management subunit, the analysis will also identify habitat values at the subunit level as well; presently 85 percent of the preferred fisher covertypes in the Stryker Subunit (which makes up the bulk of the cumulative effects analysis area; see *GRIZZLY BEAR* section) are supporting structural attributes necessary for use by fisher, which exceeds the required threshold of 75 percent.

Alternative Effects on Fishers

Direct and indirect effects

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

  No effects to fishers would be expected. Little change to the stands providing fisher denning and foraging habitats would be expected. 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. Thus, no direct or indirect effects to fisher habitats would be anticipated with this alternative.

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

  Approximately 22 of the 293 acres of riparian habitats in the project area would be included in the proposed units. The majority of this area (98 percent) is within areas that are presently meeting structural requirements of fisher. Within these areas, the proposed prescriptions would reduce potential riparian fisher habitats within the project area from 201 acres (96 percent) to 187 acres (93 percent). Additionally, approximately 450 of the 2,418 acres of fisher foraging and resting habitats in the uplands within the project area would receive treatments that would likely yield stands too open for appreciable fisher use. Thus, minor direct or indirect effects to fisher habitats would be anticipated with this alternative.

Cumulative effects

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

  Fisher denning and resting habitats would be retained. Suitable fisher foraging, denning, and resting habitats occur across the cumulative-effects analysis area. Ongoing harvesting associated with the Point of Rocks, Ewing Middle Ridge, and Dog Meadow timber sale projects are largely removing uplands that may be suitable fisher foraging and travel habitats. No further alterations to riparian habitats would occur with this alternative, and the percentage of the analysis area in preferred covertypes meeting structural requirements for potential fisher use would not change from the current 86-percent level; at the Stryker Subunit, the percentage in preferred covertypes meeting structural requirements would remain at 85 percent. Landscape connectivity within the cumulative-effects analysis area is largely intact, particularly along the numerous streams in the area. Road access within the cumulative-effects analysis area would not be changed after implementation of this alternative; therefore, fisher vulnerability to trapping would remain unchanged. Thus, no further cumulative effects to fisher habitats and/or disturbance levels would be anticipated with this alternative.

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

  Approximately 14 acres of potential riparian fisher habitats would be harvested and, therefore, removed from available fisher habitats until the stand matures again into the sawtimber stocking class. At the cumulative-effects analysis-area level, harvesting would reduce available riparian fisher habitats from 1,175 acres (86 percent) to 1,161 (85 percent). Additionally, 450 acres of potential fisher foraging and travel habitats in the uplands would be harvested in varying amounts. These reductions would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area and the ongoing harvesting associated with the Point of Rocks, Ewing Middle Ridge, and Dog Meadow timber sale projects. At the Stryker Subunit level, proposed harvesting within riparian fisher habitats would reduce available habitats from 1,090 (85 percent) to 1,076 (84 percent), which exceeds the 75-percent threshold established with *ARM 36.11.440(1)(a)*. Landscape connectivity within the cumulative-effects analysis area and subunit would be largely intact and human disturbance and potential trapping mortality would remain relatively unchanged since no changes in access within the subunit would be realized. Thus, minor further cumulative effects to fisher habitats and/ or disturbance levels would be anticipated with this alternative.

➢ **Pileated woodpecker *(Dryocopus pileatus)***

Issue

Concern was expressed that timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

Existing Environment

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 down wood for feeding, closely tie these woodpeckers to mature forests. Removal of large western larch by past timber-harvesting activity 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. Black cottonwood occurs within some of the riparian areas in the project area. Some large western larch within the project area could become suitable nesting sites, and existing Douglas-fir and western larch stands are likely providing foraging habitats. Potential pileated woodpecker nesting habitat was identified by locating in the SLI database 'old stands' 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 904 acres. Additionally, roughly 2,496 acres of sawtimber stands exist in the project area that likely serve as foraging habitats. In the last 20 years, roughly 1,111 acres within the project area have been harvested and are largely unsuitable for pileated woodpeckers. During field visits, many feeding sites and 0 to 3 snags per acre were observed in the project area.

Cumulative effects were analyzed on the contiguous Stillwater State Forest using a combination of field evaluations and aerial photograph interpretatis. Factors considered included the degree of harvesting and the amount of continuous forest within the cumulative effects analysis area. Across Stillwater State Forest, 13,763 acres are suitable for pileated woodpecker nesting and foraging, with an additional 30,218 acres that may be suitable foraging habitats. Within the cumulative-effects analysis area, the extensive harvesting that has occurred in the past has fragmented the contiguous forest to a degree. However, in the more recent past, stands that have been managed for mature western larch and western white pine, snags, and snag-recruit trees will benefit pileated woodpeckers in the long-term.

Alternative Effects on 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. Therefore, a reduction in suitable nesting trees is likely over time. Pileated woodpeckers typically do not nest in Douglas-fir or grand fir; however, they will forage on the boles of Douglas-fir. Under this alternative, stands once dominated by Douglas-fir and western larch would continue to be converted through succession to Douglas-fir, grand fir, and mixed-conifer stands. Thus, habitat sustainability and quality for pileated woodpeckers would gradually increase through time, and then decline. Thus, negligible direct or indirect

effects to pileated woodpecker habitats and/or disturbance levels would be anticipated with this alternative.

- ***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 pileated woodpeckers would be retained, including snags, coarse woody debris, numerous leave trees, and snag recruits. Of the 904 acres of pileated woodpecker nesting habitat in the project area, roughly 251 acres (28 percent) would be proposed for treatment. Within these 251 acres, the majority of the acres would receive a seedtree treatment, which would largely remove the midstory and overstory. This could reduce pileated nesting use within these acres. After the proposed harvesting, most of the 650 harvested acres within the project area would be too open to be considered pileated woodpecker habitat. These would be additive to the 1,111 acres that have been harvested in the project area in the last 20 years. Silvicultural treatments designed to recruit shade-intolerant tree species would benefit pileated woodpeckers in the distant future by providing nesting, roosting, and foraging habitats. Thus, moderate direct and indirect effects to pileated woodpecker habitats and/or disturbance levels would be anticipated under this alternative.

Cumulative Effects

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

  Western larch and Douglas-fir trees would continue to grow and die over time in the project area, providing foraging and, to a degree, nesting habitats. Through time, conversion of stands to shade-tolerant species would reduce nesting substrates for pileated woodpeckers. Stands elsewhere on Stillwater State Forest have frequently been managed for mature western larch, snags, and snag-recruit trees, which benefit pileated woodpeckers. Ongoing harvesting associated with the Point of Rocks Timber Sale Project (1,136 acres, 33 acres nesting habitats), West Fork Swift Creek Timber Sale Project (1,187 acres, 775 acres nesting habitats), Ewing Middle Ridge Timber Sale Project (131 acres, 7 acres nesting habitats), and Dog Meadow Timber Sale Project (939 acres, 4 acres nesting habitats) would continue to remove potential pileated woodpecker habitats while reducing the amount of Stillwater State Forest that is in mature, forested covertypes. This alternative would result in the retention of existing pileated woodpecker habitats, and continued pileated woodpecker use would be anticipated. Thus, no further cumulative effects to pileated woodpeckers would be anticipated under this alternative.

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

  Under this alternative, reductions in pileated woodpecker habitats would be expected. Snags, coarse woody debris, and some potential nesting trees would be retained within the project area; however, future recruitment of these attributes could be reduced by the proposed activities. Within the project area, approximately 650 acres are proposed for harvesting; the canopy postharvest would likely be too open for appreciable pileated woodpecker use.

Recently harvested stands within the project area and elsewhere on Stillwater State Forest reduced pileated woodpecker habitats. Pileated woodpecker habitats are being reduced with ongoing harvesting associated with the West Fork Swift Creek Timber Sale Project (1,187 acres, 775 acres nesting), Point of Rocks Timber Sale Project (1,136 acres, 33 acres nesting), Ewing Middle Ridge Timber Sale Project (131 acres, 7 acres nesting), and Dog Meadow Timber Sale Project (939 acres, 4 acres nesting). The loss of pileated woodpecker habitats associated with the proposed harvesting would be additive to habitat losses associated with past harvesting on Stillwater State Forest; continued widespread use of Stillwater State Forest would be expected. Additionally, continued maturation of stands across Stillwater State Forest is increasing suitable pileated woodpecker habitats. Thus, minor cumulative effects to pileated woodpecker habitats and/or disturbance levels would be anticipated under this alternative.

BIG GAME

- **Winter Range**

Issue

Concern was expressed that timber harvesting and associated activities could remove thermal cover on big game winter ranges, which could reduce the carrying capacity of the winter range.

Existing Environment

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 midstories and overstories 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 elk winter range across most of the project area (approximately 4,372 acres of the approximate 5,090 terrestrial acres in the project area, or approximately 86 percent). Additionally, approximately 61 acres of mule deer winter range was identified along the northern portion of the project area. Winter snow depths and suitable microclimates influence big game distribution and use within Stillwater State Forest and the project area. The project area is a mosaic of stands of differing ages. Portions of the project area include stands that were harvested during the last 15 to 30 years and are not currently providing thermal cover for big game. Other stands are providing the attributes facilitating big game winter use.

Cumulative effects were analyzed on the contiguous Stillwater State Forest using a combination of field evaluation and aerial photograph interpretation. Factors considered within this analysis area include the acres of winter range harvested and the level of human disturbance and development. Presently, a variety of stands across Stillwater State Forest are providing thermal cover and snow intercept for big game, and DFWP identified approximately 13,495 acres of elk winter range on Stillwater State Forest. Additionally, winter range exists for mule deer, white-tailed deer,

and moose across Stillwater State Forest. Roughly 2,842 acres (21 percent) of the 13,495-acre elk winter range have been harvested in the last 30 years or are included in ongoing timber sales projects (Dog Meadow, Ewing Middle Ridge, and Point of Rocks), likely limiting the usefulness of these acres for wintering big game. Human disturbance within the winter range is largely associated with the highway corridor; however recreational snowmobile use of the trails and roads coupled with other forms of winter recreation and commercial timber harvesting likely influence elk on this winter range.

Alternative Effects on Winter Game

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. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. Thus, no direct or indirect effects to big game winter range would occur as a result of this alternative.

- ***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. Thermal cover would be reduced for big game. No changes to the mule deer winter range would be anticipated by the proposed activities, as no proposed units occur within the 61 acres of mule deer winter range. Within the 4,372 acres of elk winter range in the project area, canopy cover would be largely removed from 650 acres where silvicultural prescriptions call for seedtree and shelterwood-type treatments. Some pockets of thermal cover would likely exist within these units after treatment, but most of the existing thermal cover would be removed. Timber harvesting would not prevent big game movement through the area. Proposed harvesting could stimulate browse production for big game species. Thus, minor direct and indirect effects would occur to big game winter range as a result of this alternative.

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 under this alternative. Continued winter use of Stillwater State Forest by big game would be expected. Those portions of ongoing sales within the winter range could continue to displace wintering big game and reduce available winter-range habitats. Thus, no further cumulative effects would occur to big game winter range as a result of this alternative.

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

  Thermal cover would be largely removed from approximately 650 acres of winter range, which would increase the amount of the elk winter range that has been harvested from 2,842 acres to 3,496 acres (approximately 26 percent) on Stillwater State Forest. Cumulatively, the reduction in thermal cover and snow intercept on winter range associated with this alternative would be additive to ongoing and past reductions across the elk winter range. Displacement associated with this alternative could also be additive to the displacement associated with ongoing timber sales should activities be conducted during the winter. Thus, minor cumulative effects to big game

winter range would occur as a result of this alternative.

- **Elk Security**

Issue

Concern was expressed that timber harvesting and associated activities could remove elk security habitat and increase elk vulnerability.

Existing Environment

Timber harvesting can increase elk vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during 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. The presence of fewer males at the beginning of the hunting season reduces the odds of any given hunter to see or harvest such an animal throughout the remainder of the season.

Much of the acreage in the project area is in close proximity to open roads. Areas that are within 0.5 mile of an open road do not provide security habitat. Within the project area, no patches meet the distance, cover, and size requirements to serve as elk security, nor do any portions contribute to elk security areas that extend outside of the project area.

Cumulative effects to elk security were analyzed on the contiguous Stillwater State Forest using a combination of field evaluations and reviewing available habitats. Factors considered within this cumulative-effects analysis area include the amount of security habitat and level of human access for recreational hunting. On the forest, approximately 31,686 acres are presently providing security cover for elk, and considerably more acres are providing hiding cover. Hunter access to Stillwater State Forest is relatively unlimited, with many open roads and considerable foot access along trails and closed roads.

Alternative Effects on Elk Security

Direct and indirect effects

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

  No changes in elk security cover would be expected. Existing cover would continue to serve as hiding cover. Timber stands would continue advancing to climax plant species. No alterations in cover would occur that would increase elk vulnerability during hunting season. No changes would be anticipated in disturbance and potential mortality due to hunting. Thus, no direct or indirect effects would occur to elk security habitat and/or elk vulnerability as a result of this alternative.

- ***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 completely within the project area. Any restricted or temporary roads opened with the project would be restricted to the public with a sign during active periods and a physical closure during inactive periods (weekends, break-up, etc.) when feasible. Thus, minimal changes in elk security or hunter access would be anticipated with these stipulations in place. The retention of pockets of cover and structure within the

proposed units would further contribute to big game security. Thus, negligible direct and indirect effects to elk security habitat and/or elk vulnerability would occur as a result of this alternative.

Cumulative effects

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

  No changes would be anticipated in elk security cover. Over time, habitats within the project area would become denser and offer greater security, which would benefit elk and deer that spend portions of hunting season in the vicinity of the project area. Past harvesting on Stillwater State Forest reduced elk security habitats and allowed increased access. Security habitat, at the Stillwater State Forest level, would largely persist, and ongoing reductions in hiding cover associated with the West Fork Swift Creek, Ewing Middle Ridge, Dog Meadow, King Bear, and Point of Rocks timber sale projects would continue. Recently harvested stands within the project area and across Stillwater State Forest would likely provide additional hiding cover in 10 to 20 years. Thus, no cumulative effects to elk security habitat and/or elk vulnerability would occur as a result of this alternative.

- ***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. Potential shifts in habitat use are anticipated with the West Fork Swift Creek Timber Sale Project. Similarly, vegetation removal associated with that project reduced elk security habitats; however, no increases in human access would be realized after the harvesting is completed. The reduction in hiding cover associated with the proposed harvest would be additive to the harvesting that is ongoing and has occurred recently within Stillwater State Forest. Closing the roads that would be opened during harvesting activities and returning human disturbance to preharvest levels would compensate for some of the reduced elk hiding cover caused by the harvesting. Recently harvested stands and the stands proposed under this alternative would likely provide blocks of security habitat in 10 to 20 years. Thus, negligible cumulative effects to elk security habitat and/or elk vulnerability would occur as a result of this alternative.

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Stipulations and Specifications

STIPULATIONS AND SPECIFICATIONS

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 that apply to operations required by, and occurring during the contract period, would be contained within the Timber Sale Contract. 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 selected action alternative to mitigate potential effects of resources.

VEGETATION

➢ ***SNAG RETENTION***

- Where available, 2 snags and 2 snag-recruitment trees, greater than 21 inches dbh, per acre would be left as wildlife trees. If 2 snags cannot be found, 4 live recruitment trees of the next largest size class would be left.
- 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 contract-administrating officer would inspect equipment periodically during project implementation.
- Prompt vegetation seeding (with a native grass seed mix) of disturbed roadside sites would be required. Roads used and closed as part of this proposal would be reshaped and reseeded.

AIR QUALITY

- To prevent individual or cumulative effects during burning operations, burning would be done in compliance with the Montana Airshed Group reporting regulations and any burning restrictions imposed in Airshed 2. This would provide for burning during acceptable ventilation and dispersion conditions.
- Excavator, landing, and roadwork debris would be piled clean to allow ignition during fall and spring when ventilation is good and surrounding fuels are wet. The Forest Officer may require that piles be drier, ignite easier, burn hotter, and extinguish sooner.
- In order to reduce smoke production, large woody debris would be left on site to minimize the number and size of burn piles.
- Dust abatement may be applied on some road segments, depending on the seasonal conditions and level of truck and public traffic.

AESTHETICS

- Damaged residual vegetation will be slashed.
- The location, size, and number of landings will be limited.
- Disturbed sites along road right-of-ways would be grass seeded.

ARCHAEOLOGY

- A contract clause provides for suspending operations if cultural resources were discovered; operations may only resume as directed by the Forest Officer.
- If cultural resources were discovered, the Confederated Salish-Kootenai Tribe has requested notification.

FISHERIES AND WATERSHED

- Planned erosion-control measures include:
  - grade breaks on roads,
  - surface water-diverting mechanisms on roads,
  - slash-filter windrows, and
  - grass seeding.

  Details for these control measures would be included in ATTACHMENT B of the TIMBER SALE AGREEMENT.
- Streamside Management Zones and Riparian Management Zones would be defined along those streams and/or wetlands where they occur within or adjacent to harvest areas. This project would meet or exceed SMZ and RMZ rules.
- Culvert sizing for all road projects would be a 50-year-flood event, as recommended by the DNRC hydrologist.
- Stream crossings where culvert removals and installations are planned would have the following requirements, as needed, to protect water quality and meet BMPs.
- Filter-fabric fences would be in place downstream prior to and during culvert installation.
- Diversion channels would be constructed and lined with plastic to divert streamflow prior to any in-channel operations.
- All soil disturbed during the installation or removal of bridges would be seeded with quick-cover mix within 24 hours of disturbance.
- Limited crossings would occur only at authorized sites.
- Brush would be removed from existing road prisms to allow for effective road maintenance. Road maintenance would reduce sediment delivery.
- The contractor would be responsible for the immediate cleanup of any spills (fuel, oil, dirt, etc.,) that may affect water quality.
- Leaking equipment would not be permitted to operate at stream-crossing construction sites.
- The BMP audit process would continue. This sale would likely be reviewed in an internal audit and may be picked at random as a State-wide audit site.
- Apply applicable Forest Management Administrative Rules for fisheries, soils, and wetland riparian management zones (*ARM 36.11.425* and *36.11.426*).

SOILS

➢ ***SOIL COMPACTION AND DISPLACEMENT***

- Logging equipment would 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 would be used where their design is consistent with prescribed treatments and meets current BMP guidelines.
- To reduce the number of skid trails and the potential for

erosion, designated skid trails would be required where moist soils or short steep pitches would not be accessed by other logging systems.

- Skid trail density in a harvest area would not exceed 20 percent of the total area in a cutting unit.
- Conventional ground-based skidding equipment would 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 would be used on steeper slopes.
- Piling and scarification would be completed with a dozer where slopes are gentle enough to permit. Steeper slopes would have slash treatment and site preparation done with an excavator.
- A majority of all feasible fine litter and 10 to 15 tons of large woody debris would be retained following harvesting (*ARM 36.11.410 and 36.11.414*).

➢ ***EROSION***

- Ground-skidding machinery would be required to be equipped with winchline to limit equipment operations on steeper slopes.
- Roads used by the purchaser would be reshaped and the ditches redefined following use to reduce surface erosion.
- Drain dips and gravel would be installed on roads as needed to improve road drainage and reduce maintenance needs and erosion.
- Some road sections would be repaired to upgrade the roads to design standards that reduce erosion potential and maintenance needs.
- Certified weed-free grass seed and fertilizer would be applied in a prompt and timely manner to all newly constructed road surfaces, cutslopes, and fillslopes. These applications would also be applied to any existing disturbed cutslopes, fillslopes, and landings immediately adjacent to open roads. Seeding to stabilize soils and reduce or prevent the establishment of noxious weeds would include:
  - seeding all road cuts and fills concurrent with construction,
  - applying “quick-cover” seed mix within 1 day of work completion at stream culvert installation sites, and
  - seeding all road surfaces and reseeding culvert installation sites when the final blading is completed for each specified road segment.
- Based on ground and weather conditions, water bars, logging-slash barriers, and, in some cases, temporary culverts would be installed on skid trails where erosion is anticipated and as directed by the forest officer. These erosion-control features would be periodically inspected and maintained throughout the contract period or extensions thereof.

WILDLIFE

- If a threatened or endangered species is encountered, consult a DNRC biologist and develop additional mitigations that are consistent for managing Threatened and Endangered Species (*ARM 36.11.428* through *36.11.435*).
- Harvesting activities would be conducted to limit disturbances to grizzly bear habitats in the recovery zone by harvesting during the denning period (November 15 through March 15) or harvesting

along open roads, as laid out in the grizzly bear section.

- In order to address wildlife rules for fisher, specifically identified streams would have a 100-foot RMZ buffer where the first 50 feet will not be harvested. Between 50 and 100 feet, a minimum of 40 percent canopy cover would be retained.
- If loon surveys locate a nest within 500 feet of a harvest unit, harvesting in that unit would be halted until after the nesting season concludes (after July 15) or the nest is determined to have failed.
- To reduce the potential for unauthorized motor vehicle use, reclose roads and skid trails that were opened with the proposed activities.
- Restrict public access at all times on restricted roads opened with the proposed activities.
- 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, particularly favoring western larch.
- Prohibit contractors and purchasers from carrying firearms while conducting contract operations on restricted roads.

Glossary

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.

Bald eagle home range
A circular area having a radius of 2.5 miles around a nest site that has been active within 5 years, or an area that has been defined in a *Bald Eagle Site-Specific Plan*.

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.

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

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.

Desired future 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.

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.

Multistoried stands
Timber stands with 2 or more distinct stories.

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*.

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.

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.

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
CFR	Code of Federal Regulations
CS	Common Schools (trust)
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
KNF	Kootenai National Forest
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
RMZ	Riparian Management Zone
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

ID Team	Interdisciplinary Team
Land Board	Montana Board of Land Commissioners
Rules	Administrative Rules of Forest Management
124 Permit	Stream protection Act Permit
3A Authorization	Authorization A—Short-term Exemption from Montana’s Surface Water Quality Standards

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