SPENCER LAKE TIMBER SALE

ENVIRONMENTAL ASSESSMENT

PREPARED BY

MONTANA DEPARTMENT OF NATURAL
RESOURCES AND CONSERVATION
NORTHWESTERN LAND OFFICE
KALISPELL UNIT
DECEMBER 2012

FINDING

SPENCER LAKE

TIMBER SALE

An interdisciplinary team (ID Team) has completed the Environmental Analysis (EA) for the proposed Department of Natural Resources and Conservation (DNRC) Spencer Lake Timber Sale. After a thorough review of the EA, project file, public correspondence, DNRC policies and Administrative Rules, Whitefish Neighborhood Plan, and the State Forest Land Management Plan (SFLMP), the following decisions have been made:

I. Alternative Selected

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

No Action Alternative

Under the No Action Alternative, no timber harvesting as proposed would occur. Small quantities of wood products may continue to be sold from small areas and hazard trees would continue to be removed next to recreational trails. No new roads would be built, traditional recreational uses would continue. Forest and plant succession would also continue, influenced mainly by the forces of nature such as insects and disease outbreaks, windthrow, and/or wildfire.

Action Alternative

The Action Alternative is designed to improve timber stand productivity and maintain healthy forests within the Spencer Lake analysis area and as a necessary means for providing revenue generating opportunities in the future. Timber harvesting would maintain or promote the Desired Future Condition (DFC) of western larch/Douglas-fir on the moister grand fir and on the drier Douglas-fir habitat types. The silvicultural treatments identified for meeting the above objectives would be intermediate harvests (commercial thin).

The Action Alternative would apply silvicultural treatments to 1,650 acres, harvesting approximately 10 MMBF of timber from two sales, Spencer Lake #1 (685 acres on the south end) and Spencer Lake #2 (965 acres on the north end). Intermediate harvest treatments would be used on all 1,650 acres.

To access harvest units, approximately 19.5 miles of road would be used - 10 miles of existing road would be improved and/or reconstructed and 9.5 miles would be new construction. In addition, three log landings (two on the north, one on the south) would be constructed in such a way so as to facilitate conversion into parking areas/trailheads for recreational use upon completion of the timber sale. It is estimated the sale of the timber would generate 1.6 million dollars for the Commons Schools, School for the Deaf and Blind, MSU 2nd grant, State Normal Schools, and Montana Tech trust accounts.

For the following reasons I have selected the Action Alternative as presented with the understanding that the implementation of the project will include the mitigations as described in the EA and within this Decision Notice:

The Action Alternative meets the Project Objectives as stated on page 4 of the EA.

- Manage for biologically diverse and healthy forests through silvicultural treatments that increase stand vigor and reduce the amount of insect and disease infected trees.
- Reduce the fire hazard to State Trust land through treatment of forest fuel accumulations.
- Develop a manageable, maintainable road system with the minimum number of road miles that provides appropriate access for short and long-term management and use of the Trust lands in the project area.
- Harvest approximately 10 MMBF of wood products to generate revenue for the five different trusts involved (See page 3 of the EA), and provide sawlog volume to contribute to the annual sustainable yield for DNRC, as mandated by 77-5-222 MCA.
- Maintain the existing recreational uses and continue to provide for future recreational use of the Trust lands in the project area.

The Action Alternative includes mitigation measures incorporated into the project design to address issues raised by the public which include effects on: vegetation and weed management, soil productivity, air and water quality, wildlife habitat, economics, recreation, and aesthetics.

A draft EA was released in December 2010 for public review. Based on additional public comment, a list of specific mitigations was developed in response to public input to lessen the impacts on recreation in the project area. The mitigations, which will be implemented as part of the project, are as follows:

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Outside of the 350 acre "Community Recreation Area" and outside the Connector Trail

The harvest prescription outside of the 350 acre Community Recreation Area and outside the Connector Trail will be a commercial thin prescription and will include a winter log requirement as described in the EA. Commercial thin will require 60 to 80 square foot basal area remaining, where such density is present, and is further defined by retaining the largest and healthiest western larch, Douglas-fir, and ponderosa pine with the goal of 75 leave trees per acre.

The degree of change due to harvest operations will be moderated to lessen the impact on existing recreation and will be achieved in part by:

- Creating 'mosaics' within prescription areas and keeping a representation of the larger trees on the landscape.
- Along roads, retain as many seedlings and saplings as possible as long as they do not interfere with the sight distance needed for log hauling traffic.
- Grass seeding disturbed areas around landings and along roads.

- Conducting high standard post-harvest slash clean up along roads (see Exhibit A) and property boundaries. Slash clean-up will include slash piling and locating slash piles away from roads and property boundaries where possible. When slash piles are planned to be burned, burn piles will be re-seeded following burning.

Within the 350 acre "Community Recreation Area" and along the Connector Trail

The harvest prescription within the 350 acre Community Recreation Area and within approximately 50 feet on either side of the center line of the Connector Trail will also be a commercial thin and will include a winter log requirement as described in the EA. Commercial thin will require 80 square foot basal area remaining, where such density is present, and is further defined by retaining the largest and healthiest western larch, Douglas-fir, and ponderosa pine with the goal of 75 leave trees per acre.

The preservation of recreational experience along the Connector Trail and within the 350 acre Community Recreation Area (Exhibit A) during harvest operations is a priority. Along the Connector Trail and within the Community Recreation Area harvest prescriptions will incorporate the following strategies to lessen the impact on existing recreation:

- Retaining seedlings and saplings along trails wherever possible.
- Skid trails will cross perpendicularly to existing trails, be limited to approximately 15 feet in width, and limited to approximately 60 foot spacing, whenever possible. This will minimize ground disturbance, lessen harvest visual impacts, and retain a quality trail tread.
- Skid trails will be visually disguised within approximately 25 feet on either of side of the trail using slash. This will discourage unauthorized trail use.
- 'Anchor trees' and 'natural gateways' will be maintained to the extent feasible.
- Log Landings and slash piles will be located away from trail junctions and trail corridors where possible. When slash piles are planned to be burned, burn piles will be re-seeded following burning.
- Other than what will be used to disguise skid trails, DNRC will meet the General Standard for slash clean up (90% of area meets the 4 foot flame length standard).

DNRC will mark trees within the Community Recreation Area and along the Connector Trail according to the specifications listed above. City and its representatives will then review the proposed marking to determine if appropriate recreation experience is maintained. If the parties cannot agree, each party will designate a representative to resolve any disagreements. The City and its representatives will identify all existing trails generally depicted on Exhibit A prior to harvest operations beginning. This process will assure the following objectives will be met:

- EA objective to maintain existing recreational uses will be accomplished.
- Timber sale mitigations will be designed to maintain the visual quality (1) of the area visible from Highway 93 and (2) within the Community Recreation Area and along the Connector Trail in order to maintain the recreational experience within those areas.
- DNRC will provide for natural looking harvest units by avoiding straight line boundary edges where possible.

- Density of over-story trees to minimize the potential for crown fire will be reduced.

Roads

After harvest is complete, DNRC will recondition and grass seed roads and areas that were disturbed during road construction and reconstruction. Grass seeding will cover roadbeds, cut and fill slopes, landings and spot improvements. After harvest, the DNRC may close perimeter access points to roads using gates or similar barricades. The roads will still be available for non-motorized recreation but not available for motorized recreation. However, snowmobile use will continue to be permitted during the winter periods.

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The analysis of identified issues did not reveal information compelling the DNRC not to implement the timber sale.

II. Significance of Impacts

a. Vegetation

The commercial thin prescription will allow for the flexibility to meet both the health and productivity objective in the younger stands and the desire for a more diverse "mosaic" type of stand condition requested by recreational users. The regeneration harvest described in the EA will not be done in response to public comment to the draft EA. Both the North and South Timber Sales will have a commercial thin prescription.

Mitigation measures to control the potential increased risk of weed establishment, such as washing equipment prior to use, grass seeding disturbed areas, and herbicide treatment of existing or introduced weed populations will be required as part of the sale.

b. Soils

In addition to the potential impacts from harvesting, up to 35 acres would be impacted by new road construction and an estimated two acres in excavated skid trails or temporary roads. All excavated skid trails and temporary roads would be recontoured and seeded with grass and littered with slash and brush at the termination of the project. Road construction would likely result in more erosion than native topography; however, BMP implementation would minimize the risk of erosion. Due to the general lack of surface water throughout the project area, the risk of delivery into streams would be very low.

By designing the proposed harvesting operations with soil moisture restrictions, season of use, and method of harvesting, and implementing the Best Management Practices as described on page 52 of the EA, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low.

c. Air and Water Quality

Because DNRC would incorporate water quality related BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a low risk of sediment from timber-harvesting activities would result from the implementation of this alternative. The existing parking area near the outlet of Spencer Lake would, as part of this project, be revegetated to provide a more effective buffer to future sediment deliver from the proposed landing and also Twin Bridges Road. The use of mitigations as prescribed in this EA (the use of soil moisture restrictions, slope restrictions, filter fabric, and slash mats) would result in a low risk of long-term adverse effects to water quality.

Burning will be done in accordance with the requirements imposed by the Montana Department of Environmental Quality, Montana/Idaho Airshed Group, and Flathead County Health Department. The late fall/winter logging requirements will result in a minimal impact from road dust associated with log hauling.

d. Wildlife

Impacts to wildlife from this project revolve around connectivity of security cover, snags and course woody debris for cavity nesters, and big game winter range (thermal cover), and the specific effects of these on fisher, flammulated owls, pileated woodpeckers, goshawks, loons, and white-tailed deer.

In general, habitat conditions would improve for species adapted to the more-open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions. Thus, moderate adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect white-tailed deer winter range in the project area since: 1) harvesting would revert succession on a portion of the project area and open stands up on much of the project area, which would reduce stand age and the amount of forested cover in the project area; 2) minor changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected. In addition, it is expected a reduction to snags and coarse woody debris would result in overall minor adverse affects on wildlife species requiring these habitat attributes.

e. Economics

An estimated $1,600,000 in revenue will be deposited into the representative trust accounts and an estimated $251,300 into the FI account. (In the EA, the estimate for FI revenue was $392,400. The FI fee has come down from $39.24/MBF to $25.13/MBF since the EA was published). Approximately $162,000 of road development and maintenance work will be accomplished. Using the employment multiplier of 10 jobs per MMBF of timber harvested (*Bureau of Business and Economic Research, 2008*); this sale will provide work for approximately 100 positions.

f. Recreation

Recreationists may be temporarily displaced from areas where timber harvesting and road construction activities occur. Adverse cumulative effects are expected to be minor since area closures would be coordinated and managed so that only a portion of the project area would be closed at a given time for road construction and timber harvesting operations. It is expected there may be some slash cleanup on or along the trails required in the spring. While the harvest operation will try to minimize the disturbance to trails during the winter logging, a day or two of hand work to clear the trails of limbs and incidental logging slash is anticipated.

g. Aesthetics

Changes to foreground and background views of the project area will be inevitable. The degree of change is expected to be moderated by a number of mitigations including but not limited to: creating mosaics where possible; keeping a representation of the larger trees on the landscape; retaining seedlings and saplings along roads and trails; grass seeding disturbed areas; and high standard slash cleanup along roads and property boundaries.

Managed timber stands would continue to grow and canopy coverage would begin to lessen the view of the ground. The harvested over mature stands would be regenerated with a mix of species, including western larch. Colors and textures associated with denser stands would return as stands mature and stocking increases. Historically, much of the private ownership and DNRC-managed State land in the Spencer area has been harvested, creating a mosaic of forests and associated textures, lines, colors and forms on the landscape. The proposed action would be similar, but would be additive to changes that have taken place within the viewshed historically.

h. Precedent Setting and Cumulative Impacts

The proposed timber sale is similar to past projects that have occurred on state trust lands in the area. Since the release of the draft EA in 2010, a community recreation area within the same area as the North Timber Sale has been proposed. The initial proposal has been released for public comment and the environmental analysis begun which will address potential cumulative effects between this timber sale and the proposed recreation area.

Taken individually and cumulatively, the identified impacts of the proposed timber sale are within threshold limits. Proposed timber sale activities are common practices and none of the project activities are being conducted on fragile or unique sites. The proposed timber sale conforms with the management philosophy adopted by DNRC in the SFLMP and the Whitefish Neighborhood Plan and is in compliance with existing laws, policies, guidelines, and standards applicable to this type of proposed action.

Upon review of the above primary issues considered as part of this EA, I find that none of the project impacts are regarded as severe, enduring, geographically widespread, or frequent. Further, I find that the quantity and quality of various resources will not be adversely affected to a significant degree. I find no precedent for future actions that will cause significant impacts, nor do I find conflict with local, State, or Federal laws, requirements, or formal plans. In summary, I find that the identified adverse impacts will be avoided, minimized, or mitigated by the design of the project to an extent that they are not significant.

III. Should DNRC prepare an Environmental EIS?

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

a. The EA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.

b. Evaluation of the potential impacts of the proposed timber sale indicates that no significant impacts would occur.

c. T he ID Team provided sufficient opportunities for public review and comment during project development and analysis. Public concerns were incorporated into project design and analysis of impacts.

Greg Poncin

Kalispell Unit Manager

MT DNRC

SPENCER LAKE TIMBER SALE
ENVIRONMENTAL ASSESSMENT

COVER SHEET

Proposed Action: The Montana Department of Natural Resources and Conservation (DNRC) is proposing forest management activities on forested State Trust lands. Proposed activities would include the sale and harvest of up to approximately 10 million board feet (MMBF) of timber from 1,650 acres of State land located approximately 3 miles west of Whitefish, Montana. Timber harvest would focus on improving the current and future productivity of forest stands while maintaining biodiversity and establishing a road system to meet current and future forest management needs in the project area. If selected, the proposed action would begin implementation as early as the summer of 2013.

Type of Document: Environmental Assessment

Lead Agency: DNRC, Northwest Land Office, Kalispell Unit

Decision Maker: Greg Poncin
655 Timberwolf Parkway
Kalispell, Montana 59901
406-751-2263

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ACRONYMS

ARM	Administrative Rules of Montana
BMP	Best Management Practices
DBH	Diameter at Breast Height
DFWP	Department of Fish, Wildlife, & Parks
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
ECA	Equivalent Clearcut Acres
FI	Forest Improvement
HUC	Hydrologic Unit Code
ID Team	Interdisciplinary Team
MBF	Thousand Board Feet
MCA	Montana Codes Annotated
MEPA	Montana Environmental Policy Act
MMBF	Million Board Feet
SFLMP	State Forest Land Management Plan
SLI	Stand Level Inventory
SMZ	Streamside Management Zone
USFS	United States Forest Service

CHAPTER 1: PURPOSE AND NEED

DESCRIPTION OF PROPOSED ACTION

The Kalispell Unit, Montana Department of Natural Resources and Conservation (DNRC) is proposing the Spencer Lake Timber Sale Project on State school Trust lands west of Whitefish, Montana. Proposed activities include:

- Timber harvesting
- New road construction
- Reforestation activities

The project area is comprised of approximately 2,500 acres and is located 3 miles west of Whitefish, Montana in sections 4, 5, 8, 9, 15, 16 in Township 30N, Range 22W and section 33 in Township 31N, Range 22W (Figure 1-1). State Trust lands within the project area share a common boundary with private landowners. If the Action Alternative is selected, an estimated 10 Million Board Feet (MMBF) of timber would be sold and harvested from 1,650 acres. Regeneration harvest would be used to treat 72 acres and intermediate harvest would be used to treat 1,578 acres. To access the harvest units, 19.5 miles of road would be used- 9.5 miles would be new road construction and 10 miles of existing road would require reconstruction and/or BMP maintenance.

Figure 1-1: Spencer Lake Timber Sale Vicinity Map

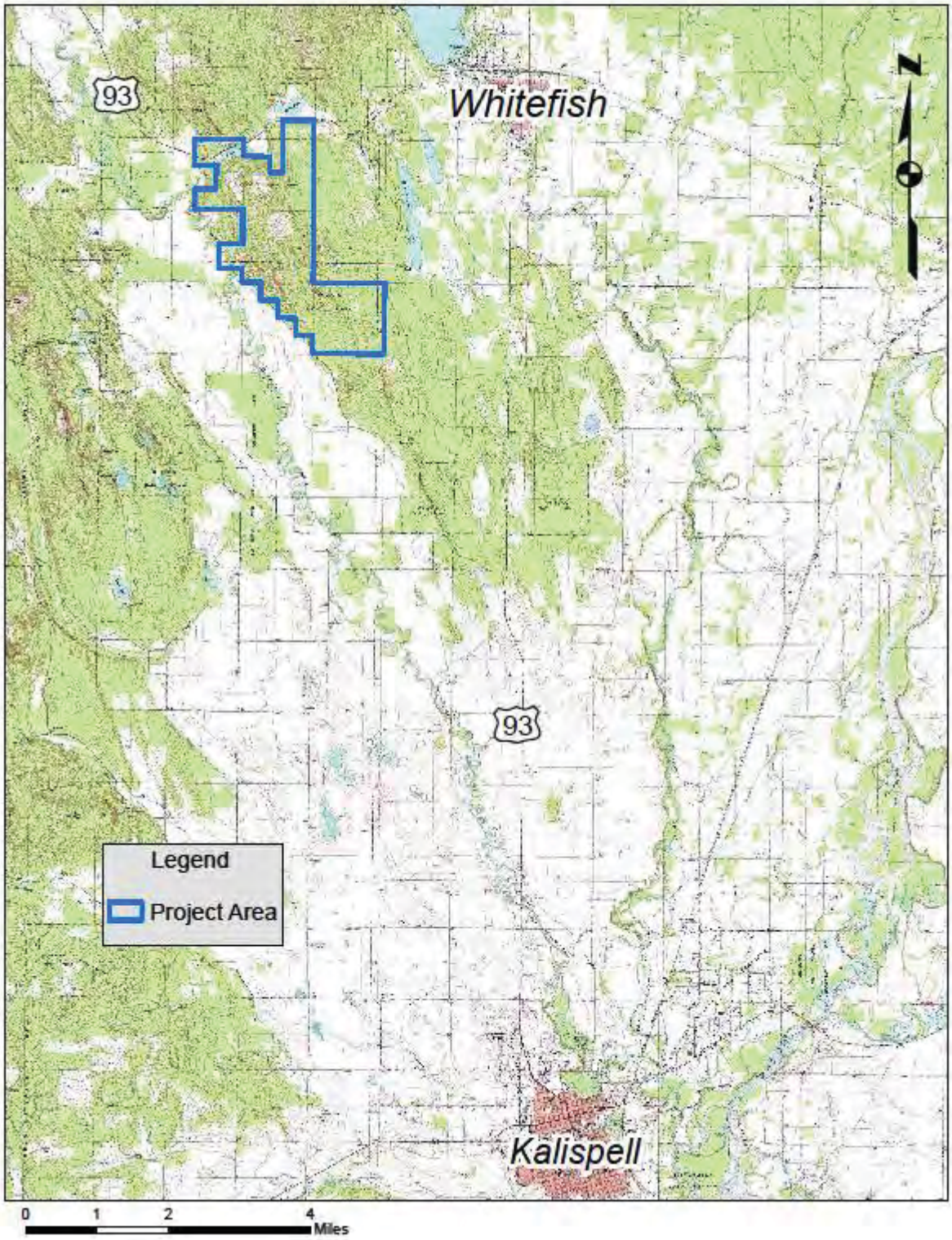
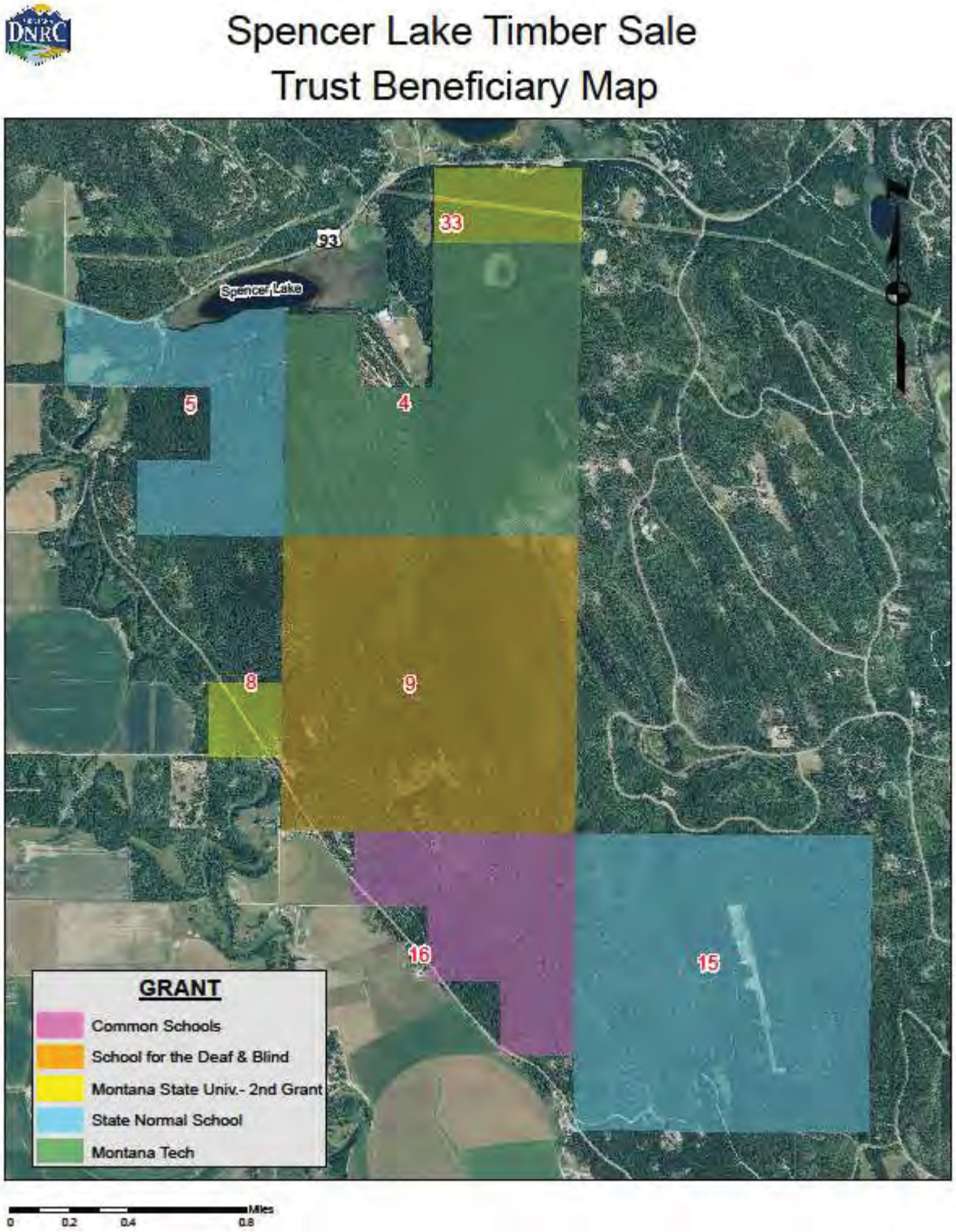


Figure 1-2: Spencer Lake Timber Sale Trust Beneficiary Map



NEED FOR ACTION

The lands involved in the proposed project are held by the State of Montana for the support of specific beneficiary institutions, including public schools, State colleges and universities, and other specific State institutions, such as the school for the deaf and blind (Enabling act of February 1889: 1972 Montana Constitution Article X, Section 11). The Board of Land Commissioners (Land Board) and DNRC are required by law to administer these Trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202 Montana Code Annotated [MCA]).

Many of the stands in the project area have high tree densities and increasing amounts of shade tolerant species that, due to the lack of natural or human-caused disturbance, would soon dominate the stands. Continued increases of the mixed conifer component in the project area would move these stands away from desired future conditions (DFC). These stands lack seral regeneration that is necessary to maintain and promote DFC in these stands. Active management in these stands would produce revenue for the Common Schools Trust while encouraging future stand conditions and development that reflect programmatic goals of managing for healthy and biologically diverse forests.

OBJECTIVES OF THE SPENCER LAKE TIMBER SALE PROJECT

In order to meet the goals of the management philosophy adopted through programmatic review, the DNRC has developed the following project objectives:

- Manage for biologically diverse and healthy forests through silvicultural treatments that increase stand vigor and reduce the amount of insect and disease infected trees.
- Reduce the fire hazard to State Trust land through treatment of forest fuel accumulations.
- Develop a manageable, maintainable road system with the minimum number of road miles that provides appropriate access for short and long-term management and use of the Trust lands in the project area.
- Harvest approximately 8-12 MMBF of wood products to generate revenue for the appropriate trust (See Figure 1-2) and provide a sufficient amount of sawlog volume to contribute to the annual sustainable yield for DNRC, as mandated by 77-5-222 MCA.
- Maintain the existing recreational uses and continue to provide for future recreational use of the Trust lands in the project area.

COOPERATING AGENCIES AND ENTITIES WITH JURISDICTION AND REQUIRED PERMITS

Montana Fish, Wildlife and Parks (FWP) has jurisdiction over the management of fisheries and wildlife in the project area. A *Stream Protection Act Permit* (124 Permit) is required by FWP for activities that may

affect the natural shape and form of a stream's channel, banks, or tributaries. Removal of existing culverts in Section 5 will require a 124 permit.

DNRC is classified as a major open burner by the Montana Department of Environmental Quality (DEQ), and is issued a permit from the DEQ to conduct burning activities on State lands managed by the DNRC. As a major open burning permit holder, DNRC agrees to comply with all of the limitations and conditions of the permit.

DNRC is a member of the Montana/Idaho Airshed Group which was formed to coordinate burning activities among members in order to minimize or prevent smoke impacts while using fire to accomplish land management objectives and/or fuel hazard reduction. As a member of the Airshed Group, DNRC agrees to burn only on days approved for good smoke dispersion as determined by the Smoke Management Unit in Missoula, MT.

Adjacent, private landowners have a road easement on the Rifle Range main haul road that is accessed off the county KM Ranch road. Road work and timber sale activities would have to be coordinated.

RELEVANT AGREEMENTS, LAWS, AND PLANS

STATE FOREST LAND MANAGEMENT PLAN (SFLMP)

DNRC developed the SFLMP to "provide field personnel with consistent policy, direction, and guidance for the management of State forested lands" (***DNRC 1996: Executive Summary***). The SFLMP provides the philosophical basis, technical rationale, and direction for DNRC's forest management program. The SFLMP is premised on the philosophy that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. In the foreseeable future, timber management will continue to be the primary source of revenue and primary tool for achieving biodiversity objectives on DNRC forested trust lands.

DNRC FOREST MANAGEMENT RULES

DNRC Forest Management Rules (*ARM 36.11.401 through 456*) are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program. The Forest Management Rules were adopted in March 2003 and provide the legal framework for DNRC project-level decisions and provide field personnel with consistent policy and direction for managing State forested lands. Project design considerations and mitigations developed for this project must comply with the Forest Management Rules.

SUSTAINABLE YIELD CALCULATION (SYC)

In addition to the SFLMP and Forest Management Rules, DNRC is required to re-calculate the annual sustainable yield for forested trust lands at least every 10 years (*MCA 77-5-221 through 223*).

The SYC determines the amount of timber that can be harvested annually on a sustainable basis from State trust lands, given all applicable laws and environmental commitments described in the SFLMP and Forest Management Rules. Important ecological commitments related to biodiversity, forest health, threatened and endangered species, riparian buffers, old growth, and desired species mix and covertypes were incorporated into the SYC. After incorporating these commitments into the model, the state-wide annual sustainable yield was determined to be 53.2 MMbf of timber.

MONTANA ENVIRONMENTAL POLICY ACT (MEPA) AND DNRC ADMINISTRATIVE RULES FOR MEPA

MEPA (*MCA 75-1-101 through 324*) provides a public process that assures Montana's citizens that a deliberate effort is made to identify impacts before the state government decides to permit or implement an activity that could have significant impacts on the environment.

DNRC's management activities on State school trust lands are subject to the planning and environmental assessment requirements of MEPA. The statute requires DNRC and other state agencies to inform the public and other interested parties about proposed projects, the potential environmental impacts associated with proposed projects, and alternative actions that could achieve the proposed project objectives.

DNRC Administrative Rules for MEPA (*ARM 36.2.521 through 543*) are specific legal requirements under which DNRC interprets and implements MEPA. DNRC is required to conform to these rules prior to reaching a final decision on a proposed action.

WHITEFISH / STATE TRUST LANDS NEIGHBORHOOD PLAN (NEIGHBORHOOD PLAN)

The Neighborhood Plan, signed in 2004, is a land-use plan for the 13,000-plus acres of State School Trust Land surrounding the community of Whitefish in Flathead County, Montana. The plan seeks to ensure increased revenue for the trust beneficiaries while maintaining the economic, environmental, and cultural vitality of Whitefish and the surrounding areas.

The 2,500 acre project area is wholly within the Spencer Subarea of the Neighborhood Plan. The Plan Concept and Implementation Strategy begins with the general premise that "The Spencer Mountain Subarea would continue to be managed by DNRC as a timber and recreational asset for a minimum of the next 10 years". The strategies in the Neighborhood Plan for long-term conservation and revenue may involve a mix of transaction tools, including conservation development, recreation/open space lease, license or easements, and the continuation of traditional uses such as timber management.

OTHER RELEVANT ENVIRONMENTAL REVIEWS IN THE AREA

- Whitefish Area Trust Lands Neighborhood Plan. DNRC. 2004
- Trail Runs Through It EA. DNRC. 2007
- Cliff Lake Timber Sale EA. DNRC. 2008
- Trail Runs Through It Phase 1A EA. DNRC. 2009
- Beaver/Swift/Skyles Timber Sale EA. DNRC. 2009
- Lion Mountain Timber Sale EA. DNRC. 2009

DECISIONS TO BE MADE

Following the 30-day public review period and the completion of the Final Environmental Assessment (EA), the Decision Maker (Kalispell Unit Manager) will review any public comments, the EA, and information contained in the project file. The Decision Maker will consider and determine the following:

- Which of the alternatives presented in the EA meets the project's objectives?

- Does the EA properly address issues and concerns?
- Are proposed mitigations adequate and feasible?
- Which alternative or combination/ modification of alternatives should be implemented and why?
- Is there a need for further analysis or preparation of an environmental impact statement?

These decisions will be published and made available to the public. The decisions in the published documentation will become DNRC's recommendation to the Land Board. The Land Board will make the final decisions regarding implementation of actions.

SCOPE OF THE ENVIRONMENTAL ANALYSIS

This section defines and explains the scope (boundaries/limits) of the Spencer Lake Timber Sale Project. It briefly describes the history and planning process, identifies the resource issues studied in detail, and identifies the issues eliminated from detailed study.

History of the Spencer Lake Planning Process

This EA was prepared in accordance with the Montana Environmental Policy Act (MEPA), which requires State government to include the consideration of environmental impacts in its decision-making process. Agencies are also required to inform the public and other interested parties about proposed projects, environmental impacts that may result, and alternative actions that could achieve the project objectives. Public scoping of the Spencer Lake Timber Sale project was initiated in October 2009 with a letter to known interested parties. A second scoping letter was sent out in November 2010, which extended the scoping period and acknowledged an additional project objective. Additional Public participation was solicited by placing notices in the Kalispell Daily Interlake and the Whitefish Pilot newspapers. The mailing list developed for this project is in the project file. The public comment period for the first initial proposal was 30 days and extended an additional 30 days with the second initial proposal. This generated approximately 25 emails and letters and 15 phone calls from interested parties. The Interdisciplinary Team (ID Team) made up of DNRC's wildlife biologist and hydrologist, began compiling the issues and gathering information related to current conditions in the fall of 2009. Final issues were defined in February 2010. The issues and concerns identified through public scoping were summarized and used to further refine the project. An open house was conducted in March 2010. Maps of the project area and proposal were displayed and questions answered. Additional comment cards were made available and accepted. A field tour of the project area was conducted in June of 2010. Harvest unit prescriptions were discussed and examples of treatments proposed were provided. Ongoing recreational use was also discussed and the group looked at examples of bike structures currently being constructed on State land.

Issues Studied in Detail

The ID team carefully considered comments received from DNRC resource specialists, the public, and other agencies.

The ID team determined that the following issues were relevant to the decisions that must be made concerning the Spencer Lake Timber Sale project. Further, these issues directly influenced the technical design of the project including the development of the alternatives (Chapter 2, Alternatives).

Issues were grouped by general resource area (Hydrology, Wildlife, etc).

Vegetation

- Timber harvesting and associated activities may affect stand characteristics with regards to species composition, stand age, and succession.
- Timber harvesting and associated activities may affect stand structure and development.
- Overstocked stand conditions are contributing to loss of timber productivity and may increase risk of mortality from insect and disease.
- Overstocked stand conditions and downed woody fuel loading may increase fire hazard.

Noxious Weeds

- Timber harvesting and associated activities may increase noxious weeds and promote invasion and establishment of new populations.

Aesthetics

- Timber harvesting and associated activities may affect the aesthetic value of the project area. Roads, skid trails, and canopy openings may appear unnatural. Residual logging slash, damaged trees, stumps and uniform tree spacing may detract from the natural appearance associated with an unmanaged forest.

Hydrology & Fisheries

- Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.
- Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality and fish habitat parameters of large woody debris, channel complexity, stream shading and stream temperature.

Soils

- Timber harvesting may result in displaced and compacted soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.

- Removal of both coarse and fine woody material off site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.

Wildlife

- Timber harvesting could reduce forested cover, which 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, which could alter their ability to use the area and or successfully reproduce.

- 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 dependent on these resources, which could alter their survival and/or reproductive ability.

- 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.

- Timber harvesting and associated activities could displace adult common loons from nest sites and/or decrease nesting success.

- Timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

- 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.

- Timber harvesting and associated activities could remove elk security habitat and increase elk vulnerability.

- Timber harvesting and associated activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.

Recreation

- Timber harvesting and associated activities may limit and/or displace recreational uses of the project area.

- New road construction may increase illegal motorized use in the project area.

Economics

- Timber harvesting in the proposed project area may not be economically viable.

Air Quality

- Burning of slash residue from logging may reduce air quality.
- Road dust from hauling logs on native or gravel surfaced roads may affect air quality.

Issues Eliminated From Detailed Study

The ID team eliminated the following issues from detailed study because they were beyond the scope of this project or because this project would not be likely to impact them.

Cultural or Paleontological Sites

The DNRC conducted a search of its Trust Land Management System database to determine if previous cultural resource had been identified, or previous cultural resource inventories had been conducted within the proposed project area. The remnants of a cabin were identified in the NWNW Section 9, T30N R22W. Although very little evidence of this former cabin remains today, it will be avoided with project related, ground disturbing activities. DNRC has sent a scoping letter to the Blackfeet Nation and the Confederated Salish and Kootenai Tribes (CS&KT), but no response concerning the presence or absence of cultural resources of importance has been obtained.

Hunting

A concern was raised about the danger to adjacent residents from hunting in the project area and wanted it to be abolished. The management of hunting in the project area resides with FWP and that agency is responsible for deciding whether or not to allow hunting.

Old Growth

No old growth, as defined by Green et al, exists in the project area.

Sensitive Plants

A review of the records for the Montana Natural Heritage Program indicated no plant species of special concern within the project area. Field reconnaissance also indicated no unique or sensitive plants within the project area.

CHAPTER 2: ALTERNATIVES

INTRODUCTION

Chapter 2 describes the alternatives developed and considered for the Spencer Lake Timber Sale project. This chapter will introduce the No Action Alternative and the Action Alternative as well as provide summaries and comparisons of the alternatives and predicted effects of each alternative, based on the detailed environmental analysis in Chapters 3 & 4.

DEVELOPMENT OF ALTERNATIVES

The role of an ID team is to summarize issues and concerns, develop management options within the project area, and analyze the potential impacts of a proposal on the human and natural environments.

The project leader provided the ID team with a harvest and road proposal to accomplish the desired future forest conditions on the Kalispell Unit and the objectives described in Chapter 1. The proposal addresses development of a road system to access timber stands currently experiencing a reduction in timber productivity while reducing the fire hazard by treating the existing fuel accumulations. The ID team further developed the proposal within the framework of the SFLMP and the ARMs. The ID team discussed how to address both public and internal issues, mitigations required by the ARMs, and additional mitigations that may be implemented to reduce or minimize effects related to the project.

Issues related to vegetation, recreation, wildlife, aesthetics, and soils resulted in the development of one action alternative.

DESCRIPTION OF ALTERNATIVES

This section describes the elements and mitigation measures of the Action Alternative, and also includes a description of the No Action Alternative. Actions designed to protect resources during harvesting and road construction or site preparation activities would be incorporated into a timber sale contract as contract specifications. These contract specifications would be applied to the Action Alternative and are a form of mitigation. Mitigation measures designed to reduce impacts on a particular resource are discussed in this chapter.

No Action Alternative

No timber harvesting would occur. Small quantities of wood products would continue to be sold from small areas and hazard trees would continue to be removed next to recreation trails.

No new roads would be constructed. Maintenance of existing roads would be limited to periods when the roads are being used for removal of forest products. Fuel mitigation treatments would continue but be limited in size and scope with limited access. Weed control efforts would continue on existing roads as priorities and funding allows.

Recreational uses of the area, both general and special would continue to include hiking, biking, horseback riding, shooting, hunting, and Nordic skiing. Efforts to curtail vandalism and resource damage associated with unauthorized recreational use would continue as funding and priorities allow.

Forest and plant succession would continue to be mainly influenced by the occurrence of natural events, such as insect and disease outbreaks, windthrow, or wildfire.

Action Alternative

The Action Alternative is designed to improve timber stand productivity and maintain healthy forests within the Spencer Lake analysis area, as a necessary means for providing revenue generating opportunities in the future, while limiting present logging and road development costs. Timber harvesting would occur to maintain or promote the Desired Future Condition (DFC) of western larch/Douglas-fir on the moister grand fir and on the drier Douglas-fir habitat types. Silvicultural treatments designed for meeting the above objective include mostly intermediate harvests in the younger stands and regeneration harvests for older stands.

The Action Alternative would apply silvicultural treatments to 1,650 acres, harvesting approximately 10 MMBF of timber. Regeneration harvests would be used to treat 72 acres and intermediate harvests would be used to treat 1,578 acres. The various types of cutting are explained under the Silvicultural Treatment section below and Figure 2-1 displays harvest unit location and type of silvicultural treatment or cutting that would be applied.

To access harvest units, approximately 19.5 miles of road will be used- 10 miles of existing road will be improved and/or reconstructed and 9.5 miles will be new construction.

Silvicultural Treatments

Commercial Thin (Intermediate harvest): Commercial thinning would reduce tree stocking levels in stands or groups of trees that are healthy, vigorous and generally less than 140 years of age. The thinning is designed to promote continued vigorous growth of western larch and Douglas-fir trees. The stands or groups would be fully stocked after harvest, but would have a more open tree canopy. Spacing between leave trees would be fairly uniform, approximately 20 to 40 feet between stems, allowing the crowns of leave trees to develop fully and sustain tree growth and vigor.

Shelterwood (Regeneration harvest): This treatment is designed to retain healthy western larch and Douglas-fir as a natural seed source for establishment of a new forest stand. Retention would be 20 to 40 trees per acre, depending upon availability. Cutting would be followed by machine scarification to prepare the site for natural regeneration and hand tree planting seral species, such as western larch.

MITIGATION MEASURES FOR THE ACTION ALTERNATIVE

The following mitigation measures were developed to reduce the potential impacts to the identified resource concerns. The resource concerns were identified through the scoping process and by DNRC resource specialists. These mitigation measures would be applied if the Action Alternative were chosen.

Vegetation

- Reduce stand densities to increase tree growth and vigor and improve forest health.
- Reduce stand densities and provide for high-standard slash clean-up adjacent to private property boundaries and open roads to reduce the fire danger to trust land.

Noxious Weeds

- All equipment used in road construction and timber harvesting operations will be cleaned of plant parts, dirt, and weed seeds prior to entry to prevent the possibility of seed dispersal by equipment.
- Grass seed cuts and fills associated with new road construction and areas disturbed during reconstruction.
- Monitor project area and contract herbicide spraying as needed to control spot outbreaks of noxious weeds.

Soils

- Limit timber harvest operations to periods when soils are frozen or less than 20% soil moisture.
- Existing skid trails and roads will be used, wherever possible, to reduce the amount of ground disturbance.
- Grass seed areas disturbed during road construction and reconstruction activities.

Wildlife

- A DNRC biologist would be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435) are needed.
- Restrict motorized public access on all existing roads and new construction during timber harvesting activities and close roads when project is completed. Discourage motorized use of skid trails by scattering slash on skid trails after harvest is completed.
- Forested corridors would be retained to maintain landscape connectivity and patches of dense vegetation, when possible, to provide security cover. Retention of cover and unharvested areas

along Spencer Mountain would facilitate travel of some wildlife requiring connected forested habitats.

- Snags, snag recruits, and coarse woody debris would be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch, ponderosa pine, and Douglas-fir. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags.
- Contractors and purchasers conducting contract operations would be prohibited from carrying firearms while operating on restricted roads.
- Harvesting activities would be conducted to limit disturbance to nesting goshawks by avoiding the nesting period by conducting the majority of activities outside of the nesting season (May 1-August 31) in the vicinity of the potential goshawk nest. Additional mitigations would be recommended should a nest be verified in the project area in the future.
- Retain areas of thermal cover and snow intercept in portions of the winter range to facilitate use by big game during the winter.
- Limit mechanized activity within 500-feet radius of common loon sites between April 15 and July 15 (ARM 36.11.441).

Recreation

- Winter logging will be conducted to reduce impacts to existing trails and limit conflicts with summer recreational use of area.
- Signage will be installed at the various road access points to inform users of road restrictions.

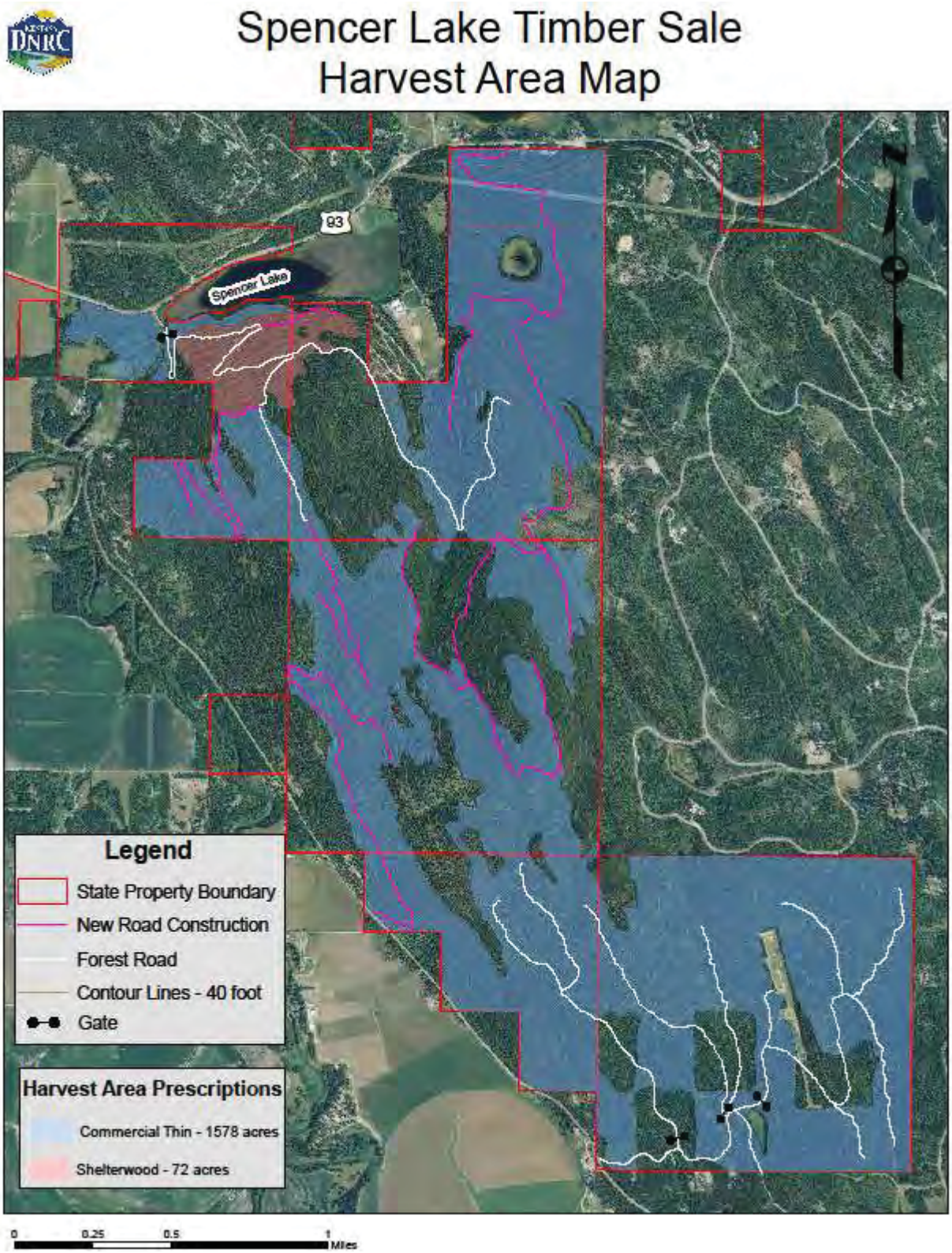
Aesthetics

- Retain seedlings and saplings along open roads and trails.
- Grass seed disturbed areas around landings and along roads.
- Winter harvest to lessen vegetation and soil disturbance.
- Slashing of sub-merchantable trees damaged during logging.
- Slash treatment in harvest units and high-standard slash clean-up adjacent to open roads and property boundaries.

Air Quality

- Slash burning will be conducted only when weather and air quality conditions are favorable for smoke dispersion and as allowed under the cooperative Montana/Idaho Airshed Group rules and regulations.
- Winter logging will reduce the amount of road dust in the air from hauling on KM Ranch Road.

Figure 2-1: Spencer Lake Timber Sale Action Alternative Harvest Map



SUMMARY COMPARISON OF ALTERNATIVES

Each alternative is unique in terms of activities, achievement of project objectives, and effects that would occur. This section presents key characteristics of the alternatives, using tables to display differences and make comparisons. Table 2-1 provides a brief comparison of on-the-ground activities that would occur if the No Action Alternative or the Action Alternative were implemented. Table 2-2 provides a comparison of how each alternative would meet the project objectives identified in Chapter One.

Table 2-1: SUMMARY COMPARISON OF ACTIVITIES

Project Actions		Alternatives	
		No Action	Action
Total Project Acres		2,487	2,487
MMBF Harvested		0	10
Acres Treated		0	1,650
Acres Treated by Harvest Method	Regeneration	0	72
	Intermediate	0	1,578
Miles of New Road Construction		0	9.5
Miles of Existing Road Reconstruction/BMP's		0	10

Table 2-2: SUMMARY COMPARISON OF PROJECT OBJECTIVE ACHIEVEMENT

Project Objective	Indicators of Achievement	Alternatives	
		No Action	Action
Generate revenue for the associated grants	Stumpage Receipts (dollars)	0	$1,600,000
Develop a manageable, maintainable road system that provides for: a) appropriate access for short and long term management, and b) improves surface drainage on existing roads	Miles of New Road Construction	0	9.5 miles
	Miles of Existing Road Reconstruction/BMP Work	0	10 miles
Manage for long-term productivity through Silvicultural treatments that increase stand vigor and reduce the amount of insect and disease infected trees.	Acres of proposed harvest treatment	0	1,650
Reduce the fire hazard to State Trust land through treatment of forest fuel accumulations.	Acres of forest fuel treatment	0	1,650
Maintain the existing recreational uses and continue to provide future recreational use.	# of Special Recreational Use Licenses	2	2
	# of Recreational Use Leases (Rifle Range)	1	1
	Miles of existing trail	27	27

Table 2-3: Summary of environmental effects of both the No Action and Action Alternative

Table 2-3: SUMMARY OF ENVIRONMENTAL EFFECTS OF THE NO ACTION AND ACTION ALTERNATIVE		
RESOURCE ISSUE	**NO ACTION ALTERNATIVE**	**ACTION ALTERNATIVE**
Vegetation: Age Class & Cover Type	Direct/Indirect: Continued decline in younger age classes. Cover types continue with conversion to Douglas-fir and mixed conifer. Cumulative: Decline in younger age classes without disturbance. Decline in acres of western larch/Douglas-fir on Kalispell Unit.	Direct/Indirect: 72 acres of regeneration harvest favoring removal of shade tolerant species. Convert 158 acres of current Douglas-fir and 39 acres of mixed conifer to 181 acres of western larch/Doug-fir and 16 acres of ponderosa pine cover types. Cumulative: Decrease in Douglas-fir and mixed conifer cover types on Kalispell Unit. 72 acres of regeneration harvest moving towards historic conditions regarding age classes.
Vegetation: Stand Structure & Development	Direct/Indirect: Multi-storied structure persists. Increase in shade tolerant species. Cumulative: Conditions favoring establishment of shade tolerant species would continue.	Direct/Indirect: 72 acres of regeneration harvest would produce a two-storied stand. Seral species favored for retention. Cumulative: Percent of multi-storied stand structures in project area reduced from 91% to 87%.
Vegetation: Timber Productivity	Direct/Indirect: Tree vigor continues to decline. Increase risk to insect and disease mortality. Cumulative: Continued decline in Tree growth and increase in susceptibility to losses from insect and disease.	Direct/Indirect: Silvicultural treatments on 1650 acres would reduce stocking and improve tree growth and vigor. 72 acres would be regenerated with healthy seedlings. Cumulative: Increase in timber productivity and growth on 1650 acres.
Vegetation: Noxious Weeds	Direct/Indirect: Noxious weed seed would continue to spread from recreation use on trails and roads. Cumulative: Noxious weed populations could increase across the project area and Kalispell landscape.	Direct/Indirect: Timber harvesting and road construction would increase the potential for further establishment. Cumulative: Potential for increase in acres infested. Could be offset with an increase in area treated.
Water Resources: Sediment Delivery	Direct/Indirect: Existing sediment sources would continue. Cumulative: Limited to the natural progression of the existing condition. Sediment sources would continue.	Direct/Indirect: Low risk of sediment from timber harvest activities with incorporation of BMP's. Cumulative: Additional adverse effects not expected with incorporation of BMP's and reduction in sediment delivery to the outlet of Spencer Lake.

Water Resources: Fish Habitat Parameters	Direct/Indirect: No reduction in large woody debris recruitment. No increases in stream temperature. Cumulative: Effects to LWD and stream temperatures due to the permanent proximity of US HWY 93, the county road, and other factors would continue. Fisheries habitat quality would be maintained at current levels.	Direct/Indirect: Limited harvesting within 100 feet of Spencer Lake would be expected to continue to provide adequate recruitable woody debris. No measureable increase in stream temperature from limited harvest near fish-bearing lakes and streams would be expected. Cumulative: Reduction in recruitable woody debris limited to approximately 300 feet of Spencer Lake shoreline. Limited removal of shade-producing vegetation next to fish-bearing lakes and streams would result in low risk of stream temperature increase above naturally occurring ranges. These effects would be in addition to those from US HWY 93, the county road, or other factors that would otherwise occur under No Action.
Water Resources: Water Yield	Direct/Indirect: No increase in water yield. Cumulative: No increase in water yield.	Direct/Indirect: Timber harvest and road construction would generate 691ECA. Cumulative: Increase in water yield in Skyles/Spencer Lake watershed of 14.8%. Remain below threshold and result in low risk to water quality.
Soils	Direct/Indirect: No change from existing condition. Compacted soil continues to recover with freeze/thaw cycles. Continued use/construction of trails would take ground out of timber production. Cumulative: Potential increase in soil productivity may occur as impacted areas recover. Potential increase in soil impacts from recreational trail construction.	Direct/Indirect: Impacts of 13.5% of the harvest area from timber harvesting and road construction. Cumulative: Cumulative impacts expected to be approximately 14.3%, less than the recommended goal of 15%.
Wildlife: Mature Forested Habitats and Connectivity	Direct/Indirect: No changes in wildlife use expected. Wildlife favoring dense stands of shade tolerant species would be favored. Cumulative: No changes to wildlife use expected.	Direct/Indirect: Reduction in habitat for species associated with older stands. Minor changes to landscape connectivity would occur. Some changes to wildlife use would occur. Cumulative: Reduction in habitat for species associated with older stands. Minor changes to landscape connectivity. Reduction in forested interior habitats expected. Some changes to wildlife use expected.

Wildlife: Snags and Coarse Woody Debris	Direct/Indirect: No direct changes to deadwood resources would be expected. Existing snags would continue to provide habitats and new snags would be recruited as trees die. Reduction in shade-intolerant species could reduce the number of shade-intolerant snags and the habitats provided. Cumulative: Wildlife species that rely on snags and coarse woody debris would be expected to persist. No effects would be anticipated since no further harvesting would occur, no changes to number of snags and no change in firewood gathering would occur.	Direct/Indirect: Present and future snags would be reduced and coarse woody debris increased in the project area. Minor adverse direct and indirect effects to snags and coarse woody debris and to the wildlife requiring these habitat attributes would occur. Cumulative: Wildlife species that rely on snags and coarse woody debris would be expected to persist at slightly lower numbers in proposed harvest units after treatment.
Wildlife: Common Loons	Direct/Indirect: No effects would be expected. Cumulative: No effects would be expected.	Direct/Indirect: Minimal effects to loons anticipated because: No activities would occur in nesting period; No changes in shoreline disturbance; levels of human recreational use of loon habitats would not change; no changes in access for public and firewood gathering anticipated. Cumulative: No effects anticipated because: no changes in shoreline disturbance; levels of human recreational use in loon habitats would not change; no changes in available nesting habitats.
Wildlife: Fisher	Direct/Indirect: No effects to fishers would be expected. Cumulative: No effects to fishers would be expected.	Direct/Indirect: Minor adverse direct and indirect effects would occur. 53.4% of fisher habitat acres would receive commercial thin harvest treatment which could facilitate some continued use of existing habitats. Minor reductions in connectivity would be expected. Cumulative: Minor adverse cumulative effects to fishers would be anticipated. Amount of preferred fisher cover types meeting structural requirements would remain unchanged at 44.3%, below the 75% threshold established. 25.8% of potential upland fisher foraging and travel habitats would be harvested.

Wildlife: Flammulated Owls	Direct/Indirect: Negligible adverse effects anticipated. Cumulative: Conversion of ponderosa pine stands to more shade tolerant Doug-fir would cause a decline in habitat sustainability and quality.	Direct/Indirect: Timber harvest on 581 acres of habitats would open stand conditions and result in a minor positive effect. Cumulative: Timber harvest would reduce nesting habitats while increasing foraging habitats.
Wildlife: Pileated Woodpecker	Direct/Indirect: No changes to existing pileated woodpecker habitat anticipated. Cumulative: Conversion of stands to shade tolerant species over time would reduce quality of habitat and lead to decreased reproduction in project area.	Direct/Indirect: Timber harvesting would reduce amount of continuous forested habitats and potential nesting and foraging habitat in the project area. Cumulative: Reduction in pileated woodpecker habitat possible with reduction in continuous forested habitat and potential nesting and foraging habitat.
Wildlife: Northern Goshawk	Direct/Indirect: No changes to existing goshawk habitat anticipated. Cumulative: No changes to goshawk habitat anticipated.	Direct/Indirect: Reduction in amount of continuous forested habitat and potential nesting habitats anticipated. Reduction in overall habitats for prey species. Cumulative: Moderate effects anticipated with reduction in continuous forested habitat and potential nesting habitat and reduction in prey availability.
Wildlife: Big Game Winter Range	Direct/Indirect: No effect to big game winter range anticipated. Cumulative: No effects to big game winter range anticipated.	Direct/Indirect: Reduction in thermal cover of 16 acres and 811 acres with reduced thermal and snow intercept capacities. Cumulative: 16 acres of thermal cover removed and 811 acres with reduced thermal and snow intercept capacities. Displacement expected to be minor due to the relatively short term that logging activities would create disturbance and the small percentage of the winter range in the cumulative effects analysis area that would be altered.
Air Quality	Direct/Indirect: No change from existing condition. Cumulative: No change from existing condition.	Direct/Indirect: Temporary and localized reductions in air quality may occur but would not exceed air quality standards. Cumulative: Cumulative effects during peak burning periods may affect residents for short durations. Project related traffic, in addition to current road users, may affect nearby residents for short durations as well.

Aesthetics	Direct/Indirect: No change to the current views in the short term. Cumulative: Changes to the views would change with natural processes, such as insect, disease, fire and blowdown events.	Direct/Indirect: Changes to views looking into and from within the project area would change. Tree canopies will be opened and views into the project area will be increased. Understory views will change and skid trails, log landings and road cuts and fills would be visible. Cumulative: Timber stands harvested would continue to grow and regenerate, reducing views into and from within the project area. Soil disturbed would be grass seeded and slash treatments would reduce the effects to view from the timber harvest.
Recreation	Direct/Indirect: Recreation would remain at current levels or increase. No changes in amount of open road miles. Cumulative: Cumulative effects would not be anticipated.	Direct/Indirect: Road construction and timber harvesting could displace recreation from portions of the project area for short durations. Minor reduction in recreation revenue from special recreational license fees possible. Winter harvest to mitigate conflict with summer recreation. Cumulative: Temporary displacement of recreational use possible. Potential for increased recreational opportunities using roads constructed for the project.
Economics	Direct/Indirect: Revenue from the project area would not be realized at this time. Trust funding would not benefit. Cumulative: Timber volume needed for the statewide sustained yield would need to come from sales elsewhere. Timber substituted may be from other areas and not benefit this region of the State.	Direct/Indirect: An estimated $1.6 million in revenue would be generated and an estimated $392 thousand into the FI account. This project would provide work for approximately 100 positions. Cumulative: Volume harvested would contribute to annual sustained yield of 53.2 MMBF. Revenue generated through this project would reduce tax burdens on Montana taxpayers.

CHAPTER 3:
EXISTING CONDITIONS & ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter identifies and describes those resources that may be affected by the proposed action and describes the environmental effects of each alternative on the resources. The chapter is organized by general resource categories and their associated issues introduced in Chapter 1. The descriptions of the existing conditions found in this chapter can be used as a baseline for comparison with the Action Alternative. Environmental Effects described in this chapter provide the basis for the Summary of Environmental Effects in Chapter 2.

Cumulative effects from current management and relevant future actions are discussed in this chapter. These include other active timber sales, those in the planning stage, ongoing maintenance, and other uses of the areas being analyzed. Direct, indirect, and cumulative effects on the resources being analyzed were considered.

VEGETATION

The vegetation section describes present conditions and components of the forest as well as the anticipated effects of both the No Action and Action Alternatives. Issues expressed during initial scoping by the public and internal were:

- Timber harvesting and associated activities may affect stand characteristics with regards to species composition, stand age, and succession.
- Timber harvesting and associated activities may affect stand structure and development.
- Overstocked stand conditions are contributing to loss of timber productivity and may increase risk of mortality from insect and disease.
- Overstocked stand conditions and downed woody fuel loading may increase fire hazard.

Analysis Areas

- ***Direct and Indirect Effects Analysis Area -*** The **Spencer Lake Project Area** was used to assess direct and indirect effects on forest cover type, species composition, the distribution of age classes, structural stages, fragmentation, and noxious weeds. This area includes all trust lands within the project area specified in Chapter One, and more specifically, those stands proposed for harvesting under each alternative.
- ***Cumulative Effects Analysis Area -*** The **DNRC Kalispell Unit** was used to assess cumulative effects on forest cover type, species composition, the distribution of age classes, structural stages, fragmentation, and noxious weeds. This area includes all scattered forested Trust land parcels, administered by the Kalispell Unit for DNRC. This geographic area is a subset of the above Lower Flathead Valley Climatic Section and includes school trust lands in the vicinity of

Whitefish, MT south to Arlee, MT and school trust lands in the vicinity of Bigfork, MT west to the Thompson Chain of Lakes.

Analysis Methods

Administrative Rules of Montana (ARM 36.11.404) direct DNRC to take a coarse filter approach to favor an appropriate mix of stand structures and compositions on State lands, referred to as a desired future condition. The following characteristics: forest composition, age class distribution, cover type and structure, are used to describe current forest and stand conditions in comparison to the estimated natural forest characteristics for Montana prior to extensive influences from fire suppression, logging, and development. This analysis will compare the desired stand conditions that DNRC believes to be appropriate for the site with current stand conditions.

Forest/Timber Analysis Methods

The method used to analyze current and desired future stand conditions, old growth timber stands, and stand development are as follows:

- *Current and Desired Future Conditions:* The DNRC site–specific model (ARM 36.11.405) was used to determine the characteristics of the desired future condition and to evaluate the potential direct, indirect, and cumulative effects. This model assigns a desired future condition in terms of cover type for each stand identified in the DNRC's Stand Level Inventory (SLI). At the administrative unit level, the aggregate acreage of each desired future cover type describes a broad picture of the desired future condition for that unit. This provides a basis for comparison of current and desired future conditions at both the project and landscape (administrative unit) levels. Current conditions are described by DNRC's 2006 SLI for the Kalispell Unit. More recent field observations and tree data were gathered to verify and further refine descriptions of specific forest stand characteristics within the project area. This data is available at the Kalispell Unit.

- Old Growth Timber Stands: The methods to identify old growth timber stands, as defined by ARM 36.11.403 (48), are based on the Kalispell Unit SLI data. The process uses the SLI to identify stands that may meet the minimum criteria (number of trees per acre that have a minimum dbh and minimum age) for a given habitat type group as described in Green et al (1992), Old Growth Forest Types of the Northern Region. Field surveys were used to verify that the definition is met in the identified stands and to determine if additional stands meet the definition.

- *Stand Structure/Development:* The analysis on stand structure and development is qualitative and discusses the conditions of timber stands, including how various natural and man-caused disturbances and site factors have affected and may continue to affect timber stand development.

- *Cover Types and Age Classes*: Climatic Section M333B- Lower Flathead Valley (Losensky 1997) was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead

Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997).

Noxious Weeds Analysis Methods

During field reconnaissance, DNRC personnel assessed road conditions, road locations, various susceptible timber stands, and generally evaluated noxious weed occurrence, extent, and location.

EXISTING CONDITIONS

General Forest Vegetation Information

The existing vegetative types, more specifically forest habitat types and cover types within the Kalispell Landscape and the Spencer Lake project area reflect the varied influences of site factors, fire regimes or disturbance patterns, and past management activities.

Site conditions vary depending upon the physiographic and climatic factors associated with geographic locations. Soil types, slope aspect and position, length of growing season, and moisture availability influence the type, growth, and development of forest vegetation. These site factors are considered in the forest habitat classifications (Pfister et al. 1977) used to generally describe forest vegetation, forest stand development, and relative forest productivity associated with given site and climatic factors.

Stand History and Past Management

Spencer Lake Project Area: The project area's first recorded harvest was around 1918 in Section 5. Additional harvests on the southern end of the project area started in early 1920 and continued into the 1940's. The first timber cutting removed the larger diameter Douglas-fir and western larch overstory and was used for railroad ties and sawlogs. After the 1940's, the next recorded entry was in 1968. Much of the existing road system of today was built for this harvest. It was also in 1968 that the Whitefish Rifle Range was relocated from Sklyes Lake to the area in Section 15, off the KM Ranch county road. The 1968 harvest removed approximately 2.26 MMBF of Douglas-fir, western larch and ponderosa pine overstory. The last timber harvest occurred as part of a limited access timber permit that was completed in the southeast corner of section 4 in 2005 and removed approximately 100 MBF of mainly lodgepole pine.

Christmas tree permits were sold over most of the project area from the 1920's until around 1980. In addition, incidental firewood and post and pole cutting has been done across the project area.

Fire suppression started in the 1920's and the last recorded fire larger than a few acres in the project area was recorded in 1931.

Adjacent Lands to Spencer Lake: The lands adjacent to Spencer Lake are mostly privately owned, with agricultural valley lands to the west and south and forested timber ground to the north and east. Much of the forested ground has been converted in the last 15 years from industrial timber growing to residential uses.

Forest Habitat Types

Approximately 80% of the project area is occupied by the Douglas-fir (*Pseudosutga menziesii)* series ranging from moderately warm and dry to moderately cool and dry climatic conditions. The ninebark *(Physocarpus malvaceus)* and snowberry (*Symphoricarpos albus) types* are the most prevalent under the Douglas-fir series. The remaining 20% of the project area is comprised of moist habitat types represented by the Grand fir, Subalpine fir, and spruce series and generally found in the draw bottoms and wetter areas in the north half of the project area. Timber productivity ranges from low to high in these habitat types, with higher productivity found in the ninebark (*Physocarpus malvaceus)* type of the Douglas-fir series.

Fire Regimes

Fire regimes for the Kalispell Landscape are variable, given the broad and scattered nature of trust lands, but are predominately within the moderate severity fire regime. As a whole, the forest exists as a mosaic of differing age and size classes that have developed from different human activities, fire frequencies and intensities in relation to other site factors such as aspect, elevation, weather, stand structure, and fuel loadings. Areas of frequent fire have produced WL/DF, PP, and DF cover types. In low severity fire regimes, fires occur frequently and create relatively smaller patches of open-grown forest. Historically, these low severity regimes maintained stand conditions that were resistant to stand replacement fires, by regularly consuming forest fuels, killing small trees, and pruning boles of small trees. As fire intervals become longer and management activities occur less frequently, more shade tolerant tree species begin to develop in the understory and stands tend to be multi-storied, with varied patch sizes and increased fuel loadings. These characteristics reflect a moderate to low severity fire regime. High severity fire regimes are characterized by large patch sizes and stand replacement fires, but often include low severity fires that act as a thinning agent, or create small openings where clumps of trees die where small crown fires erupt.

A mosaic of multi-age patches and fuel loadings are present in the project area. The Spencer Lake project area would be classified in a mixed-severity fire regime. The majority of the project area (80%) occurs in the moderately warm and dry habitats that historically had more frequent and less severe fire events occurring every 50 years or less. Fuel loadings in this part of the project area currently average less than 10 tons/acre as measured in coarse woody debris transects. The remainder of the project area (20%) occurs in the cool and moist habitat types that tend to have stand replacement events that occur every 200 years or more. Fuel loadings in this part of the project area average 10- 20 tons/acre as measured in coarse woody debris transects. The last fire event of any size occurred in the 1930's and evidence suggests it was of mixed severity and burned a portion of all sections within the project area.

Forest Cover Type and Age Class Distribution

Table 3-1 compares the DNRC Kalispell Landscape (Current Cover Type) with historical data from Losensky (1997) for the Lower Flathead Valley section, as an assessment of desired future condition for cover types.

Table 3-1: CURRENT COVER TYPES AND DESIRED FUTURE CONDITIONS FOR KALISPELL UNIT			
Cover Type	**Current Cover Type (acres)**	**Desired Future Condition (acres)**	**Current Type Minus (-) DFC (acres)****
Subalpine fir	2249.9	254.8	1995.1
Douglas-fir	1646.5	1029.4	617.1
Hardwoods	449.0	207.0	242.0
Lodgepole pine	2269.2	1376.8	892.4
Mixed Conifer	10265.8	2282.3	7983.3
Ponderosa pine	10636.9	11936.2	-1299.3
Other*	3635.4	3576.2	59.2
Western larch/Douglas-fir	25494.6	32974.5	-7479.9
Western white pine	567.6	3577.7	-3010.1
TOTAL	57214.9	57214.9	

*Other= non stocked lands, non-forest, or water.
**The Current Type minus DFC Type column above lists the excess and deficit (-) acres for each Cover Type.

The ponderosa pine, western larch/Douglas-fir, and western white pine cover types are not as well represented within the Kalispell Unit Landscape as estimated for the early 1900's. Most notable is the conversion of over 10,000 acres in the ponderosa pine, western larch/Douglas-fir, and western white pine cover types, over the last 100 years, to the present over abundance of the mixed conifer and subalpine fir cover types.

The longer intervals between disturbances and commodity extraction generally explain the decrease in the western larch/Douglas-fir and ponderosa pine cover types. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities in conjunction with 50 years or more of logging practices that favored the removal of commercially valuable western larch, ponderosa pine, western white pine and Douglas-fir for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by western larch and other seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory. These stands often include a higher percentage of more shade tolerant trees such as Douglas-fir, grand fir, or spruce, as a result of longer intervals between disturbances.

Table 3-2 Compares the Spencer Lake project area current cover type with historical data from Losensky (1997) for determining desired future conditions.

Table 3-2: CURRENT COVER TYPES AND DESIRED FUTURE CONDITIONS FOR SPENCER LAKE PROJECT AREA			
Cover Type	**Current Cover Type (acres)**	**Desired Future Condition (acres)**	**Current Type Minus (-) DFC (acres)****
Subalpine fir	0	0	0
Douglas-fir	282.7	0	282.7
Hardwoods	0	0	0
Lodgepole pine	0	0	0
Mixed Conifer	70.1	0	70.1
Ponderosa pine	72.6	100.8	-28.2
Other*	39.7	39.7	0
Western larch/Douglas-fir	2026.7	2351.3	-324.6
Western white pine	0	0	0
TOTAL	2491.8	2491.8	

*Other= non stocked lands, non-forest, or water.
**The Current Type minus DFC Type column above lists the excess and deficit (-) acres for each Cover Type.

The table shows a shift from ponderosa pine and western larch/Douglas-fir desired future condition to mixed conifer and Douglas-fir current cover types. The reasons for the shift at the project level are generally the same as listed above when comparing the Kalispell Unit Landscape. The Longer intervals between disturbances has allowed for replacement of seral species (western larch, ponderosa pine) with more shade tolerant species such as Douglas-fir, grand fir and spruce.

The shift from seral species to shade tolerant is further illustrated in Table 3-3, which shows percentage of tree species composition by board foot volume comparing inventory data from the 1920's and 30's to data collected in 2008.

Table 3-3: SPECIES COMPOSITION BY BOARD FOOT VOLUME		
Species	**1920/1930's Inventory**	**2008 Inventory**
Douglas-Fir	45%	79%
Western Larch	49%	17%
Ponderosa Pine	6%	1%
Engelmann Spruce	<1%	3%

Table 3-4 displays age class distributions on the project and landscape scales. Stands in the seedling/sapling age class (0-39) are under-represented compared to the historical condition when

compared to both the Kalispell landscape and the project area, and the 40 to 150+ age classes, over represented. This deviation from historical conditions can partly be explained by successful fire suppression increasing the interval between large, stand replacement fires and logging practices that did not necessarily create a similar disturbance to a wildfire.

Table 3-4: PERCENT OF ANALYSIS AREAS BY AGE CLASS GROUPS				
Analysis Area	**Age Class (Years)**			
	00-39	**40-99**	**100-149**	**150+**
M333B (Historic)	36%	13%	15%	36%
Kalispell (Current)	10%	21%	30%	39%
Spencer Lake Project Area	0%	22%	22%	55%

Distribution of Old-Growth Stands

As per the Land Board's decision in February 2001, the DNRC adopted definitions for old growth by forest habitat groups, based on the number and size of large trees per acre and age of those trees as noted in *Old- Growth Forest Types of the Northern Region (Green et. Al.1992).* Field verification of one potential old growth stand identified by DNRC's SLI with the project area determined that the stand did not meet the minimum criteria set forth by Green et al. to be classified as old growth. No additional stands within the project area met DNRC's old-growth definition.

Stand Structure and Development

Stand structure and patch size indicates a characteristic of stand development and disturbance and how a stand may continue to develop. Stand structure is classified as single-storied, two-storied, or multi-storied. Patch size for this project is estimated from stand sizes and provides further insight into the severity of the disturbance as it relates to dominant tree canopies. Table 3-5 displays the percent of area in the Spencer Lake Project Area and the Kalispell Landscape by stand structure class and estimated stand (or patch) size.

Table 3-5: PROPORTION OF ANALYSIS AREA BY STAND STRUCTURE AND ESTIMATED PATCH SIZE				
Stand Structure	**Kalispell Landscape**	**Kalispell Average Patch Size**	**Spencer Lake Project Area**	**Spencer Lake Average Patch Size**
Single Storied	15%	24 acres	9%	18 acres
Two-Storied	3%	28 acres	<1%	16 acres
Multi-Storied	82%	31 acres	91%	30 acres

Single-storied stands are most often associated with stand replacement events, such as severe fires or regeneration harvests, including clearcutting or seedtree cutting. Stands are fairly simple in vertical structure and are often even-aged. Regeneration harvests, such as seedtree and shelterwood, which retain 10% or more of the upper crown canopy and have a seedling/sapling understory, are considered two-storied stands. Two-storied stands have simple vertical structure and are frequently even-aged, although two age classes are usually present. The multi-storied condition arises when a stand has progressed through time and succession to the point that trees in the lower canopy levels are advancing into the upper canopy levels; this is frequently seen when shade-tolerant species capable of surviving and growing shaded understory conditions progress upward into the overstory. Three or more age classes may be present in these stands and vertical structure can be complex. These stands often experience a long interval between disturbances.

Stand size refers to openings created by disturbances and provides insight regarding the severity of a disturbance event on tree mortality. Larger patch sizes are generally associated with moderate and high severity fire regimes or regeneration harvests. Smaller sizes are attributed to low or moderate severity fire regimes and harvest treatments that retain larger proportions of the overstory.

Timber Productivity

Tree Vigor: Radial growth rates are static to declining for a majority of the project area. Over 75% of the project area is in the 100-149 and 150 years + age classes. Stand age and low vigor is also making the stands more susceptible to bark beetle attacks.

Insects:

Bark beetles: various species of bark beetles have been active in the Spencer Lake Project Area over the past several decades. Three species of bark beetle are responsible for much of the activity and subsequent tree mortality.

- The mountain pine beetle (*Dendroctonus ponderosae*) was most active in the late 1980's through the early 1990's. It was responsible for attacking the lodgepole pine on the northern half of the project area. Much of the concentrated lodgepole blowdown was killed by the pine beetle. The mountain pine beetle is currently at endemic levels in the project area with scattered pockets of trees noted as being successfully attacked during field reconnaissance.

- The fir engraver (*Scolytus ventralis*) was active starting in the mid 1990's through 2000 and affected the grand fir found on the north half of the project area. Currently, the fir engraver is at endemic levels in the project area with few overstory grand fir showing successful attacks was noted during field reconnaissance of the project area.

- The Douglas-fir (*Dendroctonus pseudotsugae*) bark beetle that is currently affecting the highest number of overstory trees. The beetle is widespread across the project area and is mainly affecting the older Douglas-fir overstory in all sections. While current beetle numbers are at

endemic levels in the project area, small pockets of successful attacks are still being found in the project area.

Defoliators: Western spruce budworm (*Choristoneura occidentalis*) defoliation has been on the increase the past five years. Damage is occurring in the Douglas-fir, grand fir and spruce overstory and understory. Heavy defoliation of seedling and saplings in all parts of the project area has led to some branch dieback and top kill.

Stem Decays: Minor amounts of Indian paint fungus (*Echinodontium tinctorium*) and white pocket rot (*Phellinus pini*) were found in the project area. Indian paint fungus is affecting the grand fir on the north half of the project area, while the white pocket rot is found affecting the older, overstory western larch.

Dwarf Mistletoes: Minor amounts of western larch dwarf mistletoe (*Arceuthobium laricis*) were found in the project area.

Root Diseases: Brown cubical root and butt rot (*Phaeolus schweinitzii*) is found affecting the older Douglas-fir stands in the project area.

Noxious Weeds

Noxious weed populations are currently found adjacent to old logging roads and recreational trails within the project area. Some populations have spread from established areas along roads and trails into adjacent openings. Weed species identified in field reconnaissance include: Orange hawkweed (*Hieracium aurantiacum*), Spotted knapweed (*Centaurea maculosa*), St. Johnswort (*Hypericum perforatum*), Yellow Toadflax (*Linaria vulgaris*), Houndstongue (*Cynoglossum officinale*), and Oxeye daisy (*Chrysanthemum leucanthemum*). All weeds identified in the project area are classified as category 1 weeds in Flathead County. Category 1 weeds are classified as abundant in Montana and widespread across many counties in the State.

VEGETATION EFFECTS

Forest Age Class & Cover Type Distribution

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, natural processes would continue to have an effect on these forest characteristics. In the absence of wildfires, older age-classes will continue to dominate the project area and the 0-39 and 40-99 age classes would continue to decline as the 70-80 year old trees move into the next age class without replacement. Forest cover type distribution would continue the conversion from western larch/Douglas-fir and ponderosa pine cover types to Douglas-fir and mixed conifer cover types.

No Action Alternative- Cumulative Effects

Under the No Action Alternative, there would likely be a decline in the overall acreage of western larch/Douglas-fir and ponderosa pine cover types on the Kalispell Unit. Western larch and ponderosa pine composition would continue to decrease, leading to a shift from these cover types to Douglas-fir and mixed conifer cover types. Across the landscape, fire suppression, insect and disease occurrence,

and increasing human use may influence cover type and age class distribution to an unknown degree. In the absence of stand replacement fires, variability of age class and cover type distribution would decline.

Action Alternative- Direct and Indirect Effects

Under the Action Alternative, timber harvesting would occur on 1650 acres. Regeneration harvests, consisting of shelterwood harvest method, would occur on 72 acres and commercial thinning with minor amounts of group selection would occur on 1578 acres. Harvest prescriptions would favor removal of shade tolerant trees and retention of seral species. Healthy Douglas-fir would also be retained to help achieve desired stocking levels, but western larch and ponderosa pine would be favored over Douglas-fir. The reduction in Douglas-fir would increase the proportion of other species in the overstory resulting in a change in composition. The unit cut with a shelterwood harvest would be regenerated with western larch to assure their presence in the newly established stand. The average age of some treated stands would decrease, although most stands would remain in the same age class after harvest, depending upon the extent of overstory tree removal.

Timber harvest treatments would convert approximately 158 acres of current Douglas-fir and 39 acres of mixed conifer cover types to 181 acres of western larch/Douglas-fir and 16 acres of ponderosa pine cover types.

Action Alternative- Cumulative Effects

The Action Alternative would result in a decrease in the amount of Douglas-fir and mixed conifer cover types and an increase in the amount of western larch/Douglas-fir and ponderosa pine cover types on the Kalispell Unit. These changes would shift the Kalispell Unit toward desired future conditions.

Cumulative effects in age class will be minimal because the Spencer Lake project is not altering the age distributions of the stands. Across the landscape, fire suppression, insect and disease outbreaks, and increasing human use may influence cover type and age class distribution to an unknown degree.

Stand Structure and Development

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, stand structure and development would continue to change as a result of natural processes. Older stands (150 +) comprise 55% of the project area and are experiencing reductions in live tree canopy due to insects and age related mortality. The mosaic pattern of multi-aged and multi-storied is likely to persist with this type of disturbance. More shade tolerant species would increase in all canopy levels continuing to replace or inhibit growth of seral species, as dense small diameter trees develop in the understory. Area coverage of forest in early successional stages, especially in larger patch sizes, would continue to decrease. Forest fuels would continue to build up in stand areas where mortality is occurring, increasing the potential for severe, less controllable fires that may result in large scale stand replacement fires.

No Action Alternative- Cumulative Effects

Forest succession and fire suppression would continue. Conditions favoring the establishment of shade tolerant species in canopy gaps, the slow establishment and growth of seedlings and saplings in closed canopies, and increasing fuel loadings would continue.

Action Alternative- Direct and Indirect Effects

Under the Action Alternative, shelterwood harvest is proposed on 72 acres, and even though it is a regeneration harvest, a moderately stocked overstory would be retained in a portion of the harvest unit. Trees may be retained in groups or individually distributed across the unit depending upon current stocking of healthy, desirable leave trees. Less homogenous stand conditions would occur, reflecting attributes of forests initiated under the mixed severity fire regime in the mid-successional stages of development, rather than the current late successional stages. Commercial thinning with some group selection proposed for 1578 acres would maintain current stand ages and structures, although canopy closure and forest fuels would be reduced. Commercial thinning would retain some of the mid- and lower- canopy, favoring seral species and vigorous trees. After slash disposal treatments are completed, more fire resistant stand conditions and structures would be maintained for several decades.

The percentage of multi-storied stand structures would be reduced from 91% to 87% and increase the simpler stand structures from 9% to 13%. Average stand size or patch size would not appreciably change.

Action Alternative- Cumulative Effects

The action alternative would result in promotion of characteristics of a mixed-severity fire regime. 72 acres of shelterwood harvest would revert from a multi-storied canopy to two-storied. Seral species would be favored and promote their future development in the overstory and reverse the current trend of shade intolerant development in the overstory. Across the Kalispell Unit, the action alternative would result in a slight decrease in the amount of multi-storied stands and a slight increase in single-storied stands. More fire resistant stand conditions and structures would be maintained.

Timber Productivity

No Action Alternative- Direct and Indirect Effects

Timber vigor would continue to decline. Growth rates of individual trees in dense, older stands would remain static to decline and opportunities for establishment of replacement trees would be limited to small openings favoring shade tolerant trees. Development of large diameter western larch as a persistent component of older stands would be hindered.

Poor vigor and overstocked stand conditions would likely increase the risk of damage and mortality from all species of bark beetles, especially the Douglas-fir bark beetle.

Defoliators would continue to find stand structures and density conditions favorable for habitat development in the project area.

Stem decays would continue to persist in the overstory with the amount of old-aged stands in the project area.

Dwarf Mistletoe affecting the western larch would continue and increase spread in both the overstory and understory.

Root diseases, specifically brown cubical butt rot, which are affecting the older-aged Douglas-fir stands, would continue to persist affecting mainly Douglas-fir overstory.

No Action Alternative- Cumulative Effects

Without silvicultural treatments or wildfires to control tree densities, reduce losses to insects and disease or initiate new stands, the trend towards increasing acreage on the Kalispell Unit covered by older, slower growing stands that are more susceptible to insect and diseases and/or wildfires would continue.

Action Alternative- Direct and Indirect Effects

Silvicultural treatments to be applied under the action alternative would remove both live and dead trees, some of which are affected by insect and disease. Healthy and vigorous trees of all species would be favored for retention where they occur. Stand health would be increased with the removal of low vigor or diseased trees. Between-tree competition would be reduced allowing residual trees to maintain or increase current growth rates.

Silvicultural treatments under the Action alternative would reduce stand densities and favor younger, more vigorous trees and reduce the risk from bark beetle attack and mortality.

Reduction in stand densities and favoring of healthy, vigorous trees will reduce damage from western spruce budworm defoliation.

Stem decays would decline as healthy, vigorous trees are retained and more susceptible, old-aged trees are removed.

Silvicultural treatments would remove overstory western larch infected with dwarf mistletoe and reduce the amount present. The reduction in overstory infected with mistletoe would translate into fewer understory infected and promote the development of seral species in the overstory.

Action Alternative- Cumulative Effects

Timber productivity would increase with silvicultural treatments that favor retention of younger, healthy trees. The acres of forested stands susceptible to insect and diseases and wildfires would decrease. Across the Kalispell Unit, the percentage of forested land that is producing timber closer to the site potential would increase by 3%.

Noxious Weeds

No Action Alternative- Direct and Indirect Effects

Noxious weed seed would continue to spread from existing populations and new populations may be introduced to the project area from recreational use, both commercial and non-commercial, and from uses adjacent to or within state land. Herbicide treatment along existing roads would continue as funding and unit priorities allow. Containment of weed infestations or a reduction in acres infested with weeds may be realized.

No Action Alternative- Cumulative Effects

Noxious weed populations could increase across the project area and Kalispell Unit as a result of the No Action Alternative. With the adoption of ARM 36.11.445 and the implementation of an integrated noxious weed agreement with Flathead County, a more aggressive approach to noxious weed identification and treatment has occurred than in the past. This ongoing treatment of noxious weeds should limit large increases in noxious weed spread and may reduce the number of acres infested in the future.

Action Alternative- Direct and Indirect Effects

Timber harvesting and road construction and maintenance would increase the potential for further establishment of noxious weeds with the exposure of bare mineral soil. Applying integrated weed management techniques within the sale design would reduce the occurrence and spread of noxious weeds. Grass seeding road construction and log landings and spot spraying new weed infestations would reduce or prevent establishment of additional populations. Washing logging equipment prior to use would limit the introduction of weed seeds into the forest. Trampling of slash in skid trails and closing roads to motorized use in the project area would limit the potential for soil disturbance and reduce the potential for weed establishment during and after logging. Treating existing weed populations with herbicide spray would reduce current populations or contain the area infested. This project would also likely be winter logged which would limit the exposure of mineral soil and deter new weed infestations.

Under the Action Alternative, timber harvesting would occur on 1,650 acres and include 9.5 miles of new road construction and 10 miles of existing road reconstruction. Acreage within harvest units and associated with road construction would be at a higher risk for incurring weed establishment and spread due to soil disturbance that may occur from skidding, landing and heavy equipment use for road construction and site-preparation activities. This risk would be limited by mitigation measures described above. Maintaining existing road closures, trampling slash in skid trails, grass seeding areas disturbed during road work, and spot herbicide treatments, would reduce current coverage and limit potential risk of further establishment of weed populations.

Action Alternative- Cumulative Effects

In combination with other management and recreational activities on the Kalispell Unit, the Action Alternative would increase the risk of further encroachment of forested sites by noxious weeds. The potential risk would be limited with the use of prevention measures implemented under the county

agreement and with the mitigation measures for the Spencer Lake Project. Actual weed treatments would likely be applied to a more extensive area under the Action Alternative, and have a greater potential for reducing current weed populations within the project area, thereby reducing the noxious weed affected area within the Kalispell Unit.

WATER RESOURCES

Introduction

This analysis is designed to disclose the existing condition of the hydrologic and fisheries resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were identified regarding water quality, water quantity, and fisheries resources. After reviewing public and internal comments, DNRC developed the following issue statements regarding the potential effects of the proposed timber harvesting:

- Timber harvesting and road construction has the potential to increase water yield, which, in turn, may affect erosive power, sediment production and stream channel stability.
- Timber harvesting and road construction may increase sediment delivery into streams/lakes and affect water quality and fish habitat parameters of large woody debris, channel complexity, stream shading, and stream temperature.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area and by assessing the level of riparian harvesting and the potential risk of changing fisheries habitat parameters.

The *ENVIRONMENTAL EFFECTS* section discloses the anticipated indirect, direct, and cumulative effects to water resources in the analysis area from the proposed actions. Past, current, and future planned activities on all ownerships in each analysis area have been taken into account for the cumulative-effects analysis.

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

- miles of new road construction and road improvements
- potential for sediment delivery to streams
- increases in Equivalent Clearcut Area and annual water yield
- increases or decreases in fish habitat parameters

Analysis Area

Sediment Delivery

The analysis area for sediment delivery is limited to harvest units and the roads used for hauling. This includes upland sources of sediment that could result from this project. In addition, in-channel sources of sediment, such as mass wasting locations or excessive scour/deposition, will be discussed for streams near proposed harvest units.

Water Yield and Cumulative Effects

Water yield will be discussed on a scale relevant to potential effects. While 6th-code Hydrologic Unit Code (HUC)watersheds adequately display the distribution of the project area and proposed harvest acres, the water yield and cumulative-effects analysis area are selected to adequately disclose potential impacts. Within the larger Stillwater River-Tobie Creek watershed, the Skyles/Spencer Lake watershed will be used for water yield and the cumulative-effects analysis. No smaller watershed breakdown is logical for the Stillwater River-Beaver Creek 6th code HUC because the contributing area is not confined to a single stream, instead this area would contribute via overland flow.

Fish Habitat Parameters

The analysis area for fisheries-habitat parameters is the proposed harvest units immediately adjacent to fish-bearing streams and lakes. This includes proposed harvest units near Spencer Lake and the unnamed outlet stream.

Analysis Method

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect, and cumulative effects include a field review of potential sediment sources from haul routes. Stream crossings and roads were evaluated to determine potential and observed sources of introduced sediment. Potential sediment delivery from harvest units will be evaluated from a risk assessment based upon DNRC's best management practice effectiveness ratings from the last 10 years. This risk assessment will also use soil information provided in *SOILS ANALYSIS* and the results from soil monitoring on past DNRC timber sales.

Water Yield and Cumulative Effects

As described in the *Forest Management Rules (ARM 36.11.423*), DNRC will determine the level of analysis dependent upon (1) the extent of the proposed activity; (2) the level of past activities; and, (3) beneficial uses present.

Annual water yield will be disclosed as a cumulative effect under *EXISTING CONDITIONS* of this analysis because the existing condition is a result of all past harvesting and associated activities. Under *ENVIRONMENTAL EFFECTS* of this analysis, water-yield increases as a result of this project will be disclosed as a direct effect. The water yield increase that includes all past, current and planned state actions will be disclosed in the cumulative effects section.

The annual water-yield increase for watersheds in the project area was estimated using the Equivalent Clearcut Acres (ECA) method as outlined in *Forest Hydrology, Part II (Haupt et. al., 1976)*. Data for the ECA method is derived from aerial-photo interpretation, previous timber sale contracts, and field based knowledge of the affected watersheds.

ECA is a function of total area roaded, harvested, or burned; percent of canopy removed during harvesting or wildfires; and amount of vegetative recovery that has occurred in the harvested or burned areas. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff. This method also estimates the recovery of these increases as new trees revegetate the site and move toward preharvest water use.

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

Fish Habitat Parameters

Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline, disclosing the expected changes due to the alternatives proposed. The analysis method for woody debris recruitment will evaluate the potential reduction in available woody debris and shading due to timber-harvesting activities. Stream temperature will be addressed by evaluating the risk of stream temperature increases due to reduced shading from existing vegetation.

Water Uses and Regulatory Framework

Water Quality Standards

This portion of the Flathead River basin, including tributaries to the Stillwater River, is classified as B-1 by the State of Montana DEQ, as stated in *ARM 17.30. 608*. The water-quality standards for protecting beneficial uses in B-1 classified watersheds are located in *ARM 17.30.623*. Water in B-1 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. State water-quality regulations limit any increase in sediment above the naturally occurring concentration in water classified B-1. Naturally occurring means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil, and water conservation practices have been applied (*ARM 17.30.602 [17]*). Reasonable land, soil, and water conservation practices include "methods, measures or practices that protect present and reasonably anticipated beneficial uses…" (*ARM 17.30.602 [21]*). The State of Montana has adopted Best Management Practices (BMPs) through its non-point source management plan as the principle means of meeting the *Water Quality Standards*.

The exception to this classification is the Stillwater River (mainstem) from Logan Creek to the confluence with the Flathead River, which is classified as B-2 by the State of Montana DEQ, as stated in ARM 17.30.608. Water in B-2 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and *marginal*

propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. State water-quality regulations limit any increase in sediment above the naturally occurring concentration in water classified B-2.

Water Quality Limited Waterbodies

Within the project area, no waterbodies are listed as a water-quality-limited waterbody in the *Draft* 2010 *303(d)* list. The *303(d)* list is compiled by DEQ as required by *Section 303(d)* of the *Federal Clean Water Act* and the *Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130)*. Under these laws, DEQ is required to identify waterbodies that do not fully meet water-quality standards, or where beneficial uses are threatened or impaired. Downstream of the project area, Stillwater River (Logan Creek and below) is listed as only partially supporting aquatic life and cold water fishery beneficial uses and not supporting drinking water beneficial uses. The probable causes of impairment are listed as total phosphorous, sedimentation/siltation, nitrates, lead and alteration of streamside vegetation. The listed probable source of impairments is loss of riparian habitat, and site clearance for land development or redevelopment.

Streamside Management Law

All rules and regulations pertaining to the Streamside Management Zone (SMZ) Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater than 35 percent. An SMZ width of 50 feet is required when the slope is less than 35 percent. Alternative practices that deviate from the SMZ law are allowed with appropriate environmental review and documentation.

Water Rights and Beneficial Users

Surface water rights exist within 3 miles downstream of the project area for fish and wildlife propagation, industrial use, stock watering, domestic use, and irrigation uses.

Existing Condition

General Description

The project area includes DNRC-managed lands in the two 6th-code hydrologic units (HUCs): Lower Stillwater River-Tobie Creek and Lower Stillwater River-Beaver Creek. *TABLE 3-6: 6th CODE HUC WATERSHEDS IN RELATION TO PROJECT* shows the project area acres and proposed harvest acres located in each watershed.

Table 3-6: 6TH CODE HUC WATERSHEDS IN RELATION TO PROJECT

6TH-CODE HUC WATERSHED NAME	WATERSHED ACRES	APPROXIMATE ACRES OF PROJECT AREA	APPROXIMATE PROPOSED HARVEST ACRES
Stillwater River-Tobie Creek	17,109	1,310	740
Stillwater River-Beaver Creek	36,809	1,136	866
Whitefish River	15,038	44	44

TOTALS	**53,918**	**2,490**	**1,650**

Within the larger Stillwater River-Tobie Creek watershed, the Skyles/Spencer Lake watershed will be used for water yield and the cumulative-effects analysis.

Due to the limited amount of project area and proposed harvest in the Whitefish River 6th-code watershed; and, due to the lack of stream channels in the project area portion of this watershed, no water yield analysis will be conducted because potential impacts would not be measureable.

Skyles/Spencer Lakes Watershed

The Skyles/Spencer Lakes watershed includes ephemeral, intermittent, and perennial streams that ultimately contribute surface flow into Stillwater River. The two lakes are likely only connected by surface water during extremely high spring runoff; during most years, groundwater is likely the only linkage between the two lakes. Although the USGS shows perennial and intermittent streams on the state parcel in Section 33 of T31N, R22W, no scoured channels were found on the parcel during field review in the summer of 2008. This information was disclosed in the Beaver-Smith-Skyles Environmental Assessment (DNRC, 2009) Additional field work was completed in 2009 and 2010 to determine where perennial and intermittent streams are present. The three intermittent streams shown on the USGS topographic quadrangle map were reviewed at various sites in each draw including at the lowest point in the project area . None of these draws had exhibited evidence necessary to be classified as a stream All had vegetation present similar to the surrounding uplands and no continual scour typically associated with streams per the SMZ law [ARM 36.11.312 (20)].

Spencer Lake is a perennial waterbody with a seasonal outlet that flows towards the Stillwater River. During much of the year, the stream is dry a short distance below the Twin Bridges County Road. During spring runoff, this stream carries water across the state Trust Land parcels, but due to a dam on private land, direct connectivity to the Stillwater River is unlikely. Nonetheless, due to the likely, occasional presence of fish in this intermittent stream, it must be treated as a Class I stream.

Fish present in Spencer Lake includes largemouth bass, northern pike, pumpkinseed, westslope cutthroat trout, and yellow perch. Ownership in the watershed includes approximately 2,020 acres of private land, 1,447 acres of DNRC-managed land, and 42 acres of FNF-managed land. Several main roads are in the watershed, including U.S. Highway 93 and Twin Bridges Road, which contain stream crossings.

Sediment Delivery

Because surface water is limited in the project area, the risk of sediment delivery to streams from roads is also limited. However, direct deliver was noted into the Class I stream that flows from Spencer Lake. The area of direct delivery is immediately adjacent to Twin Bridges road and is used as a parking area for recreationists. Much of the parking area is within 50 feet of the stream and, in some instances, as close as 10 feet from the stream. Vegetation is present between the parking area and stream; however the proximity to the stream and the volume of use suggests that some sediment is delivered.

Water Yield and Cumulative Effects

After reviewing the beneficial uses, existing channel conditions, and existing watershed condition per *ARM 36.11.423*, the threshold of concern for the Skyles/Spencer Lake watershed was set at 15%. The recommended threshold value is compared to the expected annual water yield of a fully forested condition. An annual water-yield value less than this threshold value would be expected to result in a low to moderate degree of risk to beneficial uses due to water-yield increases as described in *ARM 36.11.423(f)(iv)*.

The Stillwater River-Beaver Creek watershed will be discussed qualitatively without setting an annual water yield threshold. This is due to the lack of stream channels and the size of the watershed compared to the portion of the project area located within watershed. These two factors combine to make potential adverse affects immeasurable with an adequate degree of certainty.

Skyles/Spencer Lakes are generally not connected except during extreme high-water events. Furthermore, these lakes serve to dampen water-yield increases during the peak runoff and, therefore, reduce the potential for destabilizing downstream channels. Flows are dampened due to water storage in the lake until the lake level raises enough to overflow into the outlet stream. This would reduce or postpone the flow in the outlet stream during the typical peak that would occur without a lake. After reviewing the 2005 and 2009 aerial photographs of the watershed, canopy removal estimates were developed. These estimates included canopy removal from timber harvest and development activities. The existing annual water yield increase for the Skyles/Spencer Lake watershed is estimated at 10.8% over a fully forested condition. Due to the proposed light treatment and lack of stream channels in the watershed, no adverse measureable affects from increased water yield—such as degraded stream channels, excessive bank erosion—were noted during field review.

Fish Habitat Parameters

Fish habitat parameters are limited in scope to fish-bearing bodies of water within the project area. This only includes Spencer Lake and the outlet stream.

- *Large Woody Debris*: Woody debris in Spencer Lake is limited, most likely due to a combination of US Highway 93 reducing the recruitable woody debris and firewood removal along the southern side of the lake. Existing woody debris provides habitat and cover for fish as well as wildlife in the lake.

- *Stream Temperature*: DNRC is not aware of any long-term temperature data collected from fish-bearing waterbodies in the project area. Although, because fish currently inhabit the lakes, a reasonable assumption is that conditions are suitable for fish. As both warm- and cold-water fish species are known to persist in Spencer Lake, it is reasonable to presume that peak seasonal temperatures are vertically stratified through the lake, with very warm temperatures near the surface contributing to runoff flows in the outlet stream from late spring through early fall and relatively colder temperatures remaining near the bottom throughout the year.

WATER RESOURCES EFFECTS

Sediment Delivery

No Action Alternative-Direct and Indirect Effects

Under this alternative, no timber harvesting or related activities would occur. The existing direct sediment-delivery sources would continue until repaired by another project or funding source. Sediment delivery into the outflow channel of Spencer Lake would continue.

No Action Alternative-Cumulative Effects

Under the No-Action Alternative, the potential for sediment contribution from the proposed haul route would still exist as described in *EXISTING CONDITION*. The identified existing sediment-delivery source would continue until repaired by another project or funding source.

Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the natural progression of the existing condition. Sediment sources would continue unless repaired under a separate project.

Action Alternative- Direct and Indirect Effects

Past monitoring of DNRC timber harvests has shown erosion on approximately 6 percent of the sites monitored, although no water-quality impacts from the erosion were found (*DNRC, 2004*). These sites were harvested during the summer period, and the erosion was attributed to inadequate skid-trail drainage. By minimizing displacement, less erosion would likely occur compared to other harvest methods with more extensive disturbance (*Clayton, 1987 in DNRC, 2004*).

During a review of BMP effectiveness, including the effectiveness of stream buffers, *Raskin et al.* found that 95 percent of erosion features (disturbed soil) greater than 10 meters (approximately 33 feet) from the stream did not deliver sediment. His findings indicated that the main reasons stream buffers are effective include: 1) keeping active erosion sites away from the stream and 2) stream buffers may intercept and filter runoff from upland sites as long as the runoff is not concentrated in gullies or similar features (*Raskin et al, 2006*).

All new road construction would occur well away from streams on soils that are suitable for road construction and are not considered *high hazard* (see Soils Analysis). Because revegetation can be difficult on the road fill- and cutslopes, some erosion could occur, but due to the distance from streams, sediment delivery and subsequent water-quality impacts would not likely be a result.

Existing roads would have drainage improvements and BMP upgrades implemented under this alternative. The identified sources of sediment would be mitigated or repaired as part of the *Timber Sale Contract* requirements. Minor drainage improvements include reshaping drain dips, cleaning ditch-relief culvert catchbasins, as well as ditch reshaping and ditch-relief culvert extensions. Current maintenance activities would continue to provide drainage to area roads.

The existing parking area near the outlet of Spencer Lake would be restored as part of this project. This area would be revegetated to provide a more effective buffer to future sediment deliver from the

proposed landing and also Twin Bridges Road. Because the existing parking area is located within the SMZ of the stream, the proposed restoration work would require an SMZ Alternative Practice.

Because DNRC would incorporate BMPs into the project design as required by *ARM 36.11.422 (2)* and all laws pertaining to SMZs would be followed, a low risk of sediment from timber-harvesting activities would result from the implementation of this alternative. Additional mitigation for potential soil disturbance would be the season of operations. Due to recreation constraints, the period of operation would be limited to fall and winter periods. Winter periods typically result in less soil displacement because the ground is more resistant to displacement when frozen or covered by snow. However, the mitigation for potential sediment delivery may include winter conditions, soil moisture restriction, slope restrictions, filter fabric, and a slash mat to minimize soil disturbance. Therefore, the risk of long-term adverse direct or indirect effects to water quality or beneficial uses would be low.

Action Alternative- Cumulative Effects

Under this alternative, the proposed timber-harvesting and road-construction activities would occur. Road drainage improvements would occur on the haul route, and the direct sediment source on the outlet of Spencer Lake would be rehabilitated. A cumulative increase in sediment delivery as a result of timber harvesting would have a low risk of occurring because of BMP applications and limited surface water in the project area.

Because all timber-harvesting activities would follow BMPs as required by *ARM 36.11.422*, and the direct and indirect effects would have a low risk of impacts, additional adverse cumulative effects would not be expected to occur under this alternative. This expectation includes the results of a reduction in sediment delivery to the outlet of Spencer Lake.

Fish Habitat Parameters

No Action Alternative- Direct and Indirect Effects

Large Woody Debris Recruitment: No additional reductions in recruitable large woody debris would result from the implementation of this alternative.

Stream Temperature: No increases in stream temperature from a reduction in stream shading would be expected under this alternative.

No Action Alternative- Cumulative Effects

Large Woody Debris Recruitment: No additional reductions in recruitable large woody debris would result from the implementation of this alternative. Potential recruitment levels would remain in a slightly reduced condition due to the ongoing effects from US HWY 93.

Stream Temperature: No increases in water temperature from a reduction in shading would be expected under this alternative because no harvesting would occur. Risks of potential effects to lake and stream temperatures would remain due to the ongoing reduced canopy closure from US HWY 93.

Because no timber harvesting or associated activities would occur under this alternative, cumulative effects would be limited to the natural progression of the existing condition and effects from US Hwy 93. Conditions would be expected to continue to provide adequate levels of large woody debris for habitat, and also support a natural range of water temperatures. Connectivity between Spencer Lake and the outlet stream would continue to be a problem due to the crossing structure on the county road. The apparent lack of connectivity between the Spencer Lake fishery and the Stillwater River fishery would be expected to remain. Fisheries-habitat quality would be maintained at its current level with a low degree of risk of change due to management actions.

Action Alternative- Direct and Indirect Effects

Large Woody Debris Recruitment: Western larch and Douglas-fir trees in the stand adjacent to Spencer Lake average 72 feet in height and 86 years old. No harvesting would occur within 100 feet of Spencer Lake except for a small area (approximately 300 lineal feet where the buffer would be between 50 and 100 feet). DNRC anticipates that removal of timber within approximately 100 feet of Spencer Lake could reduce the recruitable large woody debris. The resulting stand after this limited level of harvesting near Spencer Lake would be expected to continue to provide adequate recruitable woody debris to provide habitat and cover in the lake with a low degree of risk.

Stream Temperature: Because the harvesting would be limited near Spencer Lake as described above, a measurable increase in water temperature from the implementation of this alternative is unlikely.

Action Alternative- Cumulative Effects

Large Woody Debris Recruitment: A small area along Spencer Lake would have reduced levels of recruitable woody debris because the leave buffer would only be 50 feet. The remaining shoreline along Spencer Lake would not likely see a reduction in recruitable woody debris because all trees within 100 feet of the lake would be retained. Because the reduction in recruitable woody debris would be limited to approximately 300 feet of shoreline, the risk of adverse cumulative impact would be low.

Stream Temperature: Because of the limited amount of shade-producing vegetation that would be removed, a low risk of cumulative temperature increases above naturally occurring ranges would result from the implementation of this alternative.

Because all timber-harvesting activities would follow BMPs as required by *ARM 36.11.422*, and the direct and indirect effects would have a low risk of impacts, additional adverse cumulative effects would not be expected to occur under this alternative. This expectation includes the results of a slight reduction in potential recruitable large woody debris near Spencer Lake; and an increase in modeled annual water-yield estimates. Conditions would be expected to continue to support fish-habitat parameters in Spencer Lake and provide adequate levels of large woody debris for fish habitat, and also support the pre-project range of water temperatures. Connectivity between Spencer Lake and the outlet stream would continue to be a problem due to the crossing structure on the county road. The apparent lack of connectivity between the Spencer Lake fishery and the Stillwater River fishery would be expected to remain. However, under this alternative, fisheries-habitat quality would be maintained at its current level with a low degree of risk of change due to management action.

Considering the Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber harvesting and road construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

Water Yield

No Action Alternative- Direct and Indirect Effects

No increase in water yield would be associated with this alternative.

No Action Alternative- Cumulative Effects

No increase in water yield would be associated with this alternative.

Action Alternative- Direct and Indirect Effects

If this alternative were selected, approximately 1,650 acres would be harvested using conventional ground-based. The harvest combined with the road construction would generate approximately 691ECA.

TABLE 3-7: ECA AND ANNUAL WATER-YIELD INCREASE FOR PROJECT WATERSHEDS displays the ECA increase and percent of annual water-yield increase for applicable watersheds.

Table 3-7: ECA AND ANNUAL WATER-YIELD INCREASE FOR PROJECT WATERSHEDS

Watershed	6TH Code HUC Watershed Name	Harvest Acres	ECA Increase	Annual Water Yield Increase
Skyles/Spencer Lake	Stillwater River-Tobie Creek	656	293	4%
Stillwater River-Beaver Creek	Stillwater River-Beaver Creek	865	346	*

**Due to the small scale of harvesting in relation to the watershed size and the lack of scoured channels near the proposed harvest area, it is unlikely that a measurable increase in water yield would result in this watershed Approximately 85 acres of harvest is proposed in the Stillwater River-Tobie Creek watershed. This would generate approximately 34 ECA*

Approximately 44 acres of harvest in the Whitefish River watershed would generate an estimated 18 ECA.

Because proposed harvest levels under this alternative would not substantially increase water yield or stream flow, only a low risk of increased in-channel sediment would result from this alternative. No increases of in-channel sources of sediment would be expected.

Action Alternative- Cumulative Effects

The estimated cumulative annual water-yield increases in the project watersheds would remain below the recommended thresholds if this alternative were selected. The cumulative annual water yield increase for the Skyles/Spencer Lake watershed would increase to 14.8%. Because this level would remain below the thresholds set in accordance with *ARM 36.11.425(g)*, a low degree of risk to water quality would result from the implementation of this alternative. The Stillwater River-Beaver Creek watershed would have very small increase that would likely be immeasurable.

Because the annual water-yield increases would remain below the thresholds of concern and BMPs would be implemented during timber harvesting and road construction operations, the risk of adverse cumulative impacts to water quality and beneficial uses, including fisheries habitat, would be low.

SOILS

Introduction

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were identified internally and by the public regarding soil impacts. The following issue statements were expressed from comments regarding the effects of the proposed timber harvesting:

- Ground-based harvest techniques can displace and compact soils which can adversely affect the hydrologic function, soil structure and long-term productivity of the impacted area.
- Removal of both coarse and fine woody material off-site during timber harvest operations can reduce nutrient pools required for future forest stands and can affect the long-term productivity of the site.

Analysis Area

The project area for this proposal includes approximately 2,490 acres situated primarily between Hwy 93 on the north and the KM Ranch Road on the south. Within the project area are 12 individual soil types found within 5 soil series'; however, only 8 of these soil types (in 4 soils series') have proposed units for timber-harvesting activities, which includes road construction, reconstruction, or obliteration. The analysis area for soil impacts will be the area within harvest units and where proposed road activities would take place. This analysis area will adequately allow for disclosure of existing conditions and direct, indirect, and cumulative impacts.

Analysis Methods

Methods for disclosing impacts include using general soil descriptions and management limitations due to risks of unacceptable adverse impacts. Soils have been grouped by location, topography, vegetation, and landform. These groups are referred to as a soil *series*. Each soil series and will be reviewed to qualitatively assess the risk of negative effects to soils from erosion, compaction, and displacement from

each alternative, using insight from previously collected soils-monitoring data from over 70 DNRC postharvest monitoring projects.

While the anticipated impacts from each alternative will disclose the direct/indirect effects, the cumulative impacts will be the result of previous and proposed activities.

Coarse woody debris will be analyzed by collecting data from random transects to determine the range of existing material. This information will be compared with recommended levels found in relevant literature.

Existing Conditions

General Conditions

The soil survey publication that covers information on the project area is titled Soil Survey of Upper Flathead Valley Area, Montana (USDA, 1946). Five soils series are found in the in the project area; however, activities are proposed on only 4 of these soil series; therefore, only these four will be discussed, although the bulk of the discussion will be on the Whitefish Series, on which most (99.3%) of the proposed activities are located. Additional information for all landtypes is available in the project file. TABLE 3-8: PROJECT AREA SOIL MAP UNIT DESCRIPTIONS provides a brief description of each series and soil type in the project area, while FIGURES SF-1 provides a visual depiction of the soil locations in the project area.

This portion of Kalispell Unit, like much of northwest Montana, is dominated by bedrock consisting of metasedimentary rocks from the Proterozoic age. Rocks in this formation are generally comprised of argillites, quartzites, and siltites. Surface deposits of glacial till, outwash, and lacustrine sediments can be found throughout the area. Overlying these sediments is a layer of loess that has been influenced by volcanic ash deposited and redeposited from Mount Mazama approximately 6,700 years ago (Martinson and Basko, 1998).

Existing Condition Due to Past Management

DNRC strives to maintain soil productivity by limiting cumulative soil impacts to 15 percent or less of a harvest area from skid trails and landings, as noted in the *SFLMP* (*DNRC, 1996*). As a recommended goal, if existing detrimental soil effects exceed 15 percent of an area, proposed harvesting should minimize any additional impacts. Harvest proposals on areas with existing soil impacts in excess of 20 percent should avoid any additional impacts and include restoration treatments, as feasible, based on site-specific evaluation and plans.

Past monitoring on DNRC timber sales from 1988 to 2006 has shown an average of 13.1-percent soil impacts across all parent materials. The majority of soils in the project area are comprised of cobbly and/or gravelly silty loams from glacial till. Stratifying the results by texture similar to the majority of the proposed harvesting shows an average of approximately 14.7 percent of the harvest areas impacted by displacement and severe compaction (*DNRC, 2004*).

When winter harvesting is implemented on these areas, the impacts are typically less than summer operations due to frozen soils being more difficult to compact or displace. Winter harvesting operations on similar soils shows an average of 12.3 percent of the harvest area impacted by displacement or severe compaction (*DNRC 2004*).

Section record data for past harvesting operations in the project area indicates harvesting started around 1917; generally for making railroad ties. Since that time, harvesting has continued with a variety of harvest types, from clearcuts to thinnings. The most recent large harvest (>250 mbf) in the project area was a 1976 timber sale in sections 9, 15, and 16 on the south end of the project area. Approximately 3480 mbf were removed at that time. Other large scale harvests were recorded in the 1920's, 1940's and 1960's. (*DNRC Section Record Cards, NWLO*).

Smaller forest-product removals include small salvage harvests; post-and-pole harvests; firewood gathering, and individual Christmas tree harvesting throughout the last 90-plus years.

A large portion of the DNRC-managed land in the project area has been harvested since the first entry in 1917. Through the freeze-thaw cycles and root-mass penetration of the soil, impacts from past entries are substantially reduced over time and this is generally the case with skid trails, cable corridors and roads. While vegetation similar to the surrounding vegetation is generally present and growing on these impacted areas, some of these skid trails and roads are still discernable due to use for land management and recreation. The continued use of skid trails and roads for land management activities post-pones the recovery because soil compaction is reinforced. Field reconnaissance of the project area indicates an estimated 10.1 miles of existing road and approximately 21.1 miles of single track recreation trails. Much of the existing road is currently being used as recreation trails by hikers, bikers and horseback riders. The estimated area removed from production for roads and recreation trails is 52 acres or 2.1% of the project area. This number is increasing because additional unauthorized trails are being built in the project area. Adverse cumulative compaction and displacement impacts from past and current activities are estimated to cover less than 5 percent of the project area. This ocular estimate accounts for the isolated impacts due solely to past timber harvest activities, the past and current impacts attributed to land management activities combined with recreation activities, and the past and current impacts due to solely recreation.

Coarse Woody Debris

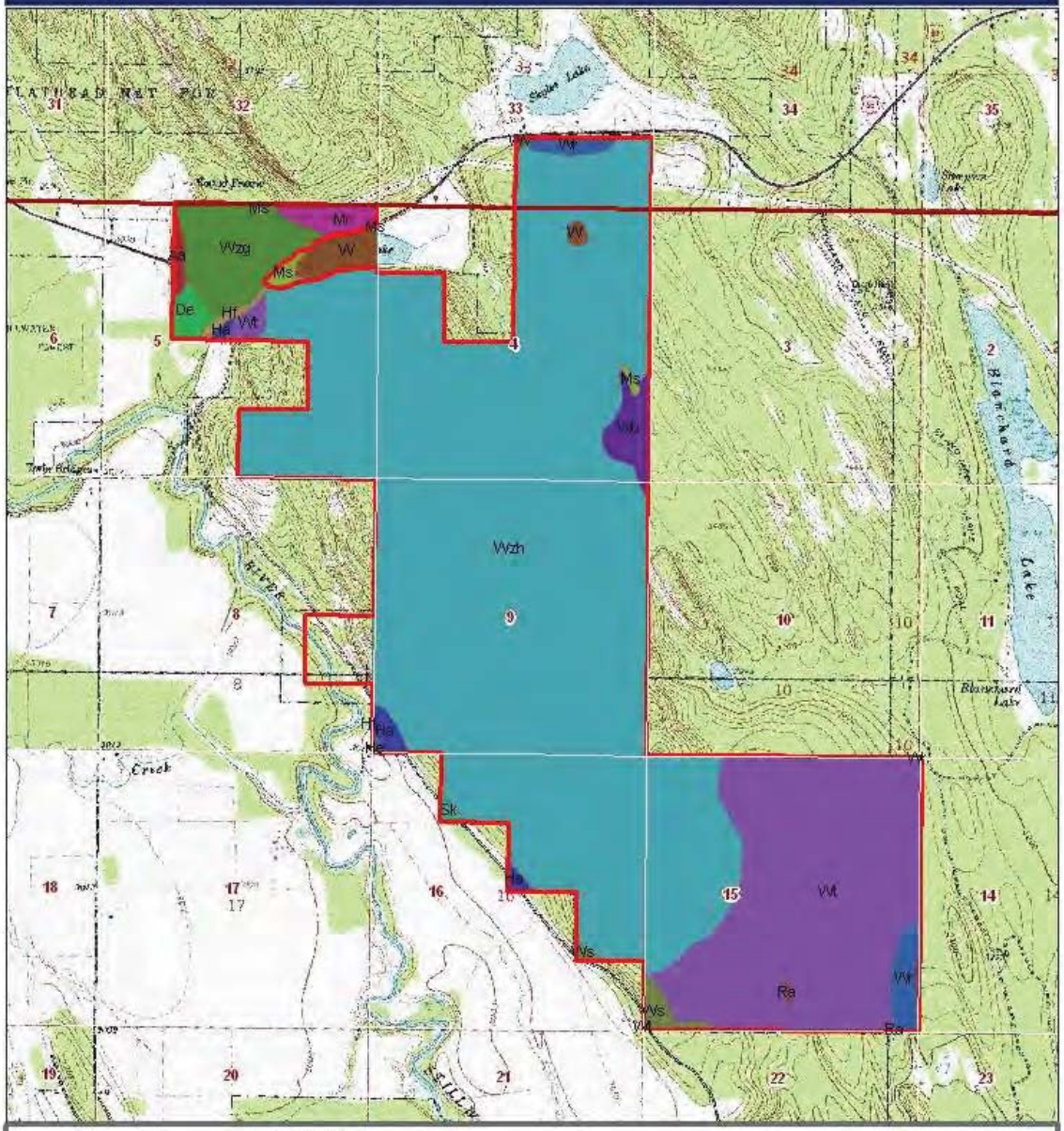
Coarse woody debris (>3 inches diameter) was measured throughout the project area along 36 randomly-located transects. The method used in to gather information can be found in the *Handbook for inventorying downed woody material (Brown, 1974)*. The coarse woody debris (CWD) levels ranged from 0 to 46 tons per acre with an average of 6 tons per acre. The median amount for the 36 transects was 2.6 tons per acre.

Recommendations by Graham et al. (1994) suggests that the CWD levels adequate to maintain soil productivity ranges from 5-9 tons per acre in Douglas-fir/ninebark habitat types to 12-25 tons per acre in Douglas-fir/snow-berry/pinegrass habitat types.

TABLE 3-8: PROJECT AREA SOIL MAP UNIT DESCRIPTIONS			
Map Symbol	**Map Unit Name**	**SOIL AND VEGETATION DESCRIPTIONS**	**MANAGEMENT CONSIDERATIONS** **K FACTOR**/EROSION POTENTIAL for TIMBER MANAGEMENT and ROADS**
Mr	Mountainous lands, low hills and mountains	Soils lower on the slopes are from the Whitefish series, which consists of deep, well-drained gravelly, silty soils.	K=0.20 This K factor is for the Whitefish Series, with slopes up to 45 percent. Potential productivity: Moderate.' ***No activities are planned on this map unit.***
Ra	Radnor silt loam 0 to 3 percent slopes	The Radnor series consists of poorly drained glaciolacustrine deposits in swales, draws and low lying areas adjacent to upland glacial till derived soils. Vegetation is typically wet grasses, forbs and shrubs that can endure a high water table or surface water during extended periods of the year.	K=0.32 Erosion potential is low to moderate. Equipment: Tractor Potential productivity: Moderate. ***No activities are planned on this map unit.***
Sk	Stryker silt loam 0 to 3 percent slopes	This map unit is poorly-drained material from the Belt formation. These soils developed on terraces of streams and glacial lakes. Vegetation is generally conifer and deciduous trees, although brush can invade pastures and previously harvested forests.	K=0.43 Erosion potential is low to moderate. Sediment delivery efficiency is low due to gentle terrain. Equipment: Tractor , although Season of operation will be very short or limited to frozen/snow-covered conditions Potential productivity: high. ***Proposed activities are located on approximately 1 acre of this map unit.***
W	Water		

Wr	Whitefish cobbly silt loam 0 to 7% slopes	The Whitefish series is generally located in the north and west sides of the Upper Flathead Valley. Soils are deep and well-drained, derived from calcareous glacial till from argillites and quartzites from the Belt Supergroup. Soil textures vary as shown in the *Map Unit Name* column of this table. The expected vegetation for this series is comprised of ponderosa pine and Douglas-fir forests over a varying density of undergrowth that may include serviceberry, huckleberry, Oregon-grape, and grasses.	K=0.20 Erosion potential is low. Sediment delivery efficiency is low on gentle terrain and moderate on steeper slopes. Equipment: Tractor Potential Production: Moderate ***Proposed activities are located on approximately 1,640 acre of this soil series.***
Ws	Whitefish cobbly silt loam 7 to 12% slopes		
Wt	Whitefish cobbly silt loam 12 to 20% slopes		
Wu	Whitefish cobbly silt loam 20 to 45% slopes		
Wv	Whitefish gravelly silt loam 0 to 7% slopes		
Wzg	Whitefish stony silt loam 12 to 20% slopes		
Wzh	Whitefish stony silt loam 20 to 45% slopes		

Figure 3-1
Spencer Lake Timber Sale Environmental Assessment
Soil Type Map



SOILS EFFECTS

No Action Alternative- Direct and Indirect Effects

No timber harvesting or associated activities would occur. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases except for locations where recreations trails are created. Continued use of the trails and expansion of unauthorized trails would remove additional ground from timber production.

No Action Alternative- Cumulative Effects

Additional adverse cumulative effects to soils would only result from the implementation of this alternative due to additional unauthorized recreation use in the form of trail building. Because the amount of unauthorized trail construction cannot be predicted, no quantitative analysis can be completed. However, an estimated 1.2 acres of forest would influence or eliminate timber production for every mile of trail constructed. As vegetation is allowed to establish on the impacted areas and freeze-thaw cycles occur, the area of reduced productivity would decrease.

Action Alternative- Direct and Indirect Effects

To provide an adequate analysis of potential impacts to soils, a brief description of implementation requirements is necessary. *ARM 36.11.422 (2)* and *(2)(a)* state that appropriate BMPs shall be determined during project design and incorporated into implementation. To ensure that the incorporated BMPs are implemented, the specific requirements would be incorporated into the DNRC *Timber Sale Contract*. As part of this alternative design, the following BMPs are considered appropriate and, therefore, would be implemented during harvesting operations:

1) Limit equipment operations to periods when soils are relatively dry, (less than 20 percent), frozen, or snow-covered to minimize soil compaction and rutting and maintain drainage features. Check soil moisture conditions prior to equipment start-up.

2) On ground-based units, the logger and sale administrator would agree to a general skidding plan prior to equipment operations. Skid-trail planning would identify which main trails to use and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw-bottom trails) would not be used without additional mitigation and may be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

3) Tractor skidding should be limited to slopes of less than 40 percent unless the operation can be completed without causing excessive erosion. Based on site review, short, steep slopes above incised draws may require a combination of mitigation measures, such as adverse skidding to a ridge or winchline skidding from the more moderate slopes of less than 40 percent.

4) Keep skid trails to 20 percent or less of the harvest-area acreage. Provide for drainage in skid trails and roads concurrently with operations.

5) Slash disposal - Limit the combination of disturbance and scarification to 30 to 40 percent of the harvest units. No dozer piling on slopes over 35 percent; no excavator piling on slopes over 40 percent

unless the operation can be completed without causing excessive erosion. Consider lopping and scattering or jackpot burning on the steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.

6) Retain 10 to 15 tons of large woody debris and a majority of all fine litter feasible following harvesting. On units where whole-tree harvesting is used, implement one of the following mitigations for nutrient cycling: 1) use in-woods processing equipment that leaves slash on site; 2) for whole-tree harvesting, return-skid slash and evenly distribute in the harvest area; or 3) cut tops from every third bundle of logs so tops are dispersed as skidding progresses. Sites near private property would have less large woody debris and fine litter left to reduce fire hazards.

Considering data from the *DNRC SOIL MONITORING REPORT (DNRC, 2004)*, the implementation of Forestry BMPs has resulted in less risk of detrimental soil impacts from erosion, displacement, and severe compaction. While the report noted that the impacts were more likely on the fine-textured soils and steep slopes, reduced soil productivity due to compaction and displacement may occur on coarser parent materials similar to those found in the state parcels. Also, the greatest impacts were noted where harvesting implementation departed from BMPs, such as steep slope ground-based skidding.

Comparing the soil type map, field reconnaissance notes and topographic map features with the proposed harvest unit map indicates that under this alternative ground-based skidding would occur on a majority of the proposed harvest areas. The extent of impacts expected would likely be similar to harvest areas monitored by DNRC and reported in the monitoring report *(DNRC, 2004)*, or between 12.3 and 14.7 percent of the harvest area depending upon ground conditions. *TABLE 3-9: EXPECTED ACRES OF IMPACT TO SOIL FROM COMPACTION AND DISPLACEMENT* summarizes the expected impacts to soils within harvest units.

Table 3-9: EXPECTED ACRES OF DIRECT AND INDIRECT IMPACTS TO SOILS FROM COMPACTION AND DISPLACEMENT DUE TO TIMBER HARVEST ACTIVITIES

Harvest Method and Season	No Action	Action
Ground-based harvest (acres to 12.3 to 14.7% harvest area impacts depending upon season)	0	203-243 acres
Average Total Area of Impacts (acres)	0	223 acres
Total Harvest Acres	0	1,650 acres
Percent of Area Impacted	0	13.5%

In addition to the potential impacts from harvesting, up to 35 acres would be impacted by new road construction and an estimated two acres in excavated skid trails or temporary roads. The entire excavated skid trails and temporary roads would be recontoured and seeded with grass and littered with slash and brush at the termination of the project. Road construction would likely result in more

erosion than native topography; however, BMP implementation would minimize the risk of erosion. Due to the general lack of surface water throughout the project area, the risk of delivery into streams would be very low.

Action Alternative- Cumulative Effects

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

DNRC estimates that an additional 225 acres (average from Table 3-9 plus 2 acres of excavated skid trail) of land may be impacted by skid trails and landings. This amount added to the existing impacts found in proposed harvest units from past timber management entries and current recreational use would result in approximately 14.3 percent impacts in the proposed harvest areas which is below the recommended goal of 15 percent of the area.. In addition, 71.2 acres of ground would be removed from production or have reduced productivity due to roads and 4.8 acres of recreation trails located outside of proposed harvest areas. As vegetation begins to establish on the impacted areas and freeze-thaw cycles occur, the area of reduced productivity would decrease.

By designing the proposed harvesting operations with soil moisture restrictions, season of use, and method of harvesting, the risk of unacceptable long-term impacts to soil productivity from compaction and displacement would be low.

WILDLIFE

Introduction

This analysis is designed to describe the existing conditions of the wildlife resources and identify the anticipated effects that may result from each alternative. DNRC Forest Management Rules and comments received during initial scoping led to the following list of issues:

- Timber harvesting could reduce forested cover, which 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, which could alter their ability to use the area and or successfully reproduce.
- 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 dependent on these resources, which could alter their survival and/or reproductive ability.

- 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.
- Timber harvesting and associated activities could displace adult common loons from nest sites and/or decrease nesting success.
- Timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.
- 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.
- Timber harvesting and associated activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.

Analysis Area

Existing conditions and environmental effects are described at two different scales: (1) the 'project area', which consists of approximately 2,458 acres of DNRC-managed lands in Sections 4, 5, 8, 9, 15, and 16 in T30N, R22W and section 33 in T31N, R22W, and (2) the 'cumulative effects analysis area' which is the broader, surrounding landscape used for assessing cumulative effects to wildlife species and their habitats. The scales of these analysis areas vary according to the species being discussed, but generally approximate the size of the home range for the particular species.

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 would persist and biodiversity would 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 proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, SLI data, aerial photographs, Montana Natural Heritage Program (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. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

Relevant Agreements, Laws, Plans, Rules, and Regulations

Various legal documents dictate management criteria for the management of wildlife and their habitats on state lands. The documents most pertinent to this project include: *DNRC Forest Management Rule*s, the *Endangered Species Act*, the *Migratory Bird Treaty Act*, and the *Bald and Golden Eagle Protection Act*.

Coarse Filter Wildlife Analysis

Of the 108 mammal species found in Montana, 66 are suspected or known to occur in Flathead County (*Foresman 2001*). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Six amphibian and 7 reptile species have also been documented in Flathead County (*Maxell et al. 2003*) and at least 65 species of birds have been documented in the vicinity in the last 10 years (*Lenard et al. 2003*). 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 may occur in lower abundance due to the decline of these elements across the landscape. Over time, due to fire suppression, tree densities have 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. However, in 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. Past timber harvesting that led to the early seral stages 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.

Mature Forested Habitats and Landscape Connectivity

Issue: Timber harvesting could reduce forested cover, which 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, which could alter their ability to use the area and or successfully reproduce.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). 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 other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid nonforested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 whole or partial sections surrounding the project area. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, aerial-photograph interpretation, and Geographical Information System (GIS) analysis. Factors considered in the analysis include the level of timber harvesting, amount of densely forested habitats, and connectivity.

Existing Environment

The project area currently contains approximately 1,891 acres of mature stands (100-plus years in age) of Douglas-fir, Douglas-fir/western larch, and mixed-conifer stands that have a reasonably closed canopy (40% canopy closure or better). These stands are interspersed with a variety of Douglas-fir, Douglas-fir/western larch, and mixed-conifer stands of varying ages and stocking densities. Currently, forested areas cover most of the project area, facilitating some use by those species requiring connected forested conditions and/or forested interior habitats. However, connectivity within the project area has been reduced with past timber harvesting and the network of closed roads and active trails.

The network of open roads in the cumulative-effects analysis area, coupled with timber management, agricultural clearing, and human developments in the past has reduced much of the landscape-level connectivity in the cumulative effects analysis area. Some connectivity exists along Spencer ridge; however this linear corridor is only partially connected to forested environments to the north, and doesn't connect to larger forested environments to the south. Ongoing harvesting associated with the Beaver/Swift/Skyles and Lion Mountain timber sale projects on DNRC-managed lands would continue reducing forested habitats and/or altering potential connectivity in the cumulative effects analysis area. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could be reducing forested habitats and/or altering potential connectivity. Across the cumulative-effects analysis area, roughly 42.8% (5,479 acres) appears to be in closed-canopied, mature forest conditions (including 2,216 of DNRC-managed lands in the project area; 17.3% of the cumulative effects analysis area), and an additional 29.6% (3,783 acres) are partially forested that has experienced some level of harvesting or thinning in the recent past, but is not closed canopied. The remaining 27.6% (3,527 acres) of the cumulative effects analysis area is not forested and would not develop those conditions in the future.

Snags and Coarse Woody Debris

Issue: 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 dependent on these resources, which could alter their survival and/or reproductive ability.

Introduction

Snags and coarse woody debris are important components of forested ecosystems. The following are 5 primary functions of deadwood in the forested ecosystems: 1) increase structural diversity, 2) alter the 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 (e.g. 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 (*Hejl and Woods 1991*). The quantity, quality, and distribution of snags affect the presence and population size of many of these wildlife species relying on these resources. Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites (*Bull et al. 1997*). Many species that use smaller-diameter snags will also use large snags; however, the opposite is not true. Additionally, snags in early stages of decay are often used more for feeding substrates, while mid-level decay provides opportunities for cavity excavation *(Schepps et al. 1999*). Some species of trees decay at slower rates than others, thereby providing habitat for longer periods of time. For example, western larch, western white pine, and ponderosa pine are harder woods that decay less rapidly than Douglas-fir, subalpine fir, or Engelmann spruce trees. Typically, older-aged stands will have greater numbers of large snags. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting, but having others nearby for foraging or roosting opportunities.

Meanwhile, 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. Several mammals 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 lynx.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 whole or partial sections surrounding the project area. This scale of analysis would be large enough to support a diversity of species that use coarse woody debris resources, from birds to small mammals and meso-carnivores.

Analysis Methods

Snags and coarse woody debris were assessed during site visits and while reviewing past DNRC harvesting information. Factors considered in the analysis include the level of harvesting, number of snags and coarse woody debris, and the risk level of firewood harvesting.

Existing Environment

During field visits to the project area, 0-6.6 (avg. 0.55) large (>21" dbh) snags per acre were observed, which were largely dominated by western larch and Douglas-fir. Large snags (greater than 21 inches dbh) were more abundant in the older stands and away from open roads that experience firewood gathering. Likewise, coarse woody debris is typically more abundant in these older stands, with much of the volume coming from larger pieces of downed wood (greater than 10 inches dbh). Smaller-sized snags (15-21" dbh) were also variable (0-19.8/acre; avg. 2.2/acre) within the project area, with a similar species mixture. Generally evidence of snag use for feeding and/or cavity building was observed across the project area. Coarse woody debris levels were also variable across the project area, with a range of 0-46 tons per acre with an average of 6 tons per acre (median =2.6 tons/ac; n=36). The open roads and trails in portions of the project area have facilitated some firewood gathering, which has affected snag and coarse woody debris levels in the vicinity of those open roads and access points.

Past harvesting in the cumulative-effects analysis area has reduced the availability of snags and snag recruits while increasing coarse woody debris levels; however, minimum-retention thresholds for each of these resources have been retained on DNRC-managed lands that have been harvested in the recent past. Ongoing harvesting associated with the Beaver/Swift/Skyles and Lion Mountain timber sale projects on DNRC-managed lands as well as any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue to alter snags, snag recruits, and coarse woody debris levels. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and some firewood gathering occurs in the cumulative-effects analysis area. Snags and coarse woody debris are largely absent from those portions of the cumulative effects analysis area that are non-forested, including a variety of human developments.

Fine Filter Analysis

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the Endangered Species Act of 1973, species listed as sensitive by DNRC, and species managed as big game by DFWP. **TABLE 3-10: FINE FILTER** summarizes how each species considered was 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 3-10: STATUS OF SPECIES CONSIDERED IN THE FINE FILTER ANALYSIS	
SPECIES/HABITAT	**DETERMINATION- BASIS**
THREATENED AND ENDANGERED SPECIES	
Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	The project area is roughly 7 miles outside of the Lazy Creek subunit of the Northern Continental Divide Ecosystem (NCDE) and over 1 mile outside of the 'occupied habitat' area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger 2002). Sustainable use of the project area by grizzly bears is not likely or anticipated due to the distance of the project area from the NCDE recovery zone, and relatively high density of human developments and high human use on lands surrounding the project area. These factors would likely preclude successful longer term occupancy of the project area by grizzly bears. Thus, no direct, indirect, or cumulative effects to grizzly bears would be expected to occur as a result of either alternative.
Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	The project area occurs outside of the elevations and habitat types where lynx are commonly found in Montana. No lynx habitats were identified in the project area. The project area is outside of the recently designated 'critical habitat' area as identified by the U.S. Fish and Wildlife Service (USFWS) and lynx are not expected to use the project area. Thus, no direct, indirect, or cumulative effects to Canada lynx would be expected under either alternative.
Gray Wolf (*Canis lupus*) Habitat: Ample big game populations, security from human activities	The project area is nearly 4 miles from the annual home range for the Lazy Creek wolf pack. This pack has fairly consistently used the southern portion of the Stillwater State Forest and hasn't been documented this far south in the past. No other wolf packs are known to occur in the vicinity. Thus, no direct, indirect, or cumulative effects to gray wolves would be expected to occur as a result of either alternative.
SENSITIVE SPECIES	
Bald eagle (*Haliaeetus leucocephalus*) Habitat: Late-successional forest more than 1 mile from open water	The project area is approximately 6 miles away from the nearest known bald eagle nest on Whitefish Lake. Spencer Lake is smaller than typically used by bald eagles and streams in the vicinity are largely too small to support a nesting pair of eagles, additionally the disturbance levels in the project area likely limit the usefulness of the area for nesting bald eagles. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	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 (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	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 (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	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 (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	Loons have been documented on Spencer Lake and have successfully nested in the past.
Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	Potential fisher habitats occur in the project area.

Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	Potentially suitable dry ponderosa pine and Douglas-fir stands exist in the project area.
Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
Northern bog lemming (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
Peregrine falcon (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
Pileated woodpecker (*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	Mature western larch/Douglas-fir, ponderosa pine, and mixed conifer habitats exist in the project area.
Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats would be anticipated as a result of either alternative.
BIG GAME SPECIES	
Big game winter range	White-tailed deer and moose winter range exists in the project area.
Elk security habitat	Elk security habitat (Hillis et al. 1991) in effective patches $\geq$ 250 acres does not exist within the project area thus, no direct, indirect, or cumulative effects to elk security cover would be anticipated as a result of either alternative.

Sensitive Species

When conducting forest-management activities, the *SFLMP* directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or may, if management activities result in continued adverse impacts, become listed under the *Federal Endangered Species Act*. 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 *Montana Natural Heritage Database* documented bald eagles, common loons, fisher, harlequin ducks, and gray wolves in the vicinity of the project area. As shown in ***TABLE W-1 - STATUS OF SPECIES CONSIDERED IN THE FINE-FILTER ANALYSIS FOR THIS PROPOSED PROJECT,*** the sensitive species portion of this analysis will focus on common loons, fisher, flammulated owls, and pileated woodpeckers. Additionally, northern goshawks will be included in this section as a pair of goshawks have been detected in the project area during field visits.

Common Loon

Issue: Timber harvesting and associated activities could displace adult common loons from nest sites and/or disturb nesting loons, reducing loon productivity.

Introduction

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 highly territorial, and typically just one pair nests on a small to mid-size lake. 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. Loons are rather sensitive to human disturbance and are usually associated with water bodies with lower levels of human disturbance. Human disturbance during the nesting and early chick-rearing period (mid-April thru mid-July) could lead to nest failures if the adults are disturbed and leave the nest unattended for even short periods of time.

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, there are around 60 to 65 successfully breeding pairs and approximately 200 birds in the total Montana population. Chick production in Montana has ranged between 35-52 chicks between 1999 and 2008. In general, besides direct loss of nesting and nursery habitat, loon reproduction tends to be most seriously affected by disturbance by recreationists.

Analysis Areas

Direct, indirect, and cumulative effects were analyzed within a 500-ft buffer of the shoreline of Spencer Lake. Since loons are almost exclusively dependent upon water, this area would be suitable to support at least 1 pairs of loons.

Analysis Methods

Effects were analyzed using a combination of field evaluations and aerial photograph interpretation within the project area. Factors considered include level of shoreline disturbance, relative level of recreational pressure on the lakes, and available nesting habitats.

Existing Environment

Loons have been documented on numerous occasions on Spencer Lake; in both 2009 and 2010, a chick was produced by the pair on Spencer Lake. Numerous other lakes exist in the vicinity that can be used by loons for foraging and/or nesting. Common loon nesting success on Spencer Lake is likely influenced by disturbance from highway 93, shoreline developments, and recreational users on both water and shoreline.

Fisher

Issue: 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.

Introduction

Fishers are a mid-sized forest carnivore whose prey includes small mammals such as voles, squirrels, snowshoe hares, and porcupines, as well as birds (*Powell and Zielinski 1994*). They also take advantage of carrion and seasonally available fruits and berries (*Foresman 2001*). Fishers use a variety of successional stages, but are disproportionately found in stands with dense canopies (*Powell 1982, Johnson 1984, Jones 1991, Heinemeyer and Jones 1994*) and avoid openings or young forested stands (*Buskirk and Powell 1994*). However, some use of openings may occur for short hunting forays or if sufficient overhead cover (shrubs, saplings) is present. Fishers appear to be highly selective of stands that contain resting and denning sites and tend to use areas within 150 feet of water (*Jones 1991*). Resting and denning sites are found in cavities of live trees and snags, downed logs, brush piles, mistletoe brooms, squirrel and raptor nests, and holes in the ground. Forest-management considerations for fisher involve providing for resting and denning habitats near riparian areas while maintaining travel corridors.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 whole or partial sections surrounding the project area (approximately 12,789 acres). This scale includes enough area to include overlapping home ranges of male and female fishers (*Heinemeyer and Jones 1994*).

Analysis Methods

To assess potential fisher habitat and travel cover on DNRC-managed lands in the cumulative-effects analysis area, sawtimber stands within preferred fisher covertypes (*ARM 36.11.403[60]*) below 6,000 feet in elevation with 40% or greater canopy closure were considered potential fisher habitat. Fisher habitat was further divided into upland and riparian-associated areas, depending on the proximity to streams and based on stream class. Effects were analyzed using field evaluations, GIS analysis of potential habitat, and aerial-photograph interpretation. Factors considered include the amount of suitable fisher habitats, landscape connectivity, and human access.

Existing Environment

The project area ranges from 3,000 to 3,880 feet in elevation, with approximately 0.24 mile of perennial streams. DNRC manages preferred fisher covertypes within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75% 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 23 acres are in these riparian areas in the project area along the 0.24 miles of Class 1 and 2 streams. Modeling fisher habitats using SLI data generated an estimate of 236 acres of suitable fisher foraging, resting, denning, and travel habitats (236 upland acres and 0 riparian acres) in the project area (*Heinemeyer and Jones 1994*). An additional 67 acres are in a correct cover type, but lack structural attributes necessary for use as fisher resting and denning habitats, but development of these structural attributes through time is possible as these stands mature.

Across the cumulative-effects analysis area, roughly 42.8% (5,479 acres) is in closed-canopied, mature forest condition (including 2,216 of DNRC-managed lands in the project area; 17.3% of the cumulative

effects analysis area), and an additional 29.6% (3,783 acres) are partially forested that has experienced some level of harvesting or thinning in the recent past, but is not closed-canopied. Some of these acres of closed-canopied and thinned forest likely provide suitable fisher habitats, but other portions are likely not preferred fisher covertypes. The remaining 27.6% (3,527 acres) of the cumulative effects analysis area is not forested and would not likely develop those conditions in the future. In the cumulative-effects analysis area there are roughly 393 acres within 100 feet of the 11.0 miles of Class 1 streams and 50 feet of the 5.6 miles of Class 2 streams. Of the 3,322 acres of DNRC lands within the 12,789-acre cumulative effects analysis area, there are currently 501 acres (15%) of suitable upland and riparian fisher habitats. Within the riparian habitats on DNRC-managed lands, 44.3% (12 of 27 acres) is in preferred fisher covertypes that are presently providing structural features necessary for use as fisher resting and denning habitats. Additionally, roughly 489 acres of upland fisher habitats exist on DNRC-managed lands in the cumulative-effects analysis area. Ongoing timber management in the cumulative effects analysis area is altering fisher habitats, including those activities associated with the Beaver/Swift/Skyles timber sale project. Connectivity of mature forest cover in the cumulative-effects analysis area is relatively fragmented due to residential development, agricultural clearing, the network of roads, and ongoing timber management in the vicinity; limited riparian habitats exist across the cumulative effects analysis area.

Flammulated Owls

Issue: Timber harvesting and associated activities could enhance flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.

Introduction

Flammulated owls are tiny, migratory, insectivorous forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States. These owls are secondary cavity nesters. They usually nest in cavities excavated by pileated woodpeckers or northern flickers in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Without disturbance, Douglas-fir encroach upon ponderosa pine stands, increasing stand density and resulting in decreased habitat quality for flammulated owls.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 whole or partial sections surrounding the project area (approximately 12,789 acres). This scale includes enough area to support many pairs of flammulated owls (*McCallum 1984*).

Analysis Methods

To assess potential flammulated owl habitat on the project area, SLI data were used to identify stands in preferred habitat types (ARM 36.11.403(28)). Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats. Factors considered within the cumulative effects analysis area included

the degree of harvesting and the amount of continuous forest within the cumulative effects analysis area.

Existing Environment

The stands in the project area are largely ponderosa pine and are appropriately ponderosa pine. Within the project area there are approximately 825 acres of flammulated owl habitats. During field visits, 0-6.6 (average 0.55) large snags >21" dbh per acre (see WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS) were observed in the project area.

Presently, at least 27.6% of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, and agriculture and thus is not likely providing flammulated owl habitats. Existing and regenerating forested stands are largely dominated by western larch/Douglas-fir, mixed conifers, and ponderosa pine. Some of the stands harvested in the recent past may be suitable foraging habitats for flammulated owls. Ongoing harvesting associated with the Lion Mountain Timber Sale Project on DNRC-managed lands would continue altering flammulated owl habitats; no effects to flammulated owls were anticipated with the Beaver/Swift/Skyles Timber Sale Project occurring on DNRC-managed lands in the cumulative effects analysis area. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering flammulated owl habitats, although these habitats are somewhat scattered throughout the cumulative effects analysis area. Collectively, potential flammulated owl habitats in the cumulative effects analysis area are somewhat limited.

Pileated Woodpecker

Issue: 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.

Introduction

Pileated woodpeckers play an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and quaking aspen, usually 20 inches dbh and larger. Pileated woodpeckers primarily eat carpenter ants, which inhabit large downed logs, stumps, and snags. *Aney and McClelland (1985)* described pileated nesting habitat as..."stands of 50 to 100 contiguous acres, generally below 5,000 feet in elevation with basal areas of 100 to 125 square feet per acre and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and downed wood for feeding, closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*).

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 18 whole or partial sections surrounding the project area (approximately 12,789 acres). This scale includes enough area to support many pairs of pileated woodpeckers (*Bull and Jackson 1995*).

Analysis Methods

To assess potential pileated woodpecker nesting habitats on DNRC-managed lands in the cumulative-effects analysis area, SLI data were used to identify sawtimber stands with more than 100 square feet basal area per acre, older than 100 years, had greater than 40-% canopy closure, and occurring below 5,000 feet in elevation. Foraging habitats are areas that do not meet the definition above, but include the remaining sawtimber stands below 5,000 feet in elevation with greater than 40-percent canopy cover. Direct and indirect effects, as well as cumulative effects, were analyzed using a combination of field evaluation, aerial-photograph interpretation, and these mapped potential habitats. Factors considered included the amount of potential habitat, degree of harvesting, and amount of continuous forested habitat.

Existing Environment

In the project area, potential pileated woodpecker nesting habitat exists on approximately 1,498 acres that are dominated by western larch/Douglas-fir and mixed conifers. Additionally, 671 acres of sawtimber stands dominated by western larch/Douglas-fir and mixed conifers exist in the project area that may be lower-quality foraging stands. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers.

Removal of large western larch by past timber-harvesting activity has reduced the quality of habitat for pileated woodpeckers. However, in the recent past, stands on DNRC lands have been managed for mature western larch, ponderosa pine, and western white pine, snags, and snag-recruit trees, which benefit pileated woodpeckers in the long-term. Large live and dead trees are less common than would occur naturally due to past timber-harvesting activities in the project area. During field visits, numerous feeding sites and 0-6.6 (average 0.55) large snags (>21 in dbh) per acre were observed; these provide foraging and nesting opportunities for pileated woodpeckers. Additionally, several medium-sized (15-21 in dbh) snags (0-19.8; avg. 2.2) per acre were observed, which are likely suitable for pileated foraging. Pileated woodpeckers and associated large cavities were detected in the project area.

Presently, at least 27.6% of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, and agriculture and thus is not likely providing pileated woodpecker habitats; an additional 29.6% of the cumulative effects analysis area has experienced some level of timber management in the recent past, likely reducing effectiveness for pileated woodpeckers. Ongoing harvesting associated with the Beaver/Swift/Skyles and Lion Mountain timber sale projects on DNRC-managed lands would continue reducing pileated woodpecker habitats. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering pileated woodpecker habitats. Collectively, potential pileated woodpecker habitats are somewhat limited in the cumulative effects analysis area.

Northern Goshawk

Issue: Timber harvesting and associated activities could alter northern goshawk habitats and/or displace nesting goshawks from active nests, resulting in increased mortality to goshawk chicks.

Introduction

The northern goshawk (hereafter goshawk) is a forest habitat generalist with specific nesting habitat requirements (*Reynolds et al. 1992, Squires and Reynolds 1997, McGrath et al. 2003*). The goshawk forages on a wide range of species, with the most predominant prey being snowshoe hares, Columbian ground squirrels, red squirrels, blue and ruffed grouse, northern flickers, American robins, gray jays, and Clark's nutcrackers (*Reynolds et al. 1992, Cutler et al. 1996, Boal and Mannan 1996, Watson et al. 1998, Squires 2000, Clough 2000*). Thus, given the diverse array of prey species, goshawks forage from a diverse array of habitats. However, *Beier and Drennan (1997*) found goshawks to forage in areas based primarily on habitat characteristics rather than prey abundance. *Beier and Drennan (1997)* found goshawks to forage selectively in forests with a high density of large trees, greater canopy closure, high basal area, and relatively open understories. *Reynolds et al. (1992)* identified 3 increasingly large spatial scales at which northern goshawks appear to utilize their nesting home range, including: 1) nest area; 2) post-fledging family area; and 3) foraging area. Goshawks will nest in ponderosa pine, Douglas-fir, and aspen stands on north-facing slopes that are typically in the stem exclusion (pole) or understory reinitiation (mature) stages of stand development, with higher canopy closure ($\geq$ 50%) and basal area than available in the surrounding landscape (*Reynolds et al. 1992, Squires and Reynolds 1997, Clough 2000, Finn et al. 2002, McGrath et al. 2003*). Goshawk post-fledging family areas are generally 300-600 acres and provide sufficient prey to allow young hawks to develop hunting skills while affording the young cover from predators. Meanwhile foraging areas provide adults an area to capture sufficient prey to support themselves and their young. In general, goshawk home ranges vary in size from 1,200 to 12,000 acres depending on forest type, prey availability, and intraspecific competition (*Squires and Reynolds 1997*).

Analysis Areas

Direct and indirect effects were analyzed on the portion of the project area within 8,680 feet of the approximate location of the potential nest area. Cumulative effects were analyzed on a 5,434-acre (8,680 foot radius) circle centered on the approximate location of the potential nest. This scale includes enough area to support a pair of goshawks while approximating the home range size for northern goshawks (*Reynolds et al. 1992*).

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of stand-initiation stage of stand development, amount of continuously forested habitats for possible nesting areas, and availability of foraging habitats.

Existing Environment

A pair of goshawks with a possible juvenile has been observed in the project area in the eastern portion of section 4, T30N R22W in the recent past during field visits, but no nest site was identified. Continued

monitoring is planned to determine if a nest is in the vicinity. For the remaining portion of the analysis, it will be presumed that a nest exists in the approximate location where the pair was detected in 2010. Roughly 1,801 acres of the project area exist within 8,680 feet of the potential nest site. Within this area, roughly 1,730 acres of Douglas-fir- and western larch-dominated stands could be potentially suitable nesting habitats (crown cover ≥50%, pole or mature forest) for northern goshawks. The remaining 71 acres are either poorly stocked or are younger than typically used by nesting northern goshawks, but could serve to provide a diversity of stand structures and seral stages used for foraging.

Of the 5,434-acre cumulative effects analysis area, roughly 2,327 acres of DNRC-managed lands, approximately 6 acres of FWP-owned lands, and the remaining 3,101 acres is privately managed. Within the analysis area, at least 2,628 acres exists as potential goshawk nesting habitat (crown cover ≥50%, pole or mature forest), and additionally some portion of the 2,184 acres of thinned forest in the analysis area could also be suitable nesting or foraging habitats. Approximately 1,730 the 2,628 acres of potential nesting habitats occur in the project area. Previous land management activities by adjacent private land owners have reduced the capacity of the analysis area for potential nest sites. Ongoing harvesting associated with the Beaver/Swift/Skyles and Lion Mountain timber sale projects on DNRC-managed lands would continue reducing potential northern goshawk nesting and foraging habitats. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering goshawk habitats. Collectively, moderate amounts of potential northern goshawk habitats exist in the cumulative effects analysis area.

Big Game Winter Range

Issue: Timber harvesting and associated activities could remove thermal cover on big game winter range, which could reduce carrying capacity of the winter range.

Introduction

Winter ranges enable big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support large numbers of big game, which are widely distributed during the remainder of the year. These winter ranges have adequate midstory and overstory to reduce wind velocity and intercept snow. The effect is that temperatures are moderated and snow depths are lowered, which enables big game movement and access to forage with less energy expenditure than in areas with deeper snow and colder temperatures. Snow depths differentially affect big game; white-tailed deer are most affected, followed by mule deer, elk, and then moose.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the contiguous 117,901-acre white-tailed deer winter range that includes portions of the project area. This scale includes enough area to support hundreds of white-tailed deer.

Analysis Methods

Effects were evaluated using a combination of field evaluation, aerial photograph interpretation, and GIS analysis. Factors considered within this cumulative effects analysis area include acres of winter range harvested and level of human disturbance and development.

Existing Environment

Montana Department of Fish, Wildlife, and Parks identified white-tailed deer (2,458 acres), elk (1,280 acres), and moose (2,458 acres) winter ranges in the project area. These winter ranges are part of larger white-tailed deer (3,798,066 acres), elk (7,042 acres and 21,681 acres) and moose (2,511,471 acres) winter ranges, respectively. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Mature Douglas-fir/western larch, ponderosa pine, and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Proximity to human developments, extensive recreational use, and the presence of open roads has likely reduced capacity of the winter range in the project area. Evidence of use by deer and elk was noted throughout the project area during field visits.

Presently, a variety of stands across the winter range in the cumulative effects analysis area is providing thermal cover and snow intercept for big game. In the recent past, harvesting on all ownerships within this area has reduced thermal cover and snow intercept. Human disturbance within the winter range is associated with development of the Flathead Valley in the last 100+ years, including residential development, agricultural clearing, numerous highways and secondary roads, and railroads. Other disturbance to the winter range occurs from recreational snowmobile use, other winter recreation, and commercial timber harvesting, all of which likely influences wintering big game populations and their habitats.

WILDLIFE EFFECTS

Mature Forested Habitats and Connectivity

No Action Alternative- Direct and Indirect Effects

Forest conditions would continue to age, and denser stands of shade-tolerant tree species with high amounts of canopy cover would gradually develop. Largely, no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated. No changes in wildlife use would be expected; wildlife favoring dense stands of shade-tolerant tree species would benefit, while those requiring conditions likely found under natural disturbance regimes would continue to be underrepresented. Habitat for forested interior species and old-stand-associated species, such as American marten, northern goshawk, and pileated woodpecker, would likely improve with this alternative; however, western larch, western white pine, and ponderosa pine, the preferred snag species, could decline in abundance over time. Thus, no direct or indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) no changes to existing stands would occur; 2) no appreciable changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

No Action Alternative- Cumulative Effects

Habitats in the cumulative-effects analysis area are a mosaic of habitat types and age classes. Past harvesting has reduced the amount of mature, forested habitats; however, continued successional

advances in the cumulative-effects analysis area is advancing stands towards mature forests. This alternative would continue to contribute to the mature forested stands in the cumulative-effects analysis area. Losses of individuals and pockets of trees would not likely alter the overall age or landscape connectivity. Ongoing harvesting activities across all ownerships would continue reducing forested habitats and/or altering connectivity. Under this alternative, continued use of the analysis area by species favoring dense stands of shade-tolerant tree species and those species requiring larger areas of mature forests would be expected. Habitat for forested-interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would likely persist. Thus, no cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area since: 1) no changes to existing stands would occur; 2) no further changes to forest age, the distribution of dense forested cover, or landscape connectivity would be anticipated; and 3) no changes to wildlife use would be expected.

Action Alternative- Direct and Indirect Effects

Approximately 1,650 acres of western larch/Douglas-fir and mixed-conifer stands would be harvested, including roughly 1,362 acres of mature stands with a closed canopy. Activities would reduce habitats for those species relying on mature, closed-canopy forested habitats across all 68 acres of the mature, forested habitats that would receive a regeneration-type treatment as well as a relatively small portion of the 586 acres of mature forested stands that would receive a commercial thinning/group select-type treatment. Approximately 708 acres of mature, forested habitats would receive a commercial-thin type treatment as well as most of the 586 acres mentioned previously that would receive a commercially-thin/group select treatment; these modifications would also reduce habitat for species needing a mature, closed-canopied stand, however, these stands could provide lower-quality habitats for those species requiring mature, forested conditions more quickly than some stands receiving regeneration-type treatments due to the anticipated tree retention levels. Overall, the resultant changes in stand age and density would reduce habitats for species associated with older stands, such as American marten and pileated woodpecker, which benefited from the increasing stand ages and densities caused, in part, by modern fire suppression. Minor changes to landscape connectivity could alter animal movements, but the combination of commercial thin-type treatments across most of the proposed units, retention along Spencer ridge, and a host of other retention pockets in the project area would continue to facilitate movements by numerous resident wildlife species. 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. Thus, minor adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) harvesting would revert succession on a portion of the project area and open stands up on much of the project area, which would reduce stand age and the amount of forested cover in the project area; 2) minor changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

Action Alternative- Cumulative Effects

Diverse ownership patterns and management regimes within the cumulative effects analysis area have created a mosaic of habitat conditions in the cumulative effects analysis area. Past harvesting has reduced mature forest stands within the cumulative effects analysis area; reductions and modifications in mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities and ongoing activities. The proposed thinning and harvesting would reduce the amount of the cumulative effects analysis area that appears to be in closed-canopied, mature forest conditions from 5,479 acres (42.8%) by roughly 68 acres to 5,411 acres (42.3%) and would increase the amount that has been harvested or thinned in the recent past by 1,651 acres from 29.6% to 42.5% of the cumulative effects analysis area. Some of the stands on adjacent parcels would continue maturing and start moving into the mature, forested class in the future. Minor changes to landscape connectivity could alter animal movements, but the combination of commercial thin-type treatments across most of the proposed units, retention along Spencer ridge, and a host of other retention pockets in the project area could continue to facilitate movements by numerous resident wildlife species. Wildlife species favoring dense stands and those species requiring larger areas of mature forests would see a reduction in available habitats within the cumulative effects analysis area while species favoring more open stands would see a slight increase in available habitats. Thus, since: 1) harvesting would alter mature stands, changing the amount of mature, densely stocked stands in the cumulative effects analysis area, 2) minor changes to landscape connectivity would occur, 3) forested interior habitats would be reduced, and 4) some changes to wildlife use would be expected, minor adverse cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative effects analysis area.

Snags and Coarse Woody Debris

No Action Alternative- Direct and Indirect Effects

No direct changes in the deadwood resources would be expected. Existing 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 could decline as these species are replaced by increasing numbers of shade-tolerant species. Shade-intolerant species tend to provide important habitats, such as nesting structures and foraging habitats, for cavity-nesting birds. Existing coarse woody debris would persist without other disturbances influencing its distribution and quality. Continued decay and decline in existing snags and trees would continue to contribute to the coarse woody debris in the project area. Thus, negligible direct and indirect effects would be anticipated to snags, and coarse woody debris would be expected to affect wildlife species requiring these habitat attributes since: 1) no harvesting would occur that would alter present or future snag or coarse woody debris concentrations, and 2) no changes to human access for firewood gathering would occur.

No Action Alternative- Cumulative Effects

Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during some of the past harvesting across the cumulative-effects analysis area. Snags and snag recruits are being retained with the ongoing DNRC-projects. Firewood

and other forest-product gathering have reduced deadwood resources in the vicinity of the open roads. Wildlife species in the cumulative-effects analysis area that rely on snags and coarse woody debris would be expected to persist. Thus, no cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur, 2) changes in the numbers of snags would be negligible, and 3) no change in the level of firewood gathering would be expected.

Action Alternative- Direct and Indirect Effects

Present and future snags would be reduced due to timber harvesting on 1,597 acres in the project area while coarse woody debris would likely be increased across much of the proposed units. Portions of the project area adjacent to open roads or in stands that lack larger snags would not see appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Prescriptions call for a minimum of 1-2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees would be left if sufficient large snags are not present), and 10 to 15 tons of coarse woody debris per acre would be planned for retention in the proposed harvest areas. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with *ARM 36.11.411*. Future snag quality in the harvested areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species that tend to provide important habitats, such as long-lasting nesting structures and foraging habitats, for cavity nesting birds. Given the amounts, range of variability in sizes, and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. No changes in motorized human access would occur and, therefore, no changes to the potential risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags and snag recruitment trees, while increasing coarse woody debris, and 2) no changes to human access for firewood gathering would occur.

Action Alternative- Cumulative Effects

Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Across portions of the cumulative-effects analysis area, snags and coarse woody debris are common, and ongoing as well as past harvesting activities on DNRC-managed lands have placed an emphasis on the 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, ongoing harvesting, as well as any ongoing firewood gathering. However, the project requirements to retain a minimum of 1-2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 1-2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), and 10 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Due to a lack of snags, the risk of firewood

gathering, or higher removal requirements for fire protection purposes, some areas would not meet these requirements. No change in human access would be anticipated; thus, no changes to the potential loss of snags and coarse woody debris to firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative-effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers in proposed units following treatment. Thus, minor adverse effects to wildlife species requiring snags and coarse woody debris would be anticipated in the cumulative-effects analysis area since: 1) a slight, but cumulative amount of the cumulative-effects analysis area would be harvested reducing snags and snag-recruit trees while increasing coarse woody debris levels, 2) no changes in access for the general public and associated firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term.

Sensitive Species

Common Loons

No Action Alternative- Direct and Indirect Effects

No direct or indirect effects to loons would be expected. Human disturbance along the shoreline would continue at similar levels. No changes in human access or recreational use would occur. No changes in available nesting habitats would be anticipated. Thus, no direct or indirect effects to common loons would be anticipated in the project area since: 1) no changes in shoreline disturbance would be anticipated; 2) levels of human recreational use of available loon habitats would not change; and 3) no changes to available nesting habitats.

No Action Alternative- Cumulative Effects

No other DNRC projects are occurring or are proposed within the cumulative effects analysis area. No changes to lake access or level of recreational use would occur. Shoreline disturbance would not change, and available nesting habitats would persist. Thus, no further cumulative effects to common loons in the cumulative effects analysis area would be anticipated since: 1) no further changes in shoreline disturbance would be anticipated; 2) levels of human recreational use of available loon habitats would not change; and 3) no changes to available nesting habitats would be anticipated.

Action Alternative- Direct and Indirect Effects

Proposed harvest operations would not disturb common loons since activities would occur in the non-nesting period. Some harvesting of the uplands within 500 feet of Spencer Lake could increase sight distances and the associated potential for disturbance to loons on Spencer Lake. DNRC is committed to limit construction of permanent roads or structures and limit mechanized activity within 500-feet radius of nest sites between April 15 and July 15 (ARM 36.11.441). Proposed harvesting would be more than 500 feet from the most recently used nest site and future nesting would be monitored to determine f the pair moves their nest closer to the proposed units; no permanent roads or developments would occur within 500 feet of any known nest sites. Limited harvesting could occur within 100 feet of the lake

for a very short length of shoreline, otherwise harvesting would be more than 100 feet from the shoreline. Prescribed tree retention levels would not likely affect potential nesting habitats on these lakes as retention levels would be fairly high and would be conducted in a manner to minimize the potential for sediment delivery to the lake. Should the pair establish a nest closer to the proposed units or proposed permanent road location, additional mitigation measures would be developed prior to harvesting to minimize effects to the nesting loons. No appreciable changes in human access to the lake would be anticipated. Thus, negligible direct and indirect effects to common loons in the project area would be anticipated since: 1) no appreciable changes in shoreline disturbance would be anticipated; 2) levels of human recreational use of available loon habitats would not appreciably change; and 3) no changes to available nesting habitats.

Action Alternative- Cumulative Effects

No other DNRC projects are occurring or are proposed within the cumulative effects analysis area. No additional changes to human access or level of recreational use would occur. Shoreline disturbance would not change, and available nesting habitats would persist. Thus, negligible cumulative effects to common loons in the cumulative effects analysis area would be anticipated since: 1) no appreciable changes in shoreline disturbance would be anticipated; 2) levels of human recreational use of available loon habitats would not change; and 3) no changes to available nesting habitats would be anticipated.

Fisher

No Action Alternative- Direct and Indirect Effects

No effects to fishers would be expected under this alternative. Minimal changes to the stands providing fisher habitats would be expected. Habitats that are conducive to fisher denning and travel may improve in time due to increases in tree growth and canopy closure; however, foraging opportunities may decline in future decades if disturbance is minimized, since habitats such as edges and younger age-class stands that support a variety of prey species would decline in abundance on the landscape. Human disturbance and potential trapping mortality would expect to remain similar to current levels. No changes in landscape connectivity would occur. Thus, no direct and indirect effects would affect fishers in the project area since: 1) no changes to existing habitats would be anticipated; 2) landscape connectivity would not be altered; 3) no appreciable changes to snags, snag recruits, and coarse woody debris levels would be anticipated; and 4) no changes to human access or the potential for trapping mortality would be anticipated.

No Action Alternative- Cumulative Effects

Existing fisher denning and resting habitats would be retained since no harvesting would occur. Some suitable fisher foraging, denning, and resting habitats occur across the cumulative-effects analysis area and no appreciable changes to those habitats would occur. Connectivity of mature forest cover in the cumulative-effects analysis area is relatively fragmented due to residential development, agricultural clearing, the network of roads, and ongoing timber management in the vicinity; limited riparian habitats exist across the cumulative effects analysis area. Road access in the cumulative-effects analysis areas would not change; therefore, fisher vulnerability to trapping would remain unchanged. Fisher habitats could be altered with the ongoing harvesting outside the project area. Thus, no further cumulative

effects to fishers would be anticipated in the cumulative-effects analysis area since: 1) no changes to existing habitats on DNRC ownership would occur, 2) landscape connectivity afforded by the stands on DNRC ownership would not appreciably change, 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected, and 4) no changes to human access or the potential for trapping mortality would be anticipated.

Action Alternative- Direct and Indirect Effects

No riparian habitats in the project area would be included in proposed harvest areas. Additionally, approximately 126 of the 236 acres (53.4%) of upland fisher habitats in the project area would receive treatments, with most of those acres receiving a commercial thin treatment, which could facilitate some continued use by fishers should they be using the existing habitat. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Minor reductions in connectivity would be expected in this landscape where connectivity has been reduced with past harvesting, agricultural clearing, residential development, and road construction (*see WILDLIFE ANALYSIS-MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY*), but activities would largely avoid riparian areas where connectivity frequently is maintained. Thus, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area since: 1) harvesting would largely avoid riparian areas; 2) harvesting would reduce upland fisher habitats; 3) minor reductions in landscape connectivity would occur, but those areas associated with riparian areas would largely remain unaffected; 4) harvesting would reduce snag and coarse woody debris levels, however, some of these resources would be retained; and 5) no appreciable changes in motorized human access levels would be anticipated.

Action Alternative- Cumulative Effects

No riparian habitats would be altered in the cumulative effects analysis area. Overall, the amount of the preferred fisher covertypes meeting structural requirements for fishers in the cumulative effects analysis area would remain unchanged at 44.3% and would continue to be below the 75% threshold established in ARM 36.11.440(1)(b)(i). Roughly 126 acres of the 489 acres (25.8%) of potential upland fisher foraging and travel habitats would be harvested; upland foraging and travel habitats would continue to be present in the cumulative effects analysis area. These reductions would be additive to the losses associated with past timber harvesting in the cumulative-effects analysis area. Connectivity in the vicinity has been compromised and no appreciable changes to landscape connectivity would be anticipated due to the Habitats present, the combination of commercial thin-type treatments across most of the proposed units, retention of unharvested areas along Spencer ridge, and a host of other retention pockets in the project area. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, minor adverse cumulative effects would be anticipated that would affect fisher in the cumulative-effects analysis area since: 1) harvesting would remove upland fisher habitats; 2) no changes to riparian habitats or preferred covertypes in the cumulative effects analysis area would be anticipated; 3) minor reductions in landscape connectivity in the cumulative effects analysis area would be anticipated; 4) harvesting in a relatively small portion of the cumulative effects analysis area would partially reduce snags and snag recruits, while increasing the

coarse woody debris levels, largely in the smaller-sized pieces; and 5) no changes to motorized human access would occur.

Flammulated Owls

No Action Alternative- Direct and Indirect Effects

Existing flammulated nesting habitats within the project area would continue maturing; likewise younger stands from the past harvesting would also mature and becoming denser, which would reduce the quality of this area for foraging. In the long term, stands once dominated by ponderosa pine could continue to be converted to Douglas-fir stands through succession, become densely stocked, and exist at high risk to insects, disease and stand-replacement fire. Therefore, habitat sustainability and quality for flammulated owls would continue to decline. Thus, negligible adverse direct and indirect effects to flammulated owls would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession would leading to denser stands in the project area.

No Action Alternative- Cumulative Effects

Flammulated owl habitats would persist in the state parcel. Portions of the cumulative effects analysis area have been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir and ponderosa pine encroachment, however retention of large ponderosa pine was not necessarily a consideration in some of these harvest units; thereby minimizing the benefits to flammulated owls. Ongoing harvesting on DNRC-managed lands in the cumulative effects analysis area would continue altering flammulated owl habitats. No further harvesting on DNRC-managed lands would be anticipated and areas exhibiting mature forested conditions would be expected to persist and could provide flammulated owl nesting habitats. Other portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats are not expected to change any time in the future. Collectively, stands would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, negligible adverse cumulative effects to flammulated owls in the cumulative effects analysis areas would be anticipated since: 1) no harvesting would occur; 2) no changes to potential nesting habitats would be anticipated; and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession would lead to denser stands that would be less suitable for flammulated owls.

Action Alternative- Direct and Indirect Effects

Flammulated owls are tolerant of human disturbance (*McCallum 1994*), however the elevated disturbance levels associated with harvesting could negatively affect flammulated owls should harvesting occur during the nesting period, but most of the proposed activities would occur outside of the nesting period. Proposed timber harvest across 581 acres of flammulated owl habitats would open the canopy while favoring ponderosa pine and some Douglas-fir. Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 1-2 snags per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (10-15 tons per acre), numerous leave trees, and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size

class) would be retained in the proposed units. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (see *WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS*), which further affects flammulated owls now and into the future. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. Thus, minor positive direct and indirect effects to flammulated owls would be anticipated since: 1) harvesting would open denser stands up; 2) elements of forest structure (snags, snag recruits, and CWD) used for foraging and nesting by flammulated owl would be retained; 3) prescriptions could lead to more open stands with scattered mature ponderosa pine; and 4) prescriptions would promote future development of ponderosa pine within the some of the proposed units.

Action Alternative- Cumulative Effects

Proposed harvesting would increase the amount of the cumulative effects analysis area that has been recently harvested by 12.9%, which would add to the amount of foraging habitats available, but possibly at the expense of nesting habitats. Conversely, the proposed reduction in stand density across numerous stands including several stands dominated by ponderosa pine would reduce potential nesting habitats within the cumulative effects analysis area. The portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats would not be expected to change any time in the future. In general, stands across the cumulative effects analysis area would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, negligible beneficial cumulative effects would be anticipated to flammulated owls in the cumulative effects analysis areas since: 1) harvesting would reduce flammulated owl nesting habitats while potentially increasing foraging habitats; and 2) a slight amount of the cumulative effects analysis area would be more representative of historic conditions.

Pileated Woodpecker

No Action Alternative- Direct and Indirect Effects

No disturbance of pileated woodpeckers would occur. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continual conversion to shade-tolerant species would reduce the quality of habitat for pileated woodpeckers over time. Therefore, a reduction in suitable nesting trees would be likely over time, which could lead to decreased reproduction in the project area. Thus, negligible adverse indirect effects to pileated woodpeckers in the project area would be expected until some other disturbance reverses stand succession since: 1) no further harvesting would occur; 2) no changes in the amount of continuously forested habitats would be anticipated; 3) no appreciable changes to existing pileated woodpecker habitats would be anticipated; and 4) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would be anticipated.

No Action Alternative- Cumulative Effects

No disturbance of pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continued use of the

cumulative-effects analysis area by pileated woodpeckers would be expected. Ongoing harvesting across all ownerships would continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes. Thus, negligible adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Action Alternative- Direct and Indirect Effects

Pileated woodpeckers tend to be tolerant of human activities (*Bull and Jackson 1995*), but might be temporarily displaced by the proposed harvesting; however the proposed activities would largely occur outside of the nesting season. Commercial harvesting on 1,650 acres would partially reduce continuously forested habitats for pileated woodpeckers. Roughly 1,102 acres of potential nesting habitat would be altered with the majority of those acres (1,082 acres; 98%) proposed to receive a commercial thin type treatment which open up stands but those stands would likely still be suitable for foraging and possibly nesting. The remaining 20 acres would likely be too open for pileated woodpecker use, which would reduce potential pileated nesting and foraging habitats for 30 to 100 years, depending on the density of trees retained. Additionally, another 548 acres of the 671 acres of lower quality foraging habitats would be modified, with very few of those acres (52 acres) being too open to be considered pileated woodpecker habitats. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 1-2 snags greater than 21 inches dbh per acre where they exist), coarse woody debris (10 to 15 tons per acre), numerous leave trees, and snag recruits (a minimum of 1-2 trees per acre greater than 21 inch dbh where they exist) would be retained in the proposed harvest areas. Some areas either lack sufficient large snags or are close to open roads where snag loss could continue due to legal and illegal firewood and forest-product gathering. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*), pileated woodpecker densities in the project area would be expected to be reduced on roughly 1,650 acres proposed to receive treatments. The silvicultural prescriptions would retain healthy western larch, ponderosa pine, and Douglas-fir while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, minor adverse direct and indirect effects would be anticipated to pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous forested habitats available; 2) potential nesting and foraging habitats would be reduced; 3) snags and snag recruits would be removed; however, mitigation measures to retain some of each of these per acre in most of the harvest areas would be included, and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

Action Alternative- Cumulative Effects

Reductions in pileated woodpecker habitat would be expected. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. In the project area, the

canopy on at least 72 acres proposed for regeneration-type treatments would likely be too open for appreciable pileated woodpecker use, including approximately 20 acres of potential pileated woodpecker habitats. Use of the remaining 1,578 acres by pileated woodpeckers would likely be reduced due to increasing openness of the stands. Stands recently harvested in the cumulative-effects analysis area reduced pileated woodpecker habitats as well. Ongoing harvesting would continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes. The loss of pileated woodpecker habitats under this alternative would be additive to habitat losses associated with past harvesting; continued use of the cumulative-effects analysis area would be expected. Additionally, continued maturation of stands across the cumulative-effects analysis area is increasing suitable pileated woodpecker habitats. Thus, minor adverse cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative-effects analysis area since: 1) harvesting would reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but forested habitats would persist; 2) potential nesting and foraging habitats would be reduced, but habitats would persist in the cumulative-effects analysis area; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in the majority of the harvest areas; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

Northern Goshawk

No Action Alternative- Direct and Indirect Effects

No disturbance of northern goshawks would occur. Forest succession and natural disturbance agents would continue to bring about changes in existing stands. Trees would continue to grow and mature, thus continuing to provide potential nesting and foraging habitats; no changes in the amounts of the project area in the stand-initiation phase of stand development would occur. Potential nest areas would improve with continued maturation in the stands in the project area. Goshawk foraging habitats consist of stands with large trees and relatively open understories and small openings and patches of dense mid-aged forests with high canopy cover. Large trees provide goshawks with hunting perches and the openness affords goshawks the opportunity to detect and capture prey species. Habitats for some prey species would improve with the increases in tree size, canopy closure, and availability of coarse woody debris, but habitats for those prey species that rely on small openings would gradually be reduced with advances in succession. Thus, no direct and negligible indirect adverse effects to northern goshawks in the project area would be anticipated since: 1) no further harvesting would occur that would increase the amount of the project area in the stand-initiation (seedling/sapling) stage of stand development; 2) no changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory would provide habitats for a host of goshawk prey species, but those prey species that rely on small openings and would gradually be reduced in the project area with continued advances in succession.

No Action Alternative- Cumulative Effects

No further disturbance to northern goshawks would occur. Ongoing harvesting on DNRC-managed lands would not likely disturb the nesting pair given the distance from the potential nest site, the other forms of disturbance in the vicinity, and the habitats present. Nest area and post-fledging family area attributes provided by the habitats in the project area would persist. No further changes in the amounts of the cumulative effects analysis area in the stand-initiation phase of stand development would occur beyond what is ongoing, including those activities on DNRC-managed lands. Potential nest areas would improve with continued maturation in the stands in the project area. Habitats for some prey species would improve with the increases in tree size and canopy closure in the project area and across much of the analysis area, but habitats for those prey species that rely on small openings would gradually be reduced with advances in succession, however additional openings are being created with the ongoing harvesting along with deposition of coarse woody debris. Thus, no direct and indirect adverse effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) no further harvesting would occur that would increase the amount of the cumulative effects analysis area in the stand-initiation (seedling/sapling) stage of stand development; 2) no further changes in the amount of continuously forested habitats or existing northern goshawk nesting habitats would be anticipated; and 3) availability of mature stands with large trees, snags, coarse woody debris, high canopy closure, and a relatively open understory as well as a diversity of stand structures could provide an array of potential prey species.

Action Alternative- Direct and Indirect Effects

No disturbance of northern goshawks would occur given the majority of the activities would occur outside of the nesting season (May 1 – August 31) for northern goshawks. Of the 1,650 acres of commercial harvesting proposed, roughly 1,111 acres would occur within 8,680 feet of the potential nest site. Proposed shelterwood treatments would reduce nesting habitats on approximately 72 acres while the commercial thinning and group select-type treatments would likely reduce canopy closure and basal area on most of the potential nesting habitats to a point where they would no longer be suitable nesting habitats. The resultant stands would be more open, contain fewer large trees, fewer snags, more coarse woody debris, fewer areas of dense mid-aged forest, but would perpetuate some small openings for additional prey species; overall a reduction in prey availability would be anticipated, but use by goshawks for foraging would likely persist. An increase in potential nest predation would be possible with the increasingly openness in the canopy surrounding the potential nest. Thus, moderate adverse direct and indirect effects to northern goshawks in the project area would be anticipated since: 1) limited amounts of the area would be transformed to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Action Alternative- Cumulative Effects

Reductions in northern goshawk nesting and foraging habitats would be anticipated in the project area. Recently harvested stands in the cumulative-effects analysis area reduced goshawk nesting habitats while altering foraging habitats. Ongoing harvesting would continue to alter potential goshawk habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes and increasing the amount of stand-initiation stage of stand development within the cumulative effects analysis area. The removal of nesting habitats on 72 acres coupled with the reduction in quality on an additional 1,039 acres would reduce the availability of nesting habitats in the cumulative effects analysis area. Overall, modifications to nesting and foraging habitats under this alternative would be additive to habitat losses associated with past harvesting; continued use of the cumulative-effects analysis area would be expected. Additionally, continued maturation of stands across the cumulative-effects analysis area is increasing suitable goshawk nesting habitats while providing additional foraging areas. Thus, moderate adverse cumulative effects to northern goshawks in the cumulative effects analysis area would be anticipated since: 1) a limited amount of the cumulative effects analysis area would be converted to the stand-initiation (seedling/sapling) stage of stand development; 2) reductions in the amount of continuously forested habitats and potentially suitable nesting habitats would be anticipated; and 3) goshawk prey availability would be altered with the proposed habitat modifications, including reducing habitats for those prey relying on mature trees, large snags, small patches of dense mid-aged stands, and closed canopied stands, while increasing potential habitat for those prey species relying on small openings and coarse woody debris.

Big Game Winter Range

No Action Alternative- Direct and Indirect Effects

No direct effects to big game winter range would be anticipated. No additional disturbance or displacement would be anticipated within the project area. 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 many of these stands. No appreciable changes to winter carrying capacity would be anticipated. Thus, no direct or indirect effects to white-tailed deer winter range in the project area would be anticipated since: 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated; 2) the amount of mature forested habitats on the winter range would not change appreciably; and 3) the levels of human disturbance would remain similar.

No Action Alternative- Cumulative Effects

No changes would be anticipated in thermal cover and snow intercept. Stands that are providing thermal cover would be expected to continue providing this resource under this alternative. Continued winter use of the larger winter range would be expected. Harvesting on private lands as well as ongoing harvesting on DNRC-managed lands could continue to displace wintering big game and reduce available of winter range habitats. Those portions of the winter range where timber harvesting occurred in the

last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Those areas that have been converted to agriculture or other human developments would not be expected to provide thermal cover or snow intercept in the future, but may provide some forage resources to wintering big game. Human disturbance levels would be anticipated to continue at similar levels. Thus, no cumulative effects to big game winter range in the project area would be anticipated since: 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated; 2) the amount of mature forested habitats on the winter range would not change appreciably; and 3) the levels of human disturbance would remain similar.

Action Alternative- Direct and Indirect Effects

Some displacement would be expected as a result of the proposed harvesting operations, particularly since most of the activities would be occurring during the winter period; all 1,650 acres in proposed units would occur on white-tailed deer winter range and roughly 808 acres (33%) of the white-tailed deer winter range in the project area would not be altered. Winter logging can benefit big game by providing felled tree tops, limbs, and slash piles that could concentrate feeding deer during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner may partially offset some of the effects associated with temporary displacement caused by logging disturbance. This short-term benefit would not be expected to offset effects associated with removal of thermal cover over the long-term (several decades). The prescriptions on much of these acres of the winter range would create more open stands that would still likely provide some limited thermal cover and snow intercept; roughly 72 acres of white-tailed deer winter range would receive regeneration-treatments that would largely eliminate thermal cover and snow intercept and thus eliminate habitat attributes that would enable concentrated winter use by deer and elk. These losses of thermal cover and snow intercept would require 40-60 years for suitable sized trees (>40 ft. tall) to develop in the stand; thermal cover and snow intercept capacities would be reduced on the other 1,578 acres and would improve through time as the stands mature and fill in between retained trees. In general, the effects to big game would be directly related to winter severity, with the greatest potential for effects occurring during severe winters. Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production within the units. Since the entire project area was identified as white-tailed deer winter range, the retention of un-harvested patches along Spencer Ridge and in numerous other locations throughout the project area would continue to provide snow intercept and winter range attributes where they exist. These retained areas of winter range occur across the project area and vary in size and topographic position. Six patches of winter range, each exceeding 40 acres in size, would be retained and would be connected with adjacent patches of winter range and/or extend across the project area. Thus, moderate adverse direct or indirect effects to white-tailed deer winter range would be anticipated since: 1) the relatively short-term that logging activities would create disturbance in this area; 2) a high percentage of the winter range in the project area would be altered; 3) the behavioral adaptability of white-tailed deer; and 4) availability of cover on surrounding ownerships that provides some opportunity for deer should they be displaced in the short or long term.

Action Alternative- Cumulative Effects

Thermal cover would be largely removed from approximately 72 acres of white-tailed deer winter range and would be reduced on an additional 1,578 acres of white-tailed deer winter range, which would be additive to ongoing and past reductions across the winter range. Portions of the winter range are expected to start providing some habitat attributes suitable for winter big game use in the near future as they continue maturing with time. Displacement associated with this alternative could also be additive to the displacement associated with ongoing timber sales, but would be partially offset by the increased forage availability that would occur. In addition to the direct displacement associated with harvesting, human disturbance levels could increase slightly with the increasing openness that could facilitate more human use and/or elevate the disturbance levels associated with ongoing activities Thus, moderate adverse cumulative effects to white-tailed deer winter range would be expected since: 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area; 2) a small percentage of the winter range in the cumulative effects analysis area would be altered; 3) the behavioral adaptability of white-tailed deer; and 4) availability of lower-quality cover on surrounding ownerships that provides some opportunity for deer should they be displaced.

AIR QUALITY

Issues expressed during initial scoping by the public and internal were:

- Road dust created from hauling logs across native or gravel surfaced roads may affect air quality.
- Burning of slash residue from logging may reduce air quality.

Analysis Area

The analysis area used to assess direct, indirect, and cumulative impacts to air quality includes Flathead County of Montana Airshed 2 as defined by the Montana/Idaho Airshed Group. The methodologies used to analyze effects to air quality include estimating the location, amount, and timing of dust or smoke generated by project-related activities.

Existing Conditions

Air quality for the project area is considered good. Currently, the project area contributes very low levels of air pollution into the analysis area or local population centers. Temporary and localized reductions in air quality within the project area may occur in the summer and fall. These reductions are due mostly to road dust generated by motorized residential and recreational traffic on native surface roads and occasionally from smoke produced from burning slash piles. None of the air quality reductions affect local population centers at levels beyond Environmental Protection Agency (EPA) standards. All burning activities conducted by land management entities (which includes DNRC, USFS, Plum Creek and Stoltze Land & Lumber Co.) comply with emission levels authorized by the Montana/Idaho Airshed Group. The project is located inside the Kalispell impact zone where additional restrictions may be imposed to protect air quality.

AIR QUALITY EFFECTS

No Action Alternative- Direct, Indirect and Cumulative Effects

The existing condition would not change under the No Action Alternative in either the project area or Airshed 2.

Action Alternative- Direct and Indirect Effects

Log hauling and other project related traffic on native surface or gravel roads would increase the amount of road dust produced during dry periods. Post harvest burning associated with slash disposal or site preparation would produce smoke emissions. The increased dust and smoke emissions are not expected to exceed air quality standards, and would be temporary, localized reductions to air quality such as currently occurs. Burning would be accomplished within the requirements imposed by the Montana Department of Environmental Quality, Montana/Idaho Airshed Group, and Flathead County Health Department. It is likely that this sale would be winter logged and therefore would mitigate much of the dust otherwise created by log hauling and harvest operations during drier months.

Action Alternative- Cumulative Effects

Dust and smoke produced from implementing the Action Alternative would be in addition to smoke and dust associated with activities on private lands, recreational use of state lands, and prescribed burning on federal, state, or industrial private lands. All major burners operate under the requirements of the Montana/Idaho Airshed Group that regulates the amount of emissions produced cumulatively to avoid exceeding air quality standards. Cumulative effects during peak burning periods may affect nearby residents for short durations. Project related traffic during dry periods, in addition to current road users, may affect nearby residents for short durations as well.

AESTHETICS

The analysis for aesthetics describes the existing landscape as it relates to attributes associated with aesthetic quality and viewsheds.

Issues expressed during initial scoping by the public and by DNRC specialists were:

- Timber harvesting and associated activities may affect the aesthetic value of the project area. Roads, skid trails, and canopy openings may appear unnatural. Residual logging slash, damaged trees, stumps and uniform tree spacing may detract from the natural appearance associated with an unmanaged forest.

Analysis Area

The analysis area for aesthetics looks qualitatively at the effects to foreground and background views into and from within the project area. The observation areas (See Figure 3-2) looking into the project area include:

- Highway 93 from Skyles Lake turnoff to junction with Twin Bridges road.
- Along KM Ranch Road from the Junction with the Whitefish Rifle Range road north.
- Along the Lodgepole road to the east of the project area.

Analysis from within the project area includes descriptions of changes to views from existing roads and trails in:

- Shelterwood harvest area above Spencer Lake.
- Commercial thinning harvest area.

Analysis Methods

Potential impacts on the visual resource caused by timber harvesting and road construction were determined based on the following assessments:

- How the visibility of the project area will change with timber harvesting and road construction.
- How the visual attributes will change color and texture based on proposed harvest treatments.

Existing Conditions

Highway 93- Skyles to Twin Bridges

The slopes of the project area visible from Highway 93 have not been logged since 1968. Foreground and background views of the project area are somewhat limited by topography but show densely stocked stands of western larch and Douglas-fir on the lower slopes and spiked topped larch and crowns of older Douglas-fir on the upper slopes. The densely stocked stands show darker colors and more uniform texture with fewer breaks in the canopy. The road system accessing the ground above the lake is not currently visible from the highway.

KM Ranch Road- Whitefish Rifle Range road to Twin Bridges

The last timber harvest occurred in 1988 on ground off of the Whitefish Rifle Range road and was not visible from the county road. Foreground views into the project area are intermingled with private ownerships along the KM Ranch road and are limited due to topography. Timber stands along KM Ranch road consist of Douglas-fir, ponderosa pine and western larch.

Lodgepole Road

Background views of the project area from Lodgepole road show stocked stands of Douglas-fir and western larch. The larch dominates the visible lower slopes while Douglas-fir is more common on the upper slopes. Open areas with rock outcrops are intermittingly visible across the upper slopes as well. Existing roads built for the 1968 harvest are not visible due to topography. Colors are generally darker with the dense canopy and show lighter colors around the openings on the upper slopes. Textures of the stands are uniform on the lower slopes and have a rougher texture around the openings with the rock outcrops.

Existing roads and Trails within the project area

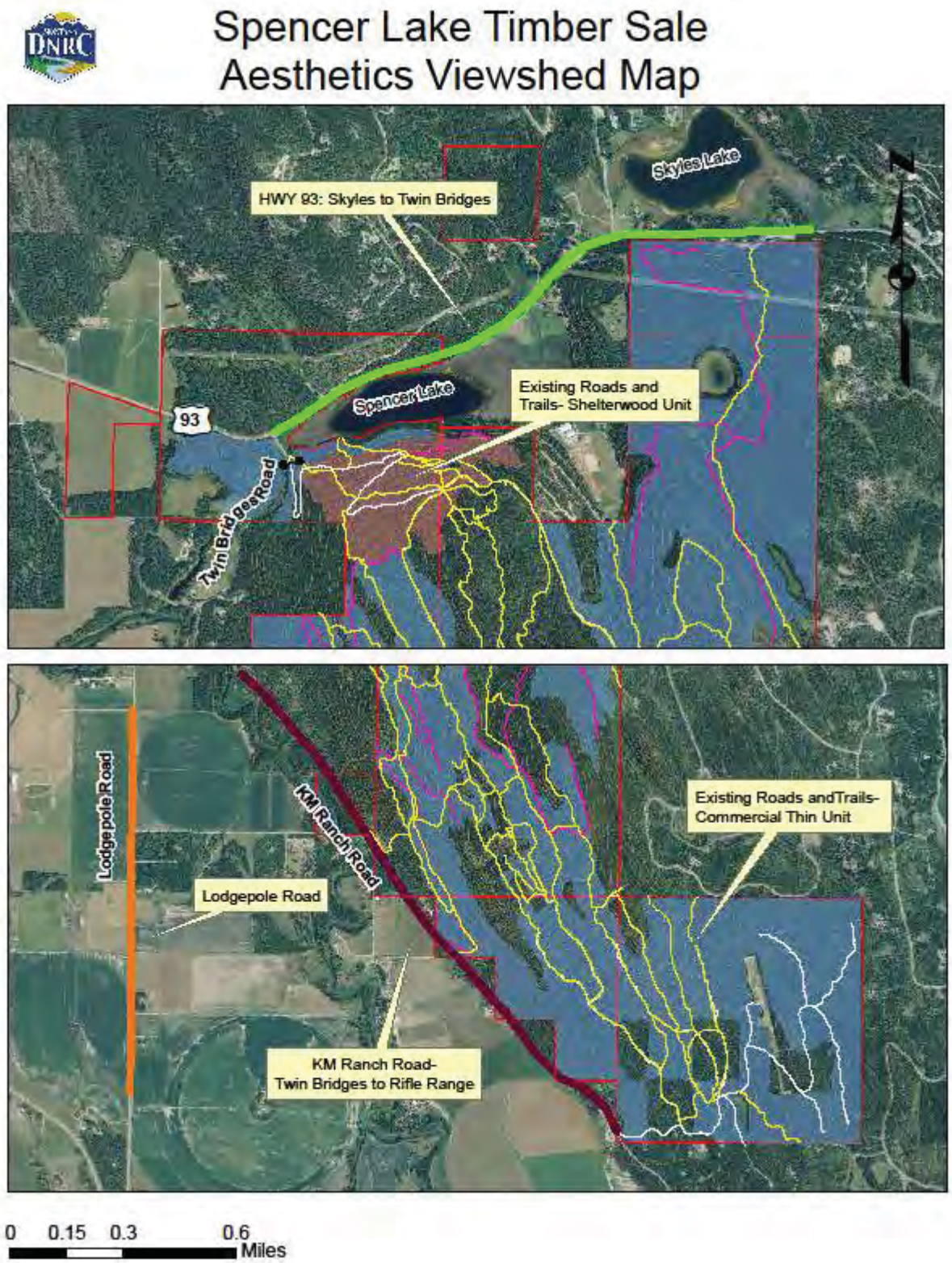
Shelterwood Harvest Area above Spencer Lake:

Views from within the project area above Spencer Lake are of multi-storied stands of Douglas-fir and western larch. Minor species represented also include lodgepole pine, engelmann spruce, grand fir and red cedar. Groups of seedlings and brush break-up the long sight distances and limit views of surrounding mountain ranges and much of Spencer Lake. Signs of past timber harvest are limited to the existing roads, old skid trails and stumps. Recreational trails crisscross much of the area and many contain constructed ramps, jumps and banked turns used by mountain bike enthusiasts.

Commercial Thinning Areas:

Views from within the commercial thinning units are of multi-storied stands of Douglas-fir and western larch. Shade tolerant species such as engelmann spruce, grand fir, and subalpine fir are common in the north half of the project area. Sight distances in the understory vary but are generally limited due to topography and stocking densities. The longer sight distances found in the understory can be attributed to higher numbers of harvest entries coupled with extensive Christmas tree harvests of the past. Stocking densities and topography limit the views of surrounding mountain ranges except when along the highest points in the project area. Signs of past timber harvest include old roads, skid trails and stumps scattered throughout. Many of the old road prisms are now trails the recreationists use today.

Figure 3-2: Spencer Lake Timber Sale Aesthetics Viewshed Map



AESTHETICS EFFECTS

No Action Alternative- Direct and Indirect Effects

Under the No Action Alternative, no timber harvesting or road construction would take place. Effects to the visual resource looking into and from within the project would not change.

No Action Alternative-Cumulative Effects

Natural processes, such as insect and disease infections, wildfire, and blowdown events, would continue to alter the visual resource over time.

Action Alternative- Direct and Indirect Effects

Highway 93- Skyles Lake to Twin Bridges:
Changes to the foreground and background views would be evident along the Highway 93 corridor. Timber harvesting would remove approximately 50-75% of the overstory in the harvest areas, resulting in more open stand conditions. Views into the project area would increase and the ground with skid trails, and slash would be visible on the harvest areas above Spencer Lake but the size of the area would be limited due to topography. Colors and textures of the timber stands would also change. The current darker more uniform textures would be replaced with lighter colors and a rougher texture typical of harvested stands.

A new road would be constructed off Highway 93 to the south and approximately ¼ mile of the road would be visible as it climbs the slope above the highway. A new access road would also be constructed above Spencer Lake. The proposed road location is mainly on a bench and would not be visible from the highway corridor. A landing area at the junction with State and Twin Bridges road would need to be constructed. Approximately ½ acre would need to be cleared for this landing and would be visible from the Highway 93 corridor.

KM Ranch Road- Whitefish Rifle Range to Twin Bridges:
Changes to the foreground views would be evident along the KM Ranch road. Timber harvesting would remove approximately 40-50% of the overstory in the harvest areas and result in more open stand conditions. Sight distances into the project area would increase and views of slash, skid trails, stumps and landings would be possible.

A new road access point would need to be constructed off the KM Ranch road approximately 1 mile north of the Rifle Range road and would be visible from the KM Ranch road for approximately 0.1 mile as it climbs across the slope.

Lodgepole Road:
Changes to the background views of the project area would be evident along Lodgepole road. Timber harvesting and road construction would remove approximately 40-50% of the canopy in the harvest

areas and result in more open stand conditions. Due to the natural openings and rock outcrops above the KM Ranch road, the colors and texture associated with timber harvest would not be as noticeable as in other parts of the project area. Many of these openings are not within proposed harvest units and will not change at all.

The new road constructed off KM Ranch would be located on benches and not visible from the Lodgepole road area.

Existing Roads and Trails- Shelterwood Harvest Area:
Silvicultural prescriptions would remove approximately 75% of the overstory in the shelterwood area. This would result in more open stand conditions and increased sight distances. Skid trails, stumps, slash, and landings would be visible. Exposed soil from road construction and reconstruction would be visible for approximately 1 to 3 seasons until grass seed takes hold. Views of the lake would be possible from most points within the harvested area as well as views of trails and bike structures scattered throughout the area.

Existing Roads and Trails- Commercial Thinning Areas:
Silvicultural prescriptions would remove approximately 40-50% of the overstory in the commercial thinning areas. This would result in more open stand conditions but much less than what would be found on regeneration (shelterwood) harvest areas. Sight distances would be increased. Skid trails, stumps, slash and landings would be visible. Exposed soil from road reconstruction would be visible for 1 to 3 seasons as grass seed takes hold. Stands would still retain much of the structural diversity as present. Structural diversity means the stands have a variety of tree sizes, species, snags, and large downed logs.

In order to mitigate changes in the viewsheds, the following mitigations were developed:

- Retain seedlings and saplings along open roads and trails where possible.
- Grass seed areas of disturbed soil around landings and along roads.
- Winter harvest to lessen vegetation and soil disturbance.
- Slashing of sub-merchantable trees damaged during logging.
- Slash treatment in harvest units and high-standard slash clean-up adjacent to open roads and property boundaries.

Action Alternative- Cumulative Effects
Timber stands managed would continue to grow and canopy coverage would begin to lessen the view of the ground. Mature stands harvested would be regenerated with a mix of species, including western larch. Colors and textures associated with denser stands would return as stands mature and stocking increases. Historically, much of the private ownership and DNRC-managed State land has been harvested, creating a mosaic of forests and associated textures, lines, colors and forms on the landscape. The proposed action would be similar, but would be additive to changes that have taken place within the viewshed historically.

RECREATION

The Spencer Lake Project Area currently experiences both general recreational use by the public and commercial use by two guest ranches and a rifle range. Issues expressed during initial scoping by the public and internal were:

- Timber harvesting and associated activities may limit and/or displace recreational uses of the project area.
- New road construction may increase illegal motorized use in the project area.

Analysis Area

The analysis area used to assess direct, indirect, and cumulative impacts to recreation includes the project area and the roads used to access the harvest units.

Analysis Methods

Methods used to describe the existing condition and determine recreational impacts of the project include determining recreational uses and approximate revenue, and potential conflict between project activities and recreational uses. State trust lands that are legally accessible and that have not been closed or restricted to such use by rule or by DNRC are open to recreational use. Recreational use is divided into two categories, commercial and noncommercial, and subsequently requires two different licenses to engage in recreational activities on state trust lands:

- General Recreational Use License: Refers to recreational activities that are nonconcentrated and noncommercial. Examples of these activities Include hiking, biking, snowmobiling, skiing, day horseback use and berry picking.
- Special Recreational Use License: Refers to recreational activities in which an entity charges a participant a fee and includes commercial and concentrated (group) activities such as trapping, overnight horse camping, or a wedding.

Existing Condition

The Spencer Lake project area, which contains a lake, forests, trails, and old logging roads, is a prime area for recreation. The primary dispersed recreational uses include hiking, biking, horseback riding, hunting, fishing, and firewood gathering. With the exception of the Whitefish Rifle Range, which has requirements of membership fees for use, the project area has no developed recreation sites such as day-use areas or overnight camping. Some undeveloped sites do exist along roads throughout the project area and an undeveloped boat launch along the south shore of Spencer Lake.

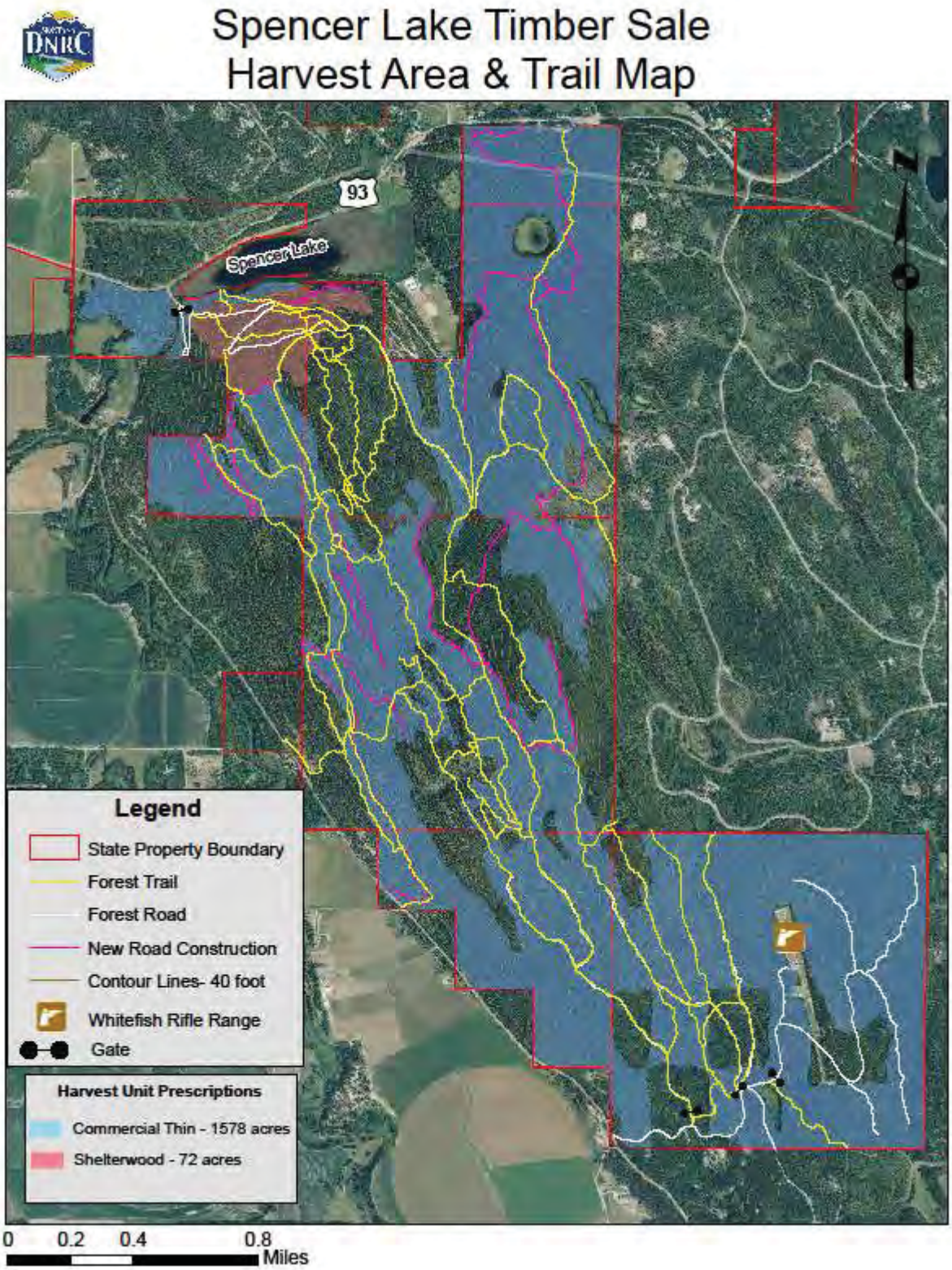
The project area has approximately 21 miles of existing trail and an additional 10 miles of existing road that is also being used as trail. Much of the existing trail network has been further developed over time by mountain bikers, horseback riders, hikers, and motorized recreational vehicles without the knowledge of, or input from, DNRC management.

Of the 10 miles of existing road in the project area, all but 0.9 mile are closed to motorized use. Unauthorized uses such as, motorcycling, ATV and 4x4 vehicles, on old roads and trails is a common occurrence.

Other recreation uses through leases and licenses in the project area include:

- 2 Special Recreational Use Licenses issued to guest ranches for horseback riding.
- 1 lease for a Rifle Range.

Figure 3-3: Spencer Lake Timber Sale Harvest Area and Trail Map



RECREATION EFFECTS

No Action Alternative- Direct and Indirect Effects

No appreciable changes would occur to recreational activity, recreation revenue, or road management in the short-term. Recreation would remain at its current level or most likely increase. Recreation revenue may increase slightly as more of the general public becomes educated about purchasing General Recreational Use Licenses. The amount of road miles open to motorized use would not change.

No Action Alternative- Cumulative Effects

Cumulative effects to recreational use would not be expected.

Action Alternative- Direct and Indirect Effects

General Recreation

In order to provide for safety during harvesting activities, general recreation activities may need to be rerouted for short durations. To limit the impacts to recreation, timber harvest activities would be restricted to fall/winter operating periods. Due to the amount of new construction and the design and construction requirements, most of the road construction activities would take place in the summer and fall. This would require temporary closures of areas as construction is taking place. Areas would be reopened when operations are completed for the season and public safety is assured.

Some noise would be associated with timber harvesting and road construction activities for fisherman on Spencer Lake.

Recreation Revenue

Revenue generated from the 2 Special Recreational Use Licenses could be affected as portions of the trails used would be closed for a short period of time. Timing restrictions would be discussed with the leaseholders to minimize impacts. Project activities would occur outside of the area leased by the Whitefish Rifle Range and would have no impact on their lease. Otherwise, this proposal is expected to have minimal direct or indirect effects to recreation revenue.

Road Management

The amount of open roads in the project would not change. The 9.5 miles of new road construction proposed to be built to access harvest areas would be closed to motorized use after the project is completed. In fact, it is very likely the new roads constructed would be used as future trails, once project activities have concluded.

Two highway approaches would be required under the Action Alternative. A new highway approach would be constructed off Highway 93N and a second approach on secondary road 424 (Twin Bridges). Landings for processing timber harvested with the proposal would be needed at the junction of the existing and new approaches and could serve as parking areas for future recreational opportunities..

Action Alternative- Cumulative Effects

Recreationists may be temporarily displaced from areas where timber harvesting and road construction activities occur over 7 years. Adverse cumulative effects are expected to be minor since area closures would be managed so that only a portion of the project area would be closed at a given time for road construction and timber harvesting operations. Recreationists would also have access to other areas for recreation on the Kalispell and Stillwater Units during the project activities.

Special Recreational Use Licenses and Land Use Licenses on State land within the Kalispell Unit would continue to generate revenue for the trust beneficiaries. Revenue may even increase slightly as new recreational uses are proposed for licensing within the project area.

ECONOMICS

An issue expressed during initial scoping both public and internal was:

- Timber harvesting in the proposed project area may not be economically viable.

Analysis Area

The geographic scope of the economic analysis is Flathead and Lincoln counties.

Analysis Methods

The economic analysis for the timber sale proposal will include estimates of costs, revenues, and returns to the trust beneficiaries; 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 by subtracting operating costs from current delivered log prices, minus costs. Operating costs include estimated road development, logging, hauling, FI payments, profit margins, and risk. The *Western Wood Products Association Inland Lumber Price Index* for 2010 was used for estimating the delivered price of the logs.

FI fees are estimated using the current FI fee schedule set at $39.24 per MBF.

The employment multiplier used in this analysis is an average of 10.0 jobs supported by every MMBF of timber harvested in the analysis area (*Bureau of Business and Economic Research, 2008*). The exactness of this employment multiplier is limited as the real change in employment varies from sale to sale. Jobs calculated using this multiplier represent mostly existing direct industry jobs that are maintained 1 full year due to this timber sale.

Existing Condition

The proposed action would take place on state lands managed by the Kalispell Unit. Timber sales in this area generally supply raw materials for lumber and pulp industries in Flathead and Lincoln counties.

Though the overall economy of each county is different, they share forestry and logging industries. Employment and wages for Forestry and logging in the two county area are described in detail in Table

3-11: (Employment and Wage). Forestry and logging employment data (*Montana Department of Labor and Industry, Research and Analysis Bureau*) is likely lower than actual employment due to missing data on a number of small informal logging and milling operations.

Table 3-11: EMPLOYMENT AND WAGE 2009				
COUNTY	**INDUSTRIAL SECTOR**	**JOBS**	**NUMBER OF ESTABLISHMENTS**	**TOTAL WAGES**
Flathead	Forestry and Logging	125	47	$5,260,358
Lincoln	Forestry and Logging	97	36	$4,899,571

DNRC earns revenue for trusts beneficiaries by selling timber on trust lands into regional markets at competitive prices. Revenues from timber fluctuate more than other trust revenue sources due to price volatility in regional, national, and international timber and wood products markets. Currently, DNRC's target sale volume is an annual statewide-sustainable yield of 53.2 MMBF. Table 3-12: Timber Sale Revenue shows gross revenue from harvests, FI fees collected, management expenses, net distributed income to the trusts, and the forest management programs net profit margin over the last 5 years.

Table 3-12: DNRC 5-YEAR TIMBER SALE REVENUE					
FISCAL YEAR	**GROSS REVENUE**	**FI FEES COLLECTED**	**MANAGEMENT EXPENSES**	**NET DISTRIBUTED INCOME**	**NET PROFIT MARGIN**
2010	$9,150,692	$1,196,307	$4,813,104	$3,141,281	34.3%
2009	$8,453,067	$868,511	$4,198,453	$3,389,343	40.1%
2008	$11,099,301	$1,098,577	$4,142,145	$5,858,579	52.8%
2007	$8,799,298	$1,316,404	$4,303,727	$3,179,167	36.1%
2006	$15,875,615	$2,875,277	$4,036,348	$8,963,990	56.5%
2005	$16,575,683	$2,924,052	$3,747,131	$9,904,500	59.8%

In addition to timber sale revenues, FI fees are collected on non-Morrill Grant lands and used to finance projects that improve the health, productivity, and value of forested trust lands. FI activities may include piling and disposing of logging slash, reforestation, thinning, site preparation, noxious weed control, acquiring access and maintenance of roads necessary for timber harvesting, other activities necessary to improve the condition and income potential of forested state lands, and to comply with other legal requirements associated with timber harvesting (77-5-204, MCA).

ECONOMIC EFFECTS

Direct and Indirect Effects of the No Action Alternative

Timber harvesting and road construction would not take place. Revenue from the project area would not be realized at this time. If timber from this project is not sold, equivalent volumes would need to come from sales elsewhere. Additionally, local mills may not be able to substitute the potential loss of logs that would not be generated from this alternative. Trust funding would not benefit from this alternative.

Cumulative Effects of the No Action Alternative

DNRC has a statewide sustained-yield annual harvest goal of 53.2 MMBF. If this project were not sold, this volume could come from sales elsewhere, but timber substituted may be from other areas and not benefit this region of the State.

Direct and Indirect Effects of the Action Alternative

An estimated $1,600,000 in revenue would be deposited into the representative trust accounts and an estimated $392,400 into the FI account. Approximately $162,000 of road development and maintenance work would be accomplished.

Using the employment multiplier of 10 jobs per MMBF of timber harvested (*Bureau of Business and Economic Research, 2008*); this sale would provide work for approximately 100 positions.

Cumulative Effects of the Action Alternative

Implementation of the Action Alternative would contribute volume to the annual sustained yield of 53.2 MMBF. The yield establishes a relatively stable supply of State Trust land timber for the regional market. The State's regional market share is growing more significant as other timber supply sources dwindle. While the region's market health ultimately relies upon energy and lumber prices established in international markets, an affordable local timber supply is still necessary for regional processing facilities to remain competitive and open.

The Action Alternative would also contribute proportionally to public school funding. Funds distributed by the State trusts partially offset tax dollars needed to fund public education. The cumulative effect of this proposed action in conjunction with revenue generating activities of other trust land is the continued financial contribution to public education in Montana. Tax dollars offset by these contributions either go to improve the State of Montana's budget for other public services or they benefit Montana taxpayers by partially reducing their tax burden.

The Action Alternative would also contribute to the Forest Improvement (FI) fund. In the long term, FI funding represents an investment in forest health, future income-generating opportunities, fire protection, and other associated benefits. The economic benefits of work conducted with FI funds cannot be directly measured, but they represent an additional cumulative effect related to the proposed action.

Table 3-13: COSTS AND BENEFITS ASSOCIATED WITH THE PROJECT BY ALTERNATIVE		
COSTS AND BENEFITS	**ALTERNATIVES**	
	NO ACTION	**ACTION**
Estimated Total Harvest Volume (MMBF)	0	10.00
Road Development Costs ($/MBF)	0	16.20
Estimated Stumpage Value ($/MBF)	0	160.00
FI Fee ($/MBF)	0	39.24
Estimated Stumpage Value + FI ($/MBF)	0	199.24
Estimated Stumpage Value+ FI + Development Cost ($/MBF)	0	215.44
Total timber-dollar value (Estimated Stumpage Value+ FI +Development Cost X Estimated Harvest Volume)	0	2,154,400
Total Revenue ($) to the State (Stumpage Value and FI)	0	1,992,400
Total Revenue ($) to the Involved Trusts (Stumpage Value)	0	1,600,000

List of Preparers

Brent Kallander – Forester, Kalispell Unit, DNRC Northwestern Land Office

Garrett Schairer – Wildlife Biologist, DNRC Northwestern Land Office

Marc Vessar – Hydrologist, DNRC Northwestern Land Office

List of Consultants

Ross Baty- Wildlife Biologist, Forest Management Bureau, Missoula

Jim Bower- Fisheries Program Specialist, Forest Management Bureau, Missoula

Gary Frank- Resource Management Supervisor, Forest Management Bureau, Missoula

Sonya Germann- Forest Management Bureau Chief, Forest Management Bureau, Missoula

Jordan Larson- Resource Economist, Forest Management Bureau, Missoula

Patrick Rennie- Archaeologist, Ag & Grazing Bureau, Helena

Jeff Schmalenberg- Soil Scientist, Forest Management Bureau, Missoula

Tim Spoelma- Silviculturist, Forest Management Bureau, Missoula

REFERENCES

Aney, W. and R. McClelland. 1985. Pileated Woodpecker Habitat Relationships (revised). Pages 10-17 in Warren, N. eds. 1990. Old Growth Habitats and Associated Wildlife Species in the Northern Rocky Mountains. USFS, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Beier, P. and J. E. Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. Ecological Applications 7:564-571.

Boal, C. W. and R. W. Mannan. 1996. Prey sizes of male and female northern goshawks. Southwestern Naturalist 41:355-358.

Bower, J., 2008. Report to NWLO on fisheries presence/absence for the Beaver-Swift Interface Timber Sale. Sept. 22, 2008.

Brown, James K. 1974. Handbook for inventorying downed woody material. USDA Forest Service General Technical Report INT-16. Ogden, Utah. 24 p

Bull, E. L., and J. A. Jackson. 1995. Pileated woodpecker: Dryocopus pileatus. American Ornithologists' Union. Washington DC. 24pp.

Bull, E.L., C. G. Parks, and T. R. Torgersen. 1997. Trees and Logs Important to Wildlife in the Interior Columbia River Basin. General Technical report PNW-391. USDA Forest Service, Pacific Northwest Research Station, Portland, OR. 55pp.

Buskirk, S.W., and R.A. Powell. 1994. Habitat ecology of fishers and American martens. Pages 283-296 *in* Buskirk, S.W., A. Harestad, M. Raphael, eds. Biology and conservation of martens, sables and fishers. Cornell University Press, Ithaca, NY.

Clough, L. T. 2000. Nesting habitat selection and productivity of northern goshawks in west-central Montana. University of Montana, Missoula, Montana.

Cutler, T. L., R. J. Steidl, and S. DeStefano. 1996. Diets of northern goshawks in Oregon. Arizona Cooperative Fish and Wildlife Research Unit, Tucson, Arizona.

DFWP, 2007. Fisheries monitoring results from Montana Fish, Wildlife and Parks. Unpublished. Prepared for Montana Department of Natural Resources and Conservation, Northwestern Land Office. Kalispell, MT

DNRC, 1996. State Forest Land Management Plan. Montana Department of Natural Resources and Conservation. Missoula, MT

DNRC. 2003. Montana administrative rules for forest management. DNRC. Forest Management Bureau, Missoula, Montana.

DNRC, 2004. DNRC compiled soils monitoring report on timber harvest projects. Missoula, MT

DNRC, 2004. DNRC compiled soils monitoring report on timber harvest projects. Missoula, MT

DNRC Section Record Cards. Kept at NWLO for a record of past management activities on DNRC-managed lands.

Finn, S. P., J. M. Marzluff, and D. E. Varland. 2002. Effects of landscape and local habitat attributes on northern goshawk site occupancy in western Washington. Pages 249-258 *in* S. DeStefano and R. G. Haight, eds. Forest Wildlife-Habitat Relationships. Society of American Foresters, Bethesda, Maryland, USA.

Foresman, K.R.. 2001. The wild mammals of Montana. Special Publication 12. American Society of Mammalogists. Allen Press, Kansas. 278pp.

Graham, Russell T.; Harvey, Alan E.; Jurgensen, Martin F.; Jain, Theresa B.; Tonn, Jonalea R.; Page-Dumroese, Deborah S. 1994. **Managing coarse woody debris in forests of the Rocky Mountains**. Res. Pap. INT-RP-477. Ogden, UT: U.S. Department of Agriculture, Forest Service, lntermountain Research Station.

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-growth forest types of the Northern Region. R-1 SES. Unpublished report on file at United States Forest Service, Northern Region, Missoula, Montana.

Haupt, H.F., et al., 1974. Forest hydrology part ii hydrologic effects of vegetation manipulation. USDA Forest Service, Region 1. Missoula, MT

Hejl, S. J. and R. E. Woods. 1991. Bird assemblages in old-growth and rotation-aged Douglas-fir/ponderosa pine stands in the Northern Rocky Mountains: a preliminary assessment. Pages 93-100 *in* D. M. Baumgartner and J. E. Lotan, eds. Proc. Symposium: Interior Douglas-fir: the species and its management. Washington State University, Pullman, WA. 306pp.

Heinemeyer, K. S., and J. L. Jones. 1994. Fisher biology and management in the western United States: A literature review and adaptive management strategy. USDA Forest Service, Northern Region, Missoula, Montana. 108pp.

Hillis, J.M., and M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining Elk Security: The Hillis Paradigm. Pages 38-43 in A.G. Christensen, L.J. Lyon, and T.N. Lonner, comps., Proc. Elk Vulnerability Symposium., Montana State University, Bozeman, MT. 330pp.

Johnson, S. 1984. Home range, movements, and habitat use of fishers in Wisconsin. M.S. Thesis, University Wisconsin, Stevens Point. 78pp.

Jones, J.L. 1991. Habitat use of fisher in north-central Idaho. M.S. Thesis, University of Idaho, Moscow, Idaho. 147 pp.

Koopal, M., 2004. Fisheries resource summary report. Unpublished. Prepared for Montana Department of Natural Resources and Conservation, Northwestern Land Office. Kalispell, MT.

Lenard, S; J. Carlson, J. Ellis, C. Jones, and C. Tilly. 2003. P.D. Skaar's Montana Bird Distribution, 6th Edition. Montana Audubon, Helena, Montana.

Losensky, J.B. 1997. Historical vegetation of Montana. *Prepared for* DNRC. Unpublished report on file at DNRC Forest Management Bureau, Missoula, Montana.

Martinson, A. H., and W. J. Basko. 1998. Soil survey of Flathead National Forest area, Montana. USDA Forest Service, Flathead National Forest, Kalispell, MT

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

McCallum, D. A. 1994. Review of technical knowledge: flammulated owls. Pages 14-46 *in* G. D. Hayward and J. Verner, tech eds. Flammulated, boreal, and great gray owls in the United States: a technical conservation assessment. USDA Forest Service Gen. Tech. Rep. RM-253. Fort Collins, Colorado.

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

McGrath, M. T., S. DeStefano, R. A. Riggs, L. L. Irwin, and G. J. Roloff. 2003. Spatially explicit influences on northern goshawk nesting habitat in the interior Pacific Northwest. Wildlife Monographs 154:1-63.

MDEQ, 2007. Montana nonpoint source management plan. Montana Department of Environmental Quality. Helena, MT 238pp.

Montana Department of Labor, "Research and Analysis Bureau"

Parks, C.G. and D.C. Shaw. 1996. Death and decay: A vital part of living canopies. Northwest science. Vol. 70, special issue: 46-53.

Pfister, R.D., B.L. Kovalchik, S.F. Arno, and R.C. Presby. 1977. Forest habitat types of Montana, United States Forest Service., Intermountain Forest and Range Experimental Station, General Technical Report, GTR-INT-34, Ogden, UT.

Powell, R. 1982. The fisher: National history, ecology, and behavior. University of Minnesota Press, Minneapolis, Minnesota. 217pp.

Powell, R. A. and W. J. Zielinski. 1994. Fisher. Pages 38-73 in Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, tech eds. The scientific basis for conserving forest carnivores: American

marten, fisher, lynx, and wolverine in the western United States. USDA Forest Service Gen. Tech. Rep. RM-254. Fort Collins CO.

Raskin, Edward B., Casey J. Clishe, Andrew T. Loch, Johanna M. Bell. 2006. Effectiveness of timber harvest practices for controlling sediment related water quality impacts. Journal of the American Water Resources Association 42 (5), 1307–1327.

Reynolds, R. T., R. T. Graham, M. H. Reiser, R. L. Bassett, P. L. Kennedy, D. A. Boyce Jr., G. Goodwin, R. Smith, and E. L. Fisher. 1992. Management recommendations for the northern goshawk in the Southwestern United States. Management recommendations for the northern goshawk in the Southwestern United States. U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, General Technical Report RM-217.

Schepps, J., S. Lohr, and T. Martin. 1999. Does tree hardness influence nest-tree selection by primary cavity nesters? The Auk 116: 658-665.

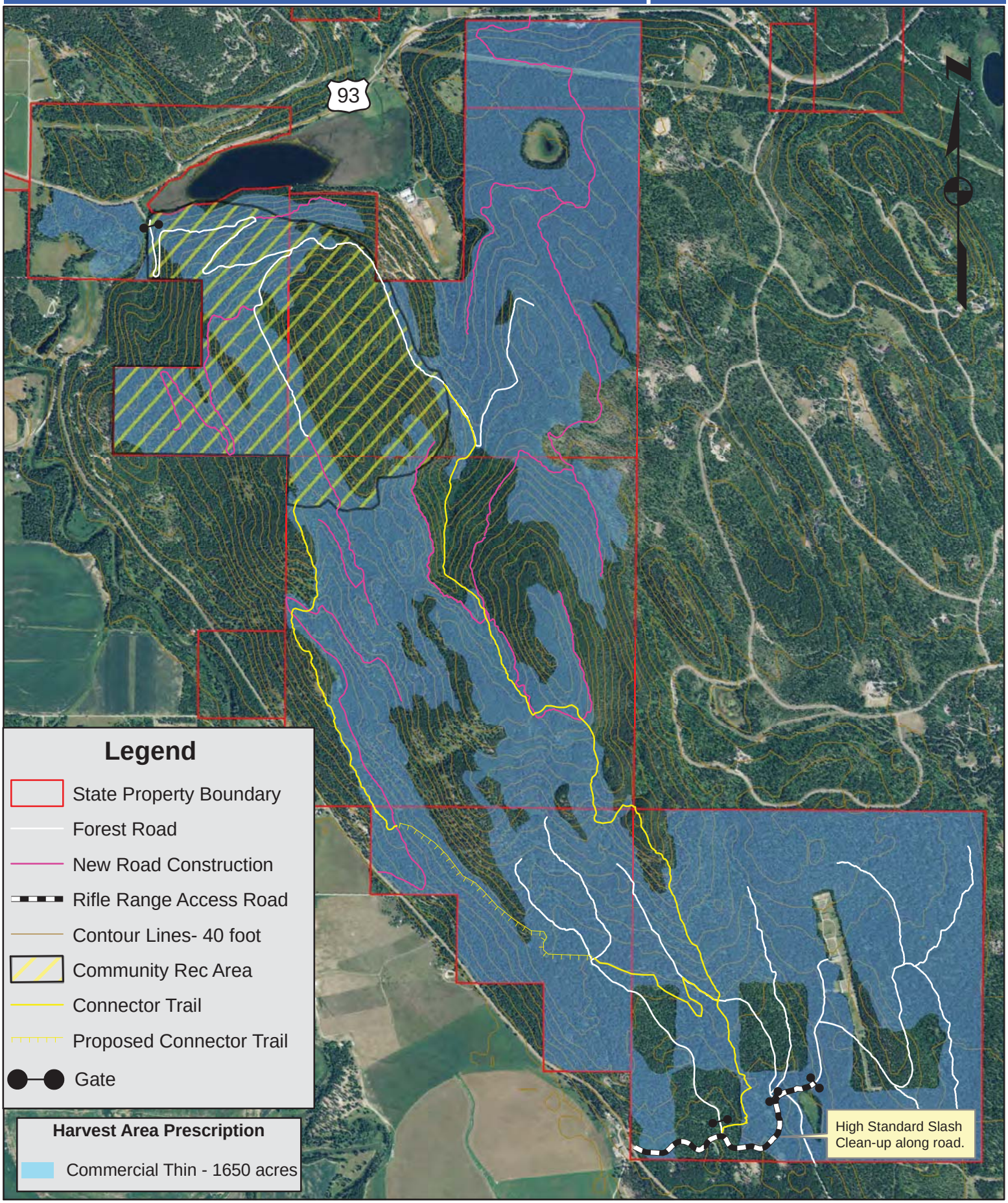
Squires, J. R. 2000. Food habits of northern goshawks nesting in south central Wyoming. Wilson Bulletin 112:536-539.

Squires, J. R. and R. T. Reynolds. 1997. Northern goshawk. Pages Pp. 1-32 *in* A. Poole and F. B. Gill, The Birds of North America. The Academy of Natural Sciences, Philadelphia, PA.

University of Montana, "Bureau of Business and Economic Research"

Watson, J. W., D. W. Hays, S. P. Finn, and P. Meehan-Martin. 1998. Prey of breeding northern goshawks in Washington. Journal of Raptor Research 32:297-305.

Western Wood Products Association, "2010 Inland Index"

Wittinger, W.T. 2002. Grizzly bear distribution outside of recovery zones. Unpublished memorandum on file at USDA Forest Service, Region 1. Missoula, Montana. 2pp.

Spencer Lake Timber Sale
Harvest Area Map