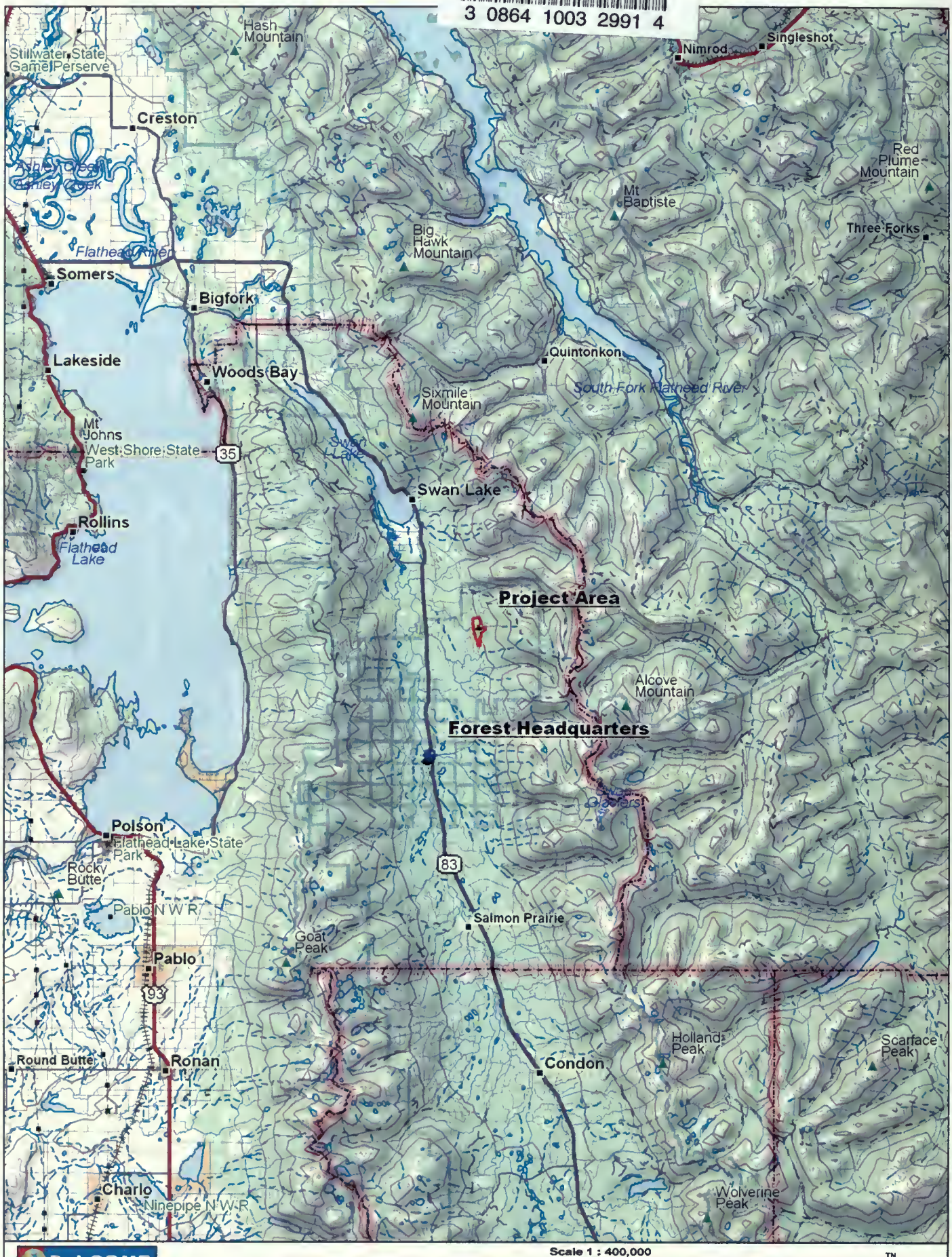
CILLY BUG SALVAGE TIMBER SALE

CHECKLIST ENVIRONMENTAL ASSESSMENT

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

SWAN RIVER STATE FOREST

January 7, 2005



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CILLY BUG SALVAGE TIMBER SALE PROJECT
CHECKLIST ENVIRONMENTAL ASSESSMENT AND FINDING

January 7, 2005

Enclosed is a copy of the completed Cilly Bug Salvage Timber Sale Project Checklist Environmental Assessment and Finding. We encourage you to review the document and within the next 30 days direct any comments or questions to: Swan River State Forest, 58741 Highway 83 South, Swan Lake, Montana 59911. We appreciate the comments we have received from the public and have addressed those concerns in the analysis. The Department of Natural Resources and Conservation is planning to present the Cilly Bug Salvage Timber Sale Project to the State Board of Land Commissioners at their February 22, 2005 meeting.

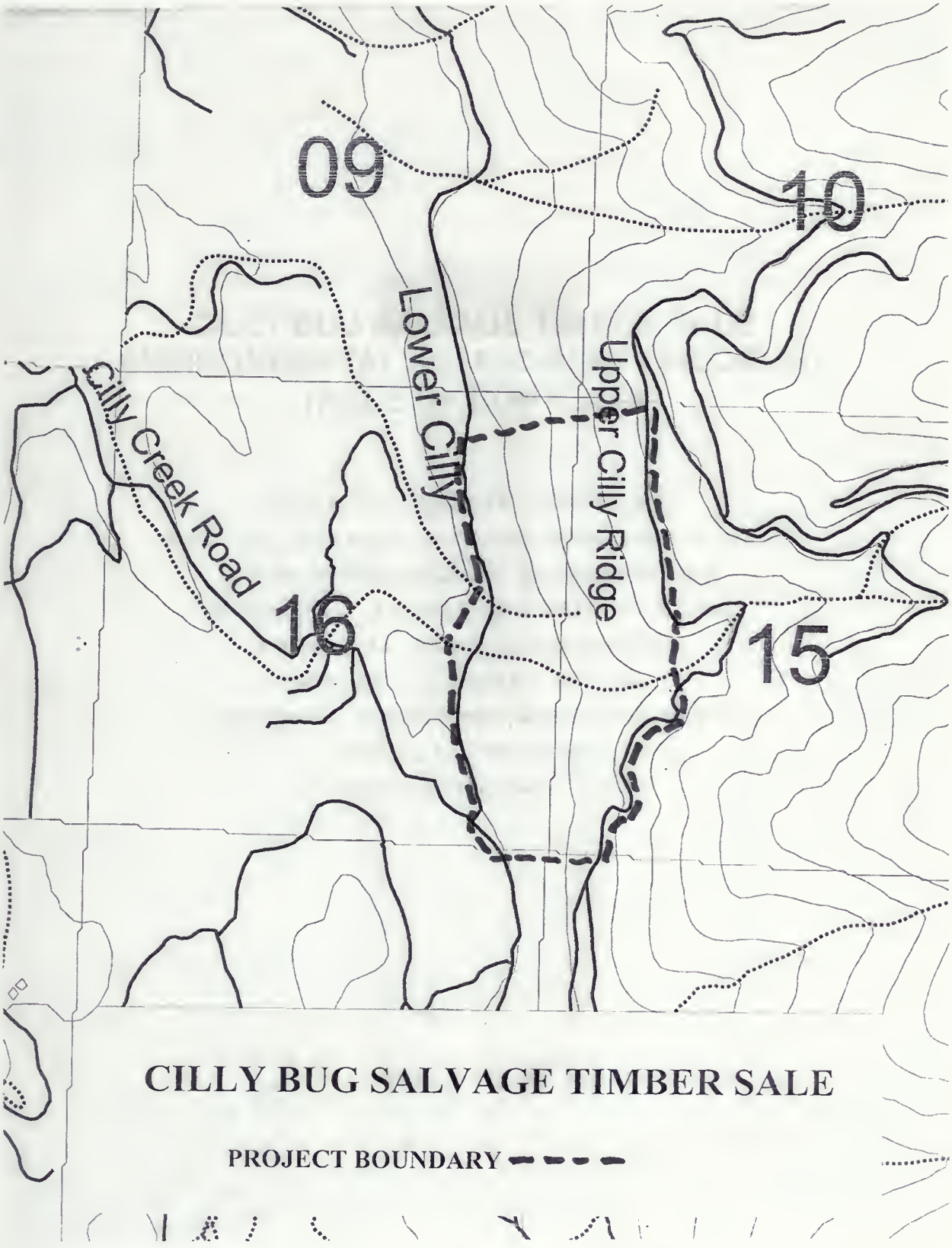
The proposed project is approximately eight miles south of Swan Lake and just east of the main Cilly Creek Road approximately two miles north of the junction with Soup Creek Road. The project was initiated to address the significant and ongoing insect and disease problems that are occurring in this part of the forest.

Sincerely,

Roger M Ziesak

Roger Ziesak
Forest Management Supervisor
Swan River State Forest
58741 Hwy 83 South
Swan Lake, Montana 59911
(406) 754-2301

RZ:wh
Enclosure
CC: Project file



CILLY BUG SALVAGE TIMBER SALE

PROJECT BOUNDARY - - - -

CILLY BUG SALVAGE TIMBER SALE
ENVIRONMENTAL ASSESSMENT CHECKLIST
TABLE OF CONTENTS

CHECKLIST ENVIRONMENTAL ASSESSMENT (CEA)

Project Name:	**Cilly Bug Salvage Timber Sale Project**
Proposed Implementation Date:	January 1, 2005 through March 31, 2006
Proponent:	Montana Department of Natural Resources and Conservation (DNRC)
Location:	Swan River State Forest, Sections 15 and 16, T24N, R17W
County:	Lake

I. TYPE AND PURPOSE OF ACTION

INTRODUCTION

Stands in the proposed Cilly Bug Salvage Timber Sale area have accumulated substantial damage and mortality from a variety of pathogens, insects, and abiotic (such as drought and wind) factors during the last several years. The tree species most heavily affected and proposed for removal are primarily Douglas-fir and western larch, with minor amounts of western white pine, lodgepole pine, Engelmann spruce, and grand fir. The predominant damage and mortality factors affecting these species include western larch dwarf mistletoe (*Arceuthobium laricis*), flatheaded fir borer (*Melanophila drummondi*), prolonged drought, Douglas-fir bark beetle (*Dendroctonus pseudotsugae*), red brown butt rot (*Phaelolus schweinitzii*), white pine blister rust (*Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*), fir engraver beetle (*Scolytus ventralis*), and Indian paint fungus (*Echinodontium tinctorium*). The relevant biology of, and management strategies for, these pathogens and insects are outlined in *APPENDIX D - FOREST INSECT AND DISEASE REPORT*.

In response to this situation, DNRC, as manager of Swan River State Forest, has proposed a forest-management project to salvage the dead, down, damaged, diseased, and dying timber within these sections. This timber harvest will:

- slow the ongoing Douglas-fir beetle attacks,
- reduce the overall severity and amount of western larch dwarf mistletoe, and
- recover the value of 500 to 700 thousand board feet (mbf) of recently-killed and dying trees.

Trees designated for harvesting are scattered throughout the stands and comprise 10 to 100 percent of the trees in any given area. Salvage harvests associated with this project would remove trees in portions of 4 stands that cover approximately 100 acres. The proposed harvest period would begin in January or February of 2005 and expire March 31, 2006. The majority of the work would take place during winter months. The expiration date would allow 30 days of summer activity starting June 16, 2005, as specified under the Swan Valley Grizzly Bear Conservation Agreement (SVGBCA). To properly address harvesting on steep slopes, approximately 1.3 miles of new road would need to be constructed. This road would be built in the summer season during the 30-day window.

A number of stands in Sections 15 and 16 have a large component of mature Douglas-fir and have been experiencing persistent and damaging attacks by the Douglas-fir bark beetle. As a result, these stands contain substantial numbers of beetle-killed Douglas-fir, as well as live trees that are currently undergoing attacks. Field inspections indicate that beetle attacks are severe and widespread in these stands. The main area of current Douglas-fir mortality in these stands contains a substantial number of live, beetle-infested trees along the eastern edge of the project area. The attacks appear to be moving upslope, killing over 90 percent of the large, overstory Douglas-fir and heavily attacking the co-dominant and intermediate Douglas-fir. The proposed salvage would harvest the brood trees in which the next generation of bark beetles is developing.

Western larch, also a major component of the overstory, has recently been undergoing attacks by flatheaded fir borers. All of the attacked western larch appear to be, or had been, severely infected with western larch dwarf mistletoe. The flatheaded fir borer attacks appear to have started 2 to 3 years ago, and, along with dwarf mistletoe, has resulted in extensive western larch mortality; approximately 50 percent of the mature western larch have been killed. Numerous other western larch are alive, but in a debilitated condition, with dead tops and dwarf mistletoe infection throughout the crown. As a result, and in combination with the prolonged drought, these trees are vulnerable to attack by the flatheaded fir borer. However, severe drought stress and heavy dwarf mistletoe infection may act in concert to kill trees; therefore, it should not be assumed that the flatheaded fir borer is involved in the death of every large western larch within the project area.

Mountain pine beetles are killing mature western white pine and lodgepole pine in this area. Western white pine is a minor component of the overstory, comprising less than 2 percent of the stand; mountain pine beetles have attacked approximately half of the western white pine. Lodgepole pine is a very small component, approximately 1 percent of these stands; mountain pine beetles have attacked over half of the observed lodgepole pine trees.

Pathogens identified in these stands include red brown butt rot, white pine blister rust, and Indian paint fungus. White pine blister rust has heavily infected 50 to 75 percent of the western white pine in the project area. Other western white pine appear to be resistant or have not yet been infected. Under this salvage proposal, western white pine infected with blister rust (identified with 2 or more indicators) would be harvested.

Statutory Authority

The lands involved in the proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, State colleges and universities, and other specific State institutions, such as the School for the Deaf and Blind *(Enabling Act of February 22, 1889; 1972 Montana Constitution, Article X, Section 11)*. The Montana State 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 Codes Annotated [MCA])*.

The State is required by law to establish a salvage timber program that provides for the timely harvest of dead and dying timber that is threatened by insects, diseases, wildfires, or wind on State forests. Under this requirement, DNRC shall, to the extent practicable, harvest dead and dying timber before there is substantial wood decay and value loss (*Section 77-5-207, MCA*).

On March 12, 2003, DNRC adopted Administrative Rules for Forest Management (Administrative Rules of Montana [*ARM] 36.11.401 through 450*). DNRC will manage the lands involved in this project in accordance with these Rules.

Analysis Area

The analysis area is the project area. Due to the relatively small size of the project and the fact that only salvage harvesting would take place under this proposal, wide analysis for comparison is not necessary.

The project area consists of flat ground on the western boundary that transitions into mountain slopes as you move east. Scattered small streams, springs, or wetlands are in or near the lower elevations of the project area. Elevations range between 3,600 and 4,400 feet above sea level. The primary access point to the project area is Cilly Creek Road via Soup Creek Road. Upper and Lower Cilly Ridge Roads, which have restricted access, are located near mileposts 1.00 and 1.88, respectively, on the Cilly Creek Road, and access all salvage units for this project. The roads and salvage units are all within Swan River State Forest's blocked lands; therefore, no adjacent landowners are involved with this project.

GOALS AND OBJECTIVES

Cilly Bug Salvage Timber Sale Project goals and objectives:

- The primary goal is to apply proven forest-management techniques and timber salvage practices to the forest's persistent disease problems and ongoing insect outbreaks in an economical, practical, and ecologically acceptable manner.
- Reduce or halt bark beetle damage, particularly from Douglas-fir bark beetles, and salvage recently killed or live insect-infested or severely diseased Douglas-fir, western larch and western white pine.
- Recover revenue for the school trust and comply with the State statute by salvaging trees that have been killed or damaged by wind, diseases, and/or insects.
- Reduce the risk of catastrophic fire to DNRC lands and adjacent landowners by reducing forest fuel loading caused by windthrown timber or dead and dying standing timber.
- Contribute 500 to 700 mbf to the Northwestern Land Office (NWLO) portion of the annual timber harvest on State trust lands as required by State law (*77-5-221 through 223, MCA*).
- Salvage timber in a manner that complies with SVGBCA, the Montana Best Management Practices (BMPs) for timber harvests, and other applicable laws, rules, standards, and guidelines.

II. PROJECT DEVELOPMENT

1. PUBLIC INVOLVEMENT, AGENCIES, GROUPS OR INDIVIDUALS CONTACTED:

Provide a brief chronology of the scoping and ongoing involvement for this project.

The initial scoping packet included the project information sheet and cover letter signed by Dan Roberson, decisionmaker for this CEA, and a request for comments. The packet was mailed August 13, 2004 to landowners, Agency representatives, various Agency resource specialists, and all interested parties. The comment period was open until September 27, 2004. Scoping notices were also sent to the *Bigfork Eagle* and *Daily Interlake* newspapers. *APPENDIX B - SCOPING DOCUMENTATION* lists all recipients of the scoping proposal. Three comments were received: Craig Kamps, Stoltze Land and Lumber; Neil Meyer, Swan Valley Ad Hoc Committee; and Arlene Montgomery, Friends of the Wild Swan. Two comments favored the project; the other has several questions and concerns, but did not take a position. The questions and concerns expressed in each of the responses will be addressed as a part of this document. An amendment letter, mailed out on November 18, 2004, amended the original scoping notice by explaining to the public that approximately 1 mile of new road would be necessary to properly conduct this project. The original notice stated that no new roads would be required. No additional comment period was specified although the public was urged to contact the DNRC as quickly as possible if they had concerns. As of January 4, 2005 no additional comments were received.

The Montana Department of Fish, Wildlife, and Parks (DFWP) has jurisdiction over the management of fisheries and wildlife populations in the project area. DFWP is on the mailing list and has received the scoping letter.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:

DNRC is a member of the Montana Airshed Group, which regulates slash burning through air quality and weather monitoring on DNRC lands. DNRC receives an air-quality permit for burning slash through participation in this group. An air-quality permit is the only permit needed for this salvage project.

The SVGBCA, a cooperative agreement between DNRC, DFWP, the United States Fish and Wildlife Service (USFWS), and the United States Forest Service (USFS) is currently in effect. This

agreement defines mitigation measures for operating in the Grizzly Bear Recovery Zone. The project will operate within the parameters of the SVGBCA for timber harvesting.

3. ALTERNATIVES CONSIDERED:

NO-ACTION ALTERNATIVE

- No timber would be salvaged, though firewood gathering in some areas would likely continue.
- When funding is available and equipment is in the area, roads and closures would be maintained.
- Wildfire suppression efforts would continue.
- Efforts to control the spread of noxious weeds would continue.
- No forest-improvement work would take place in the near term, but may take place in the future as time and funding permit.
- Future actions, including timber harvesting, would be proposed and go through the appropriate environmental analyses.

ACTION ALTERNATIVE

- Salvage 500 to 700 mbf of timber in the form of trees killed or severely damaged by insects, diseases, and/or abiotic causes before the commercial value is lost.
- Maintain roads and address sediment, surface, drainage, or erosion problems. Aproximately 1.3 miles of new road would need to be constructed to harvest the timber and meet current BMPs.
- Reduce the buildup of woody fuels to moderate levels through timber harvesting, slash piling, and burning, while providing habitat for wildlife species that require snags and down woody debris.
- Wildfire suppression efforts would continue.
- Efforts to control the spread of noxious weeds would continue.
- Apply proven forest-management principles to improve the growth and vigor of these stands.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

Consider the presence of fragile, compactable or unstable soils. Identify unusual geologic features. Specify any special reclamation considerations. Identify any cumulative impacts to soils.

INTRODUCTION

The proposed project area lies in the lower portions of the Swan River valley. Glacial moraines formed the unnamed watersheds in the proposed project area. The dominant soil types found in the project area are deep glacial tills and glacial outwash.

ANALYSIS METHODS

Soil productivity will be analyzed by evaluating the current levels of soil disturbance in the proposed project area. Analysis criteria will also include soil stability risk factors.

ANALYSIS AREA

The analysis area for evaluating soil productivity will include DNRC-owned land in the proposed project area.

EXISTING CONDITIONS

Approximately 35 acres of the proposed project area have been salvage harvested in the past. Harvesting and salvaging was conducted in and around the proposed project area in the 1960s. Harvest methods in previously salvaged areas (proposed Unit 1 and a small portion of proposed Unit 2) have used ground-based yarding systems. Ground-based yarding affects soil productivity through displacement and compaction of productive surface layers of soil. Proper spacing of skid trails and season-of-use restrictions are the most effective methods to minimize the loss of soil productivity. Skid trails identified in proposed salvage units are located on gentle slopes (generally less than 20 percent), appear well spaced, and are not actively eroding. These trails do not comprise more than 20 percent of the proposed harvest units.

Soil types in the project area are primarily glacial till on slopes ranging from 50 percent or more to level to rolling. The project area also contains several wetlands. High risk soil types were identified in Units 2 and 3 of the proposed project area, according to the Flathead National Forest Soil Survey. These soil types are classified as high risk due to slope steepness. Slope failures are not generally associated with the soil types in the proposed project area, and no indications of past slope failures were identified during field reconnaissance. A list of soil types found in the project area and their associated management implications is found in *TABLE B-2 - SOIL MAP UNIT DESCRIPTIONS FOR THE CILLY BUG SALVAGE PROJECT AREA.*

ALTERNATIVE EFFECTS

Direct and Indirect Effects

- ***No-Action Alternative***

  The No-Action Alternative would have no direct effects on soil productivity. No ground-based machinery would be operated under this alternative, which would leave the soil in the project area unchanged from the existing conditions.

- ***Action Alternative***

  The Action Alternative would have direct impacts on approximately 12 acres of ground. None of these acres would occur in areas previously managed for timber. Direct impacts would include compaction and displacement resulting from use of ground-based equipment to skid logs on approximately 61 acres, soil displacement in cable-yarding corridors, and from approximately 1.3 miles of newly constructed road. Activities would take place when soil is dry, frozen, or snow-covered. These impacts would leave approximately 15.7 percent of the proposed harvest units with moderate to high impacts to soils.

TABLE B-1 – SUMMARY OF DIRECT EFFECTS OF ALTERNATIVES ON SOILS

DESCRIPTION OF PARAMETER	NO-ACTION ALTERNATIVE	ACTION ALTERNATIVE
Acres of harvest	0	89
Acres of tractor yarding	0	61
Acres of skid trails and landings[1]	0	12
Acres of cable yarding	0	28
Acres of yarding corridors[2]	0	3
Acres of moderate impacts[3]	0	11
Percent of harvest area with impacts	0	12

[1] *20 percent of ground-based area*
[2] *5 to 10 percent of cable-yarding units*
[3] *75 percent of ground-based skid trails and 50 percent of cable corridors*

CUMULATIVE EFFECTS

- ***NO-ACTION ALTERNATIVE***

  This alternative would have no cumulative impacts on soil productivity. No soil would be disturbed under this alternative, and no reentry of past harvest units would occur.

- ***ACTION ALTERNATIVE***

  The salvage of proposed Unit 1 and the previously salvaged portion of proposed Unit 2 could generate cumulative effects to soil productivity. The risk of cumulative impacts is low on these acres since most of the existing trails are properly located and adequately spaced. As a result, existing trails would be used, except where they do not meet current management goals. Impacts to all proposed salvage areas would be kept to less than 20 percent of the proposed harvest area, including areas previously entered for salvage. In areas not previously salvaged or harvested, cumulative impacts to soil productivity would be similar to those described in the *Direct Effects* and *Indirect Effects* portions of this analysis.

TABLE B-2 – SOIL MAP UNIT DESCRIPTIONS FOR THE CILLY BUG SALVAGE PROJECT AREA

MAP UNIT	DESCRIPTION	SOIL DRAINAGE	ROAD LIMITATIONS	TOPSOIL DISPLACEMENT AND COMPACTION	SEEDLING ESTABLISHMENT	EROSION (BARE SURFACE)	NOTES
16	Alluvial fans	Well drained	Low to moderate	Moderate	Fair	Slight	Deep gravel and shallow surface soils. Beargrass competition common. Avoid displacement.
26A-9	Glacial till, 20-40%	Well drained	Moderate	Moderate	Good	Moderate	Deep, productive soil. Fine-textured soil remains moist; check soil moisture. Topsoil depth important.
73	Glacial trough wall, 60-90%	Well drained	Rocky, steep	Cable - moderate	Fair	High	Steep slopes, rocky soils with common rock outcrops. Cable logging recommended for slopes over 45 percent. Lop and scatter or excavator-pile slash.

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

Identify important surface or groundwater resources. Consider the potential for violation of ambient water quality standards, drinking water maximum contaminant levels, or degradation of water quality. Identify cumulative effects to water resources.

INTRODUCTION

WATER QUALITY

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

WATER YIELD

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

ANALYSIS METHODS

SEDIMENT DELIVERY

Methodology for analyzing sediment delivery will be completed using a sediment-source inventory. All roads and stream crossings were evaluated to determine sources of introduced sediment and compliance with applicable BMPs.

WATER YIELD

An analysis of water-yield increases will not be completed for the proposed project. The project proposal involves the salvage of trees killed, or in imminent danger of being killed, by forest insects and diseases. As a result, water-yield increases have already occurred or will occur through natural processes, and the proposed project would not contribute to the removal of live vegetation or subsequent water-yield increases.

ANALYSIS AREA

WATER QUALITY

The analysis will cover all stream segments within the proposed project area and all forest roads within and leading into the project area. The project area is located within the Cilly Creek watershed.

EXISTING CONDITIONS

REGULATORY FRAMEWORK

Montana Surface Water Quality Standards: According to *ARM 17.30.608 (2)(a)*, the Swan River drainage and its tributaries, including Cilly Creek, are all classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and moderate

increases are allowed over naturally occurring turbidity. "Naturally occurring," as defined by *ARM 17.30.602 (17)*, includes conditions or materials present during runoff from developed land where all reasonable land, soil, and water-conservation practices (commonly called BMPs) have been applied. Reasonable practices include methods, measures, or practices that protect present and reasonably anticipated beneficial uses. These practices include, but are not limited to, structural and nonstructural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after the completion of activities that may impact the resource.

The designated beneficial surface-water use within the project area is cold-water fishery. Beneficial uses on Cilly Creek include domestic water use approximately 1 mile downstream from the proposed project area.

Water-Quality-Limited Waterbodies: The proposed project area is located within the Cilly Creek watershed. Cilly Creek is not listed in the 1996 or 2004 List of Waterbodies in Need of Total Maximum Daily Load (TMDL) Development publication produced by the Montana Department of Environmental Quality (*DEQ, 1996, 2004*). Cilly Creek is tributary to Swan River and Swan Lake, however, and Swan Lake is listed as impaired on the 2002 List of Waterbodies in Need of TMDL Development.

Montana Streamside Management Zone (SMZ) Law: By the definition in *ARM 36.11.312(3)*, Cilly Creek is a class 1 stream. Cilly Creek flows less than 6 months per year in the reach located within the proposed project area, but does contribute surface flow to another stream and supports fish when flowing, and, therefore, meets the class 2 definition.

Forest Management Rules: By definition in *ARM 36.11.403 (95)*, each parcel of the proposed project area may contain isolated wetlands. As required in *ARM 36.11.426*, wetlands greater than one-quarter acre in size should have a 50-foot Wetland Management Zone (WMZ) delineated around their perimeter. For wetlands smaller than one-quarter acre in size, the WMZ would be delineated on the wetland border.

WATER QUALITY

The bed and banks of Cilly Creek are in stable condition through this portion of the project area, and streamside vegetation is intact with good riparian function. No bank cutting or channel degradation were noted in reaches extending through the proposed salvage area. The road system used to access the proposed project area is on moderate to gentle grades and has some surface drainage installed. Some additional surface drainage and erosion control may be needed on this road system, but no erosion or sediment delivery was identified during field reconnaissance.

DIRECT AND INDIRECT EFFECTS

- ***No-Action Alternative***

  Direct and indirect effects of the No-Action Alternative would be similar to the conditions described under *EXISTING CONDITIONS* for *WATER QUALITY*. The water quality would be unaffected by the No-Action Alternative, and Cilly Creek would continue to be affected by natural and preexisting conditions.

  No stream crossings would be replaced and no road-surface drainage would be improved or added.

- ***Action Alternative***

  The proposed project would salvage timber from approximately 89 acres. No water-yield increases are anticipated as a result of the proposed activities since the only trees proposed for removal have either been killed by insects or diseases or have been damaged by insects or diseases to the point that death is imminent. No increases in sediment delivery are expected since none of the proposed units contain a stream.

  The Action Alternative would also improve the erosion control and surface drainage where needed on all existing roads proposed for hauling in the proposed project area; these roads

would be brought up to applicable BMP standards for the duration of activity. The proposed Action Alternative would construct approximately 1.3 miles of new road to the north of Cilly Creek in Unit 2; this road would meet all applicable BMPs. No stream crossings would be constructed or replaced with the proposed project. All existing stream crossings are adequately functioning and not in need of replacement. Road-construction and surface-drainage work would increase the risk of sedimentation in the short term. Over the long term, surface-drainage-improvement activities would reduce the erosion and sediment delivery risk from the current levels and may improve water quality in the proposed project area.

CUMULATIVE EFFECTS

- ***No-Action Alternative***

  Cumulative effects of the No-Action Alternative on water quality would be similar to the situations described in the existing conditions. The water quality would be unaffected by the No-Action Alternative, and Cilly Creek in the proposed project area would continue to be affected by natural and preexisting conditions.

- ***Action Alternative***

  Past activity in the proposed project area has mainly consisted of timber harvesting. On sites where timber was harvested, there has been substantial vegetative recovery with no apparent impact to sediment delivery.

The risk of sediment delivery in the proposed project area would be reduced from current levels. Improvement of surface drainage and erosion control on the existing road system would lower the long-term risk of sediment loading to live streams or Swan River.

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6. AIR QUALITY:
What pollutants or particulate would be produced? Identify air quality regulations or zones (e.g. Class I air shed) the project would influence. Identify cumulative effects to air quality.

INTRODUCTION

The project is within Montana Airshed 2 and is not within a Class 1 Airshed. Air quality within this airshed is considered good. Temporary, local reductions in air quality currently occur from wildfires, prescribed broadcast burns, slash burning, and road dust.

Direct and Indirect Effects

- ***No-Action Alternative***

  The existing condition would not change.

- ***Action Alternative***

  Postharvest burning would produce smoke emissions; log hauling and other project-related traffic on dirt roads would temporarily increase road dust during dry periods. Due to the relatively small size of the project, no temporary increases are expected to exceed standards or impact local population centers if burning is completed within the requirements imposed by the Montana Airshed Group and logs are hauled primarily during winter months as planned.

Cumulative Effects

- ***No-Action Alternative***

  The existing condition would not change.

- *ACTION ALTERNATIVE*

  Additional smoke produced from prescribed burning on adjacent USFS, private, and State trust forestland would remain within the standards for air quality, but cumulative effects during peak burning periods could affect individuals with respiratory illnesses at local population centers for short durations. All known major burners operate under the requirements of the Montana Airshed Groups, which regulate the amount of emissions produced cumulatively by major burners.

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7. VEGETATION COVER, QUANTITY AND QUALITY:

What changes would the action cause to vegetative communities? Consider rare plants or cover types that would be affected. Identify cumulative effects to vegetation.

INTRODUCTION

The following analysis provides a detailed description of the present conditions of the forest and addresses the potential effects of the proposed alternatives in relation to the following:

- The condition of several stands within the project area is being severely impacted by various forest insects, diseases, and/or abiotic factors.
- The ongoing Douglas-fir bark beetle outbreak would likely cause significant, additional tree mortality if salvage harvesting does not remove active brood trees. To the greatest extent possible, trees, especially brood trees, would be removed this winter through March 31. However, the contract would continue until March 31, 2006 to allow 2 winter seasons and one 30-day operating period (consistent with the SVGBCA) during the summer season (June 16 through August 31).
- The risk of catastrophic fires would increase on Swan River State Forest and adjacent lands if standing dying, dead, and/or down woody fuels (trees) are not removed. Three recent lightning strikes on 2 snags and 1 live tree were observed within the proposed salvage units; the heavy rains occurring in conjunction with the thunderstorm appear to have prevented a wildfire.
- Harvesting would remove significant numbers of dead, dying, severely diseased, windthrown, and damaged trees in the harvest units; individual snags and groups of snags would be retained as habitat for snag-dependent species. Snag-recruitment issues would also be addressed.

BACKGROUND

As a whole, the forest has an ongoing and severe bark beetle problem. Douglas-fir bark beetles, mountain pine beetles, fir engravers, and flatheaded fir borers are currently attacking trees on Swan River State Forest. The Douglas-fir bark beetle and flatheaded fir borer have caused extensive tree mortality within the project area. (See *APPENDIX D - FOREST INSECT AND DISEASE REPORT* for further discussion). The flatheaded fir borer attacks are a fairly recent development. The attacks in the project area started approximately 2 years ago, but live larvae were found in recently dead western larch trees in the project area in the late summer of 2004.

DNRC is required by law to establish a timber program that provides for the timely salvage of dead and dying timber that is threatened by insects, diseases, wildfires, or windthrow on State forests (*Section 77-5-207, MCA*). Under this requirement, DNRC shall, to the extent practicable, harvest dead and dying timber before there is substantial wood decay and value loss.

CURRENT HABITAT TYPES AND FOREST PRODUCTIVITY WITHIN THE PROJECT AREA

All stands within the project area are a grand fir habitat type. Three of the 4 stands are in the warm, moist habitat-type group, and the other is in the moderately cool habitat-type group. Forest productivity (growth) is rated as high on these stands. These stands typically contain varying

populations of Douglas-fir, western larch, western white pine, lodgepole pine, ponderosa pine, black cottonwood, white paper birch, yellow birch, grand fir, Engelmann spruce, western red cedar, and subalpine fir.

Past Management Activities

Inventory records show that past timber harvesting in the project area began in the early 1950s. The following information pertains to timber sales in, and adjacent to, the Cilly Creek Salvage Timber Sale Project area:

- Since the early 1950s, salvage harvesting has taken place in areas of low elevation throughout Swan River State Forest. Most harvesting in the project area has been on a small scale and has consisted of salvage sales only. Green timber sales over 25 years ago resulted in small clearcuts in the project area. These stands have successfully and completely revegetated and are heavily stocked with trees 25 to 45 feet tall. The last entry into the project area was in 1999, when the small Cilly Bug Timber Sale salvaged beetle-killed Douglas-fir.

VEGETATION: COARSE-FILTER ANALYSIS

AGE CLASS AND COVERTYPES

Existing Condition

The stands in the project area consist primarily of a Douglas-fir overstory, with co-dominant western larch. Grand fir is the predominant understory species. Western white pine, western red cedar, Engelmann spruce, and lodgepole pine are dispersed throughout the project area, but appear mainly at lower elevations and comprise a minor component of the project area stands. These stands are classified as old stands 150 plus years old, 2 of the stands meet DNRC old-growth criteria. These stands are highly decadent and are in an advanced state of decline due to insect and disease attacks. Previous salvage efforts and recently dead and dying Douglas-fir have created numerous small openings that have filled in with seedlings, saplings, and various brush species. Regeneration is primarily grand fir, with minor amounts of Douglas-fir, western white pine, western larch, western red cedar, and Engelmann spruce.

Direct and Indirect Effects

- ***No-Action Alternative***

  The project area has light to severe damage and/or mortality scattered throughout. If the proposed salvage would not occur in these stands, the shade-tolerant trees would continue to regenerate, changing the dominant tree/covertype from seral to climax species. The long-term covertype would change to an overstory dominated principally by grand fir. Age class for the stand would continue to decrease as the older Douglas-fir, western white pine, and western larch die from the effects of insect and pathogen attacks.

- ***Action Alternative***

  The salvage units would be concentrated in the areas hardest hit by beetle attacks. More moderately affected areas may, at some future time, be treated under a management plan that is not tied directly to salvage. Salvaged areas would open up numerous small areas within the project area to allow seral species an opportunity to regenerate. Since the trees targeted for removal were already killed or are dying from natural events, stand covertype and age-class composition would not change beyond what is naturally occurring. The covertype effects would not be significantly different from the No-Action Alternative.

Cumulative Effects

- ***No-Action Alternative***

  The brood trees of the Douglas-fir bark beetle would not be removed. Covertypes would quickly shift as overstory Douglas-fir trees die from continued bark beetle activity and are replaced by other species, primarily grand fir. In the short term, the stand would become more open as trees are harvested under potential future salvage projects or as they die and fall. Over the long term, the stand would fill in with the shade-tolerant species that are already growing.

  As beetle-infested trees die and the younger shade-tolerant trees begin to move into the dominant class, the age class of the stand would change to that of a younger stand.

- ***Action Alternative***

  Because Douglas-fir, a dominant overstory species, are being attacked by Douglas-fir bark beetles in the project area, the stand composition would change. Some portions of the project area would become predominantly grand fir, others would regenerate to seral species that may take advantage of the small openings created during salvage operations. These openings would be created significantly sooner and be relatively larger than if they were generated naturally. Combined with soil disturbance and removal of a majority of the large woody debris, the openings would significantly increase the opportunity for seral species to regenerate.

  The stand's age class would change to that of a younger stand as beetle-infested trees die and the current understory of younger shade-tolerant trees begin to move into the dominant class. The natural regeneration of the salvaged areas would also reduce the stand age class. The removal of brood trees, however, would allow more of the unaffected large older trees to survive, thus, moderating the change in age classes for the affected stands.

FRAGMENTATION

Existing Condition

Swan River State Forest lands and adjoining properties display a pattern of fire-generated stands overlain by human-generated stands of harvest units and land clearing. The Swan River State Forest's Stand-Level Inventory (SLI) database shows that timber stands are delineated along natural and human-generated boundaries. The natural boundaries fall along edges of moisture regimes, age classes, soil types, topographic features, and fire influences that created visible differences in timber-stand characteristics. The human-generated boundaries follow property, natural, and past-harvest boundaries. Stand size is highly variable.

Direct and Indirect Effects

- ***No-Action Alternative***

  Forest fires and timber harvesting on adjacent ownerships would continue to change existing patterns and edges associated with forest patch size and shape.

- ***Action Alternative***

  Existing patterns and edges associated with forest patch size and shape would not change except through forest management on adjacent ownerships or wildfires. Stand boundaries would not change. This is due to stand composition density and structure not being significantly altered enough to create a fragmented stand.

Cumulative Effects

Forest fires and timber harvesting on DNRC-managed lands and adjacent ownerships would continually change existing patterns and edges associated with forest patch size and shape.

OLD GROWTH

Existing Condition

The SLI lists 2 of the 4 stands being analyzed for this salvage harvest project as old growth; these are Stand 24 in Section 16 and Stand 8 in Section 15. Field verification confirms that both of these stands qualify as old growth under current DNRC criteria. In addition, the remaining 2 stands (Stand 16 in Section 16 and Stand 10 in Section 15), which are located just north of Stands 8 and 24, were field-checked and were determined to not meet current old-growth criteria. Stand 16 was checked by collecting field data and Stand 10 was visually inspected.

DNRC has adopted *Green et al (1992)* to define old growth on State lands. This definition is based on the number, age, and size of trees over a specified diameter at breast height (dbh) per acre based on habitat type and covertype. The SLI provides the initial data for labeling stands as old growth. At the project level, stands identified as old growth through the SLI are verified through field reconnaissance and/or the collection of field data from the project stands.

Direct and Indirect Effects

Portions of the 2 old-growth stands would be harvested. However, since the only trees harvested are either dead or dying, any effect from this salvage operation would mimic natural events with regard to these stands meeting the old-growth criteria. Old-growth attributes would be effected by reducing snags in larger diameter classes and by removing a minor amount of down and woody material greater than 3 inch diameter. After harvest it is anticipated that there would be 15 to 20 tons per acres of down woody material, and the number of snags reserved in all size classes would still provide diversity. The number of large snags reserved would exceed requirements under the Forest Management Rules and would consist of all commercial species.

Cumulative Effects

General site characteristics and past road construction, timber harvesting, insect and disease events, weather events, and wildfires have led to the current forest structure and composition. The overall composition of the forest is not expected to change under either alternative since only dead, down, damaged, diseased, and dying trees are being considered for harvesting. Other active timber sales in the area include the Big Blowdown, Goat Squeezer, and Goat Squeezer II timber sales. Both Goat Squeezer sales harvested green trees, but no old growth. The Big Blowdown sale salvages timber that is dead, down, damaged, diseased, and dying in old-growth stands. Essentially, that same approach would be followed in this project. Based on the harvesting of trees as described above, the impacts to old-growth stands would be very similar to what would occur naturally. Impacts from this project would be minimal under either alternative.

FIRE EFFECTS

Existing Conditions

Wildfire hazards in these stands are above natural levels, with moderate to high accumulations of downed woody debris in all size classes and increased ladder fuels. On-the-ground fuel loads would increase significantly if the current and future snags killed by the current cycle of insect and disease attacks begin to fall over or break off above the ground. The encroachment and establishment of young shade-tolerant trees, coupled with the continuing mortality of dominant and co-dominant trees caused by beetle kill and windthrow, are increasing fuel loads and, therefore, catastrophic fire risks.

Direct and Indirect Effects

- ***No-Action Alternative***

  The risks of wildfire would continue to increase over time. With continued accumulations of large and fine fuels, snags, ladder fuels, and deadwood components, the risk of a stand-replacement fire would increase.

- ***Action Alternative***

  The proposed salvage would remove a significant portion of the dead and dying large woody fuel material. These treated areas would see short- and long-term fire hazards reduced. Immediately following the salvage harvesting, the amount of fine, flashy fuels would moderately increase. Scattering slash and cutting limbs and tops to lay low to the ground to hasten decomposition, coupled with yarding trees to landings and piling slash for later burning would reduce fire hazards. Residual fuel loads after harvesting would be within the range of 15 to 20 tons per acre.

Cumulative Effects

- ***No-Action Alternative***

  The risk of stand-replacing wildfires in historically nonlethal regimes would continue to increase as a result of forest fuel acummulation.

- ***Action Alternative***

  Fuel loads would be reduced in stands that are treated with salvage harvests, thus, wildfire risks in these specific areas would be reduced. Similar treatments on other sales would decrease fire hazards as well.

FOREST INSECTS AND DISEASES

Existing Conditions

A number of insects, pathogens, and abiotic factors are significantly and adversely altering stand productivity, structure, and composition in a large part of the project area (see *APPENDIX D - FOREST INSECT AND DISEASE REPORT*). Stands are rapidly declining as the number of healthy trees continues to fall.

Direct and Indirect Effects

- ***No-Action Alternative***

  Trees would continue to be lost from the project area due to insects and diseases. Stand growth and vigor would continue to decline as insect infestations and disease infections spread unchecked. Stand composition would be significantly altered as seral tree species are killed and replaced by shade-tolerant species, primarily grand fir.

- ***Action Alternative***

  This salvage harvest would remove Douglas-fir that host active bark beetle broods and those that have been recently killed by insect attacks. Western larch trees would be removed if they are dead or if mistletoe infection is a 5 to 6 on the Hawksworth scale (see *APPENDIX D - FOREST INSECT AND DISEASE REPORT*). Mortality would be reduced within these stands by reducing beetle populations and, thereby, limiting further attacks. Top-killed or obviously blister-rust-infected western white pine would be harvested. Small amounts of lodgepole pine, Engelmann spruce, and grand fir would also be harvested. All of these efforts would reduce the future and immediate threat of insect attacks and disease infections spreading to the remaining healthy trees.

Cumulative Effects

- ***No-Action Alternative***

  Dead or dying trees would not be harvested. These stands would continue to significantly decline with loss of growth and volume per acre due to insect and disease mortality. Fuel loading would continue to increase. Current forest conditions would continue throughout Swan River State Forest. Nearby timber sales are harvesting insect-infested and disease-infected wood. In the immediate project area control of these insect and disease outbreaks would be through natural means only.

- ***Action Alternative***

  Harvesting infected trees on this project, in combination with harvesting efforts on the Big Blowdown and Goat Squeezer and Goat Squeezer II timber sales, would reduce the overall threat of Douglas-fir bark beetle attacks in the area. The risk of increasing attacks on western larch from flatheaded fir borers would also decrease. The risk of further attacks in the project area could be reduced significantly in the short term.

SNAGS

Existing Condition

The project area contains a large number of snags in all diameter classes. Snags in larger diameter classes (over 21 inches) are common throughout the project area and are heaviest to the south and west. Predominant species of large snags are western larch and Douglas-fir. Western white pine and grand fir occur in this size class incidentally. Sample snag surveys show the north end of the project area averages 6.8 snags per acre 21 inches dbh and greater and 15.3 snags per acre 15 inches dbh and greater. The south end of the project area averages 9.3 snags per acre 21 inches dbh and greater and 13.3 snags per acre 15 inches dbh and greater.

There are numerous snags per acre between 8 and 15 inches. All tree species common to the area are represented.

Direct and Indirect Effects

- ***No-Action Alternative***

  Snag numbers in all of the stands would continue to increase. Due to restricted access, firewood losses would be minimal or not occur. Short-term snag recruitment would be accelerated due to the number of trees under attack from insects and diseases.

- ***Action Alternative***

  In Stands 8, 10, 16, 19, and 24, snags per acre that are 15 inches dbh in diameter and larger would be reduced to a minimum of 4 to 7 per acre. Snags 21 inches dbh and larger would be reduced to 2 to 4 per acre (see *APPENDIX A - WILDLIFE ANAYSIS*). Snag density after harvesting on any given acre of land would vary based on the original snag numbers. A large portion of the merchantable snags would be harvested. Residual snags would be well scattered throughout the portion of the stand that would be salvaged, although some snags in Stands 16 and 10 may be clumped together in small groups as well as scattered. All snags that have nesting-cavity openings would be reserved from cutting.

  Snags that are considered merchantable, but are reserved for wildlife, would be marked on the uphill and downhill sides with a blue "W". A total count of reserve snags would be kept for each harvest unit.

Cumulative Effects

- *No-Action Alternative*

  Snags in the project area would continue to increase, especially in the larger diameter classes of Douglas-fir. Snag recruitment in and around the project would be accelerated due to the large number of trees under attack from insects and diseases. The total number of snags in all size classes in all stands would increase.

- *Action Alternative*

  In harvest areas within Stands 10, 16, and 24, the majority of snags would be harvested; therefore, the snags per acre would decrease. Live trees with active bark beetle attacks or severe dwarf misteltoe infection would also be harvested, thereby, reducing the number of Douglas-fir and western larch, the primary snag-recruitment species in these stands. However, unharvested areas of stands and surrounding stands would continue to provide snags in the 10- to 20-inch and 21-inch-plus size classes. The number of reserve snags over 21 inches in all harvest units would be greater than the minimum required by the Administrative Rules for Forest Management. Firewood cutting would have minor effects on the number of snags.

SENSITIVE PLANTS

Existing Condition and Analysis Methodology

Swan River State Forest had a sensitive plant survey completed on all State lands within the forest boundaries; fieldwork was finished in the summer of 2003. Plants targeted were species of special concern listed by the Montana Natural Heritage Program. Results of this survey were then compared to the proposed harvest sites for potential direct and indirect impacts of the proposal. No sensitive plant species are known to exist in the project area. If sensitive species were discovered during operations, appropriate mitigation measures would be developed, if needed.

Direct, Indirect, and Cumulative Effects

No short-term or cumulative impacts on sensitive plants are anticipated from this project.

NOXIOUS WEEDS

Existing Condition

Spotted knapweed (*Centaurea mauclosa*) has become established along roads within the project area. Swan River State Forest has a program to reduce the spread and occurrence of noxious weeds.

Direct and Indirect Effects

- *No-Action Alternative*

  Swan River State Forest may initiate spot spraying under the Forest Improvement (FI) program to reduce noxious weeds along roads in the forest.

- *Action Alternative*

  Logging disturbance may provide opportunities for noxious weeds to establish; log trucks and equipment may introduce seeds from other sites. Mitigation steps would require machinery to be washed and inspected prior to entering the project area. Grass seeding disturbed roads and landings would reduce or prevent the establishment of new weed populations. Roadside herbicide spraying is not planned as a part of this project. Swan River State Forest may initiate spot spraying under the FI program at a later date to reduce noxious weeds along roads.

CUMULATIVE EFFECTS

- ***NO-ACTION ALTERNATIVE***

  The No-Action Alternative would have negligible effects on the weeds in the area. If spraying were initiated in the area, weed populations would be reduced.

- ***ACTION ALTERNATIVE***

  Following the above mitigation measures; this alternative is expected to have negligible effects on the noxious-weed population. If spraying were initiated in the area, weed populations would be reduced.

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8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:
Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify cumulative effects to fish and wildlife.

Wildlife and avian discussions and concerns are addressed in *APPENDIX C – WILDLIFE ANALYSIS*.

Impacts to streams are discussed under item 5 (*WATER QUALITY, QUANTITY AND DISTRITUBTION*) of this document. Impacts to streams are minimal to none; thus, impacts to fish would be very slight to none. Brook trout are known to inhabit Cilly Creek below the project area. Through the lower part of the project area Cilly Creek is dry with all flow going subterranean. No impacts to fish or the stream itself below the project area are expected. In the upper half of the project area Cilly Creek has surface flow, but contains no fish (verified by DFWP). No impacts to fish populations are expected.

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9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:
Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

The proposed salvage units are not near any known sensitive wetlands or upland sites. The Foothills Meadow wetland area, a different drainage than any in the project area, is approximately 4,000 feet to the south-southwest. Several small springs were located very near the bottom of the project area in Stand 16. These springs flow into the ditch along Lower Cilly Ridge Road and all appear to go dry shortly after crossing the road. Mitigation for these springs is discussed under item 5 (*WATER QUALITY, QUANTITY AND DISTRITUBTION*). The area where the springs surface and flow down to Lower Cilly Ridge Road would not be included in a salvage unit.

This analysis considers species of special concern and threatened and endangered species in *APPENDIX C – WILDLIFE ANALYSIS*.

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10. HISTORICAL AND ARCHAEOLOGICAL SITES:
Identify and determine effects to historical, archaeological or paleontological resources.

Historical and archaeological sites are not known to be located on the project area.

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11. AESTHETICS:
Determine if the project is located on a prominent topographic feature, or may be visible from populated or scenic areas. What level of noise, light or visual change would be produced? Identify cumulative effects to aesthetics.

None of the project areas are visible from any open road. The project areas are near an open road, but the short duration of the actual harvesting, combined with the wintertime schedule for completing a majority of the work, would create no significant long- or short-term effects to aesthetics.

Harvesting and road construction in the summer would create minor impacts due to a short operating period and restricted access. The proposed new road would not be visible from any open roads or viewpoints. Few green trees are planned for cutting so the viewshed will not appreciably change.

12. DEMANDS ON ENVIRONMENTAL RESOURCES OF LAND, WATER, AIR OR ENERGY:
Determine the amount of limited resources the project would require. Identify other activities nearby that the project would affect. Identify cumulative effects to environmental resources.

None.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:
List other studies, plans or projects on this tract. Determine cumulative impacts likely to occur as a result of current private, state or federal actions in the analysis area, and from future proposed state actions in the analysis area that are under MEPA review (scoped) or permitting review by any state agency.

The Goat Squeezer Environmental Impact Statement (EIS) and the Big Blowdown Environmental Assessment (EA) were considered in the cumulative effects analysis.

In relation to grizzly bears, cumulative effects of timber management and road construction were analyzed in the EA and Biological Opinion for the SVGBCA (*USFWS, 1995a and 1995b*). Timber harvesting and road use related to the proposed alternative would be conducted in accordance with this agreement (*USFWS et al, 1997*).

IV. IMPACTS ON THE HUMAN POPULATION

- *RESOURCES potentially impacted are listed on the form, followed by common issues that would be considered.*
- *Explain POTENTIAL IMPACTS AND MITIGATIONS following each resource heading.*
- *Enter "NONE" If no impacts are identified or the resource is not present.*

14. HUMAN HEALTH AND SAFETY:
Identify any health and safety risks posed by the project.

None.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:
Identify how the project would add to or alter these activities.

Approximately 500 to 700 mbf of logs will be made available to the wood-products industry.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:
Estimate the number of jobs the project would create, move or eliminate. Identify cumulative effects to the employment market.

The wood-products industry currently employs people in this area. Due to the relatively small size of this project, the proposed action would result in no significant changes to local employment, but would provide loggers with wintertime employment that may not otherwise be available in this area.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

People currently employed in the wood-products industry in this region are paying income and business taxes. Due to the relatively small size of this salvage project, the proposed action would result in no measurable cumulative impact on tax revenues. However, this sale will produce enough logs for one medium-sized mill in the area to operate 4 to 6 weeks, which may result in the payment of additional corporate taxes.

18. DEMAND FOR GOVERNMENT SERVICES:

Estimate increases in traffic and changes to traffic patterns. What changes would be needed to fire protection, police, schools, etc.? Identify cumulative effects of this and other projects on government services

The demand for government services would not be cumulatively impacted as a result of this proposal. The predominately winter operating period would have minimal impacts to traffic, and the probability of a few people temporarily relocating to the area would be low.

19. LOCALLY ADOPTED ENVIRONMENTAL PLANS AND GOALS:

List State, County, City, USFS, BLM, Tribal, and other zoning or management plans, and identify how they would affect this project.

In March 2003, DNRC adopted Administrative Rules for Forest Management (*ARM 36.11.401 through 450*). DNRC will manage lands involved in this project in accordance with the Rules.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:

Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

EXISTING ENVIRONMENT

The Cilly Bug Salvage Timber Sale Project area receives light to moderate recreational use throughout the year. The area is primarily used for firewood gathering, snowmobiling, bicycling, hiking, and hunting.

DIRECT AND INDIRECT EFFECTS

- ***NO-ACTION ALTERNATIVE***

  Recreational uses would not change.

- ***ACTION ALTERNATIVE***

  All parts of this project are behind locked gates on restricted roads. Harvesting is planned for the winter months outside of the hunting season and for a 30-day period in the summer of 2005. Short delays due to log hauling, road grading, and snowplowing may inconvenience recreationists; however, recreational use in the project area is not expected to change with the implementation of this project. The closed roads would be open to logging traffic only during harvesting operations.

  The status of the closed roads used to access this project would not change with project implementation.

Cumulative Effects

- ***No-Action Alternative***

  Recreational use is not expected to change.

- ***Action Alternative***

  The log-hauling activities of this project utilize the first 3.8 miles of Soup Creek Road and the first 1.8 miles of Cilly Creek Road, both open roads. Logging traffic may displace recreational use to adjacent areas for a short time. All levels of existing recreational use on Swan River State Forest are expected to continue.

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21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:
Estimate population changes and additional housing the project would require. Identify cumulative effects to population and housing.

Due to the relatively small size of this project and the fact that people are already employed in the forest-products industry in the region, no measurable cumulative impacts related to population and housing would be expected.

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22. SOCIAL STRUCTURES AND MORES:
Identify potential disruption of native or traditional lifestyles or communities.

None.

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23. CULTURAL UNIQUENESS AND DIVERSITY:
How would the action affect any unique quality of the area?

None.

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24. OTHER APPROPRIATE SOCIAL AND ECONOMIC CIRCUMSTANCES:
Estimate the return to the trust. Include appropriate economic analysis. Identify potential future uses for the analysis area other than existing management. Identify cumulative economic and social effects likely to occur as a result of the proposed action.

Direct and Indirect Effects

- ***No-Action Alternative***

  Since there is no direct economic activity associated with the No-Action Alternative, local employment or wages would not be affected and there would be no monetary return to the trust.

- ***Action Alternative***

  The potential benefit to the trust can be estimated by looking at recently sold timber sales in the area and adjusting for the degree of difficulty of this proposed sale compared to the recently sold timber sales. Recent sales of sawlog material have sold in the range of $43 to $48 per ton. These sales had slightly lower logging costs than this sale would have, though road costs on a per ton basis are roughly the same. To estimate this sale, we will take the average of the above values and reduce it by $5 per ton. Hence the average of $45.50 minus $5.00 equals $40.50 per ton. Using 600 MBF times 5 tons per MBF equals 3,000 tons; 3,000 tons times $40.50 per ton equals $121,500. This is a potential return to the trust and is higher than the

appraised value would be. This figure assumes a highly competitive market with several interested parties. This calculation is not an actual appraisal of the projected timber sale.

The average employment and wage effects are found in the table below. This project is estimated to create the equivalent of 6.88 jobs. These would not necessarily be new jobs but would be employment in the winter months primarily when jobs typically are scarce for loggers.

TABLE 24-1 AVERAGE EMPLOYMENT IMPACT – ACTION ALTERNATIVE

	Employment	Wages
Average	10.58 jobs/MMBF	$34,000 per job
Estimate effect of sale	6.35 jobs	$215,900

CUMULATIVE EFFECTS

- ***NO-ACTION/ACTION ALTERNATIVES***

  If the dead and dying trees are not salvage harvested, their commercial value and the benefits described above would be permanently lost to the trust and to the local and State economy.

EA Checklist Prepared By:	**Name:** Roger M. Ziesak		**Date:** December 23, 2004
	Title: Forest Management Supervisor		

V. FINDING

25. ALTERNATIVE SELECTED:

Two alternatives are presented and fully analyzed in the CEA:

- No-Action Alternative - includes existing activities, but does not include a 500 to 700 MBF timber sale salvage permit.
- Action Alternative - In addition to existing activities, the Action Alternative proposes preparing a Timber permit that salvage harvests a total of 500 to 700 MBF of timber from approximately 100 acres and constructs approximately 1.3 miles of new road.

I have reviewed the correspondence from the public and information presented in the CEA. For the following reasons, I have selected the Action Alternative without additional modifications:

- The selected Action Alternative meets the goals and objectives listed in the checklist.
- The analysis of identified issues did not reveal information to persuade DNRC or myself to choose the No-Action Alternative.
- The project area is located on State-owned lands that are principally valuable for the timber that is on them (*77-1-402 MCA*). DNRC manages these lands according to the standards adopted by the Administrative Rules for Forest Management (*ARM 36.11.401* through *450*) and the philosophy within the SFLMP, which states:

Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests ... In the future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives.

- The proposal provides an important mechanism to manage intensively for healthy and biologically diverse forests in a way that harvests dead timber before a substantial value loss occurs while limiting environmental impacts.
- As mandated by State statute *77-5-222, MCA*, the proposed sale will contribute to DNRC's sustained yield.

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26. SIGNIFICANCE OF POTENTIAL IMPACTS:

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

- The proposed salvage project conforms to the management philosophies of DNRC and is in compliance with existing laws, rules, policies, and standards applicable to this type of proposed action.
- The Action Alternative will not preclude analyses of future actions on State land.
- Mitigations and specifications identified in *APPENDIX A - STIPULATIONS AND SPECIFICATIONS* of the CEA will be implemented as prescribed.
- The proposed activities, similar to past projects on State lands, use common practices in the industry and are not being conducted on unique or fragile sites.

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27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

Based on the following, I find that a more detailed EA or an EIS does not need to be prepared:

- The CEA adequately addressed the issues identified during project development and displayed the information needed to make the decisions.
- Evaluation of the potential impacts of the proposed Cilly Bug Salvage indicates that no significant impacts would occur.
- The ID Team provided adequate opportunities for public review and comment. Public concerns were incorporated into the project design and analysis of impacts.

☐	EIS	☐	More Detailed EA	☒	No Further Analysis

EA Checklist Approved By:	**Name: Daniel J. Roberson** **Title: Unit Manager**
Signature:	Daniel J Roberson **Date:** 1/7/05

APPENDIX A

SPECIFICATIONS AND STIPULATIONS

SALVAGE CRITERIA

The following salvage criteria identify requirements that must be met before a timber sale can be harvested under this CEA.

TREES TO BE HARVESTED

Trees that meet 1 or more of the following requirements:

A. All harvest trees outside of the road right-of-way have been marked at dbh or above with a blue horizontal paint stripe. The criteria listed below were used for selection. Any additional trees approved for harvesting must meet these criteria. All trees within the road right-of-way both merchantable and nonmerchantable will be cut.

   a. Dead and/or dying timber, including insect-attacked Douglas-fir, western larch, western white pine, grand fir, and lodgepole pine. A tree with definite insect attack/damage (frass, pitch seams, pitch tubes, beetle galleries, bore holes) is considered a dying tree. Insect attack may be from Douglas-fir bark beetles, mountain pine beetles, flat-headed fir borers, or Scolytus beetles.

   b. Western white pine infected with white pine blister rust that exhibit a combination of 2 or more of the following characteristics: blister-rust canker on the bole, red blister-rust flagging in the lower two-thirds of the crown, dead tops, pitch flows on the stem, and poorly colored crowns (yellowing needles).

   c. Blown down timber of any commercial species.

   d. Any commercial species (grand fir, western larch, western white pine, Douglas-fir, Engelmann spruce, lodgepole pine) damaged by wind (damage to 1/3 or more of the bole and/ or root systems pulled out of the ground).

   e. Commercial species that are infected, dead, or dying from disease. Western larch must score a 5 or 6 on the Hawksworth scale (used to measure degree of infection for mistletoe) to be eligible for salvage.

SNAGS

Snag retention will meet or exceed the Forest Management Rules per-acre requirement in the harvest units. All merchantable snags that are to be left standing have been marked with a blue "W" on 2 sides to designate them as wildlife trees. Nonmerchantable snags will not be cut except for safety or operational concerns, as approved by the Forest Officer.

ROADS and SKID TRAILS

Existing roads and skid trails must be used to remove harvested material in Unit 1. Units 3 and 4 are winchline units to be yarded to the existing road. The new road in Unit 2, as well as the existing road, will be used for cable-yarder landings. Corridors for line skidding are not planned. If the operator finds an area where this may prove to be the most effective method for removing logs, it must be approved by the Forest Officer prior to cutting the corridor and yarding the timber. In Unit 2, existing skid trails should be used whenever practical for tractor ground.

ROAD CONSTRUCTION

All road construction activities are restricted to the road corridor defined by the clearing limits. Clearing limits are marked with yellow paint. Slash must be piled in natural openings or constructed burn bays for burning. Right-of-way slash will be piled and burned by the Purchaser.

STREAMSIDE MANAGEMENT ZONES

Minimal harvesting is planned in small portions of SMZs and WMZs. No mechanized equipment will be allowed into the areas. Trees to be felled away from the stream are to be winched out of the SMZ, WMZ, and 1 equipment restriction zone.

STEEP SLOPES

Tractor yarding will be permitted on slopes up to 40 percent. Cable yarding systems are required on slopes greater than 40 percent.

SLASH TREATMENT

All logging slash and cull material created by harvesting activities will be lopped to a maximum height of 18 inches and scattered. Concentrations of slash at landings will be machine piled for burning.

DOWN WOODY DEBRIS

An average of 15 to 20 tons per acre shall be left on the ground in the harvest areas.

SOILS

Skidding and yarding activities are restricted to periods when 1 or more of the following conditions exist:

- The soil moisture content at a 4-inch depth is less than 20 percent of oven-dry weight.
- The minimum frost depth is approximately 3 inches.
- The minimum snow depth is approximately 18 inches, loose, or 8 inches, packed.

REGULATORY FRAMEWORK

- Harvest-related activities must adhere to BMPs.
- Harvest-related activities must follow the SVGBCA.

APPENDIX B
SCOPING DOCUMENTATION

INITIAL SCOPING

The following is a list of landowners, Agency representatives, various specialists, and all interested parties that were sent an initial scoping letter on August 13, 2004.

Jane Adams

Alliance for the Wild Rockies

Rod Ash

Roger Bergermeier,
Montana Trust

Bigfork Eagle

Steve Brady
Swan Lake Ranger District

Kathy Bramer,
Office of Public Instruction

Allen Branine, Fire Supervisor
Swan River State Forest

Ron Buentemeier
F.H. Stoltze Land & Lumber Company

Dan Bushnell, DNRC

Tommy Butler, Legal Council
DNRC

Steve Caldbeck

Kevin Chappell, DNRC

Jeff Collins, Soil Scientist
DNRC

Marcia Cross, Tribal Historic Preservation Office,
Confederated Salish and Kootenai Tribes

Ann Dahl
Swan Ecosystem Center

Jon Dahlberg, Area Manager
Northwestern Land Office

Ecology Center

Paul Engelman, Forest Economist
DNRC

Ellen Engstadt
Montana Wood Products Association

William Ensign

Brennan Ferguson, Contract Forest Pathologist

Steve Fuecht

Steve Funke

Donald Gee

Ted Geisey
Manager Forestry and Land Programs
Northwestern Land Office

Randy Gordon

David Groeschl, Bureau Chief
DNRC

Patrick Heffernan
Montana Logging Association

Caesar Hernandez
Montana Wilderness Association

Jeanne Holgrem, DNRC

Tony M. Hulett Logging

Sara Johnson

Steve Kelly

Jim Krantz,
Plum Creek Timber Company

Fred Lestiko

Stuart Lewin

Tim Litchfield, Wildlife Biologist
Department of Fish, Wildlife, & Parks

Brian Long, Inventory Section
Forestry Division

Luckow Logging

Jim Mann
Daily InterLake

Norm Merz, Wildlife Biologist
Northwestern Land Office

Neil Meyer
Swan Valley Ad Hoc Committee

Montana Environmental Information Center

Arlene Montgomery
Friends of the Wild Swan

Doug Mood
Pyramid Mountain Lumber

Bill Moore

Bud Moore

Tony Nelson
Hydrologist/Fisheries Biologist
Northwestern Land Office

Todd O'Hair, Policy Advisor
Governor's Office

Sara Pierce, MEPA Specialist
DNRC

Tom and Melanie Parker

Mark Phares, Legal Council
DNRC

Plum Creek Timberlands

Patrick Rennie
DNRC

Steve Rolfing

Bruce Rowland, DNRC

Scott Rumsey
Fisheries Biologist
Fish, Wildlife and Parks

Gordon Sanders
Pyramid Mountain Lumber

Tom Schultz
Forest Management Bureau

Roger Sherman

Gayle Shirey,
Secretary of State's Office

Lyndee Stevenson

Swan View Coalition

Pat Tabor

Steve Thompson
Natural Resource Consultant

Ed Tinsley,
State Auditor's Office

Donna Thornton
Montanans for Multiple Use

Tom Weaver
Department of Fish, Wildlife and Parks

Candace West,
Department of Justic

Allen Wolf, Silviculture Supervisor
Northwestern Land Office

APPENDIX C

WILDLIFE ANALYSIS

INTRODUCTION

The discussion in this section pertains to wildlife species and their habitat as they currently exist and the changes expected to that environment due to this proposal. This discussion occurs on 2 scales. The project area includes DNRC-managed lands primarily along restricted roads in Section 18, T24N, R17W and Section 24, T24N, R18W. The second scale relates to the surrounding landscape for assessing cumulative effects. This scale varies according to the species being discussed, but generally approximates the size of the home range of the species in question. In the cumulative-effects analysis area, prior State actions and foreseeable future actions, along with current conditions on other ownerships, were considered and discussed. Species were dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative.

To assess the existing condition of the project area and the surrounding landscape, a variety of techniques were used. Field visits, field data, scientific literature, data from the SLI and Montana Natural Heritage Program, aerial photography, consultations with other professionals, and professional judgment provided information for the following discussion and effects analysis. In the effects analysis, changes in the habitat quality and quantity from the existing conditions were evaluated and explained. Specialized methodologies are discussed under the species in which they apply.

COARSE-FILTER ANALYSIS

This project proposes to harvest standing and blown down dying and/or dead trees. No substantial changes in age classes, forested cover, connectivity, or covertypes would occur from what would be expected if no action were taken. Therefore, the coarse-filter analysis will only consider the direct effects of disturbance to wildlife species using the area and the indirect effects of the project related to deadwood habitats.

Deadwood (downed trees and snags) is an important component of forested ecosystems. Five primary functions of deadwood in the forested ecosystems are: 1) increase structural diversity, 2) alter canopy microenvironment, 3) promote biological diversity, 4) provide critical habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (*Parks and Shaw 1996*). This analysis focuses on the importance of dead wood as wildlife habitat and the effects of this project on those habitats.

Snags and downed trees provide feeding and rearing sites, along with shelter for an array of wildlife species. Deadwood provides insects, fungus, and food sources for small mammals. In turn, these small mammals provide prey for predatory birds and mammals. Additionally, deadwood provides areas with stable temperatures and moisture for animals, along with shelter from the environment, lookout areas, and food storage sites. Small mammals, such as red-backed voles, to large mammals, such as black bears, rely on deadwood for survival and reproduction.

The dbh, height, and snag densities determine the snag habitat value for wildlife species. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites for birds and mammals. Cavity-nesting birds often nest in areas where several snags are available, while using individual snags as feeding or roosting sites. Similarly, the size, length, decay, and distribution of deadwood affect their capacity to provide specific habitat. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single, scattered down 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. Therefore, considering the size and distribution of these resources is important.

The presence of insects, predaceous birds, and mammals are important to forest management. Insects and birds are suspected of controlling insects that are harmful to wood production, such as the Douglas-fir tussock moth, bark beetles, and spruce budworm (*Otvos 1979, Dahlstan 1982, Torgensen 1994*). However, at epidemic

levels, mammalian and avian predators probably exhibit minor effects on population reductions (*Torgensen 1994*). Therefore, maintenance of habitats for insectivorous birds and mammals is important for long-term forest health.

EXISTING CONDITION – COARSE FILTER

The project area contains 6 stands in mature age classes in the mixed-conifer and western larch/ Douglas-fir covertypes. These areas received a variety of timber harvests (see *CEA, Part 7* for detailed information), which affected the presence and attrition of deadwood. Currently, the area is experiencing disease infections and insect infestations, especially by larch mistletoe, Douglas-fir bark beetles, and flathead woodborers. Therefore, the project area in general, and the proposed units in particular, consist of clumped distributions of snags and log piles, along with scattered deadwood throughout the stands.

DNRC collected large tree data in Proposed Units 1, 2, and 4 to verify the units' old-growth status (*Green et al 1992*). No plot data were collected in proposed Unit 3. The large trees in the proposed units are primarily Douglas-fir and western larch, while the understory is primarily grand fir. Fifth-acre plots were used to estimate large tree densities. Sampling determined that proposed Units 1 and 4 met the minimum old-growth definition (*Green et al 1992*) with an average of 15 and 17.7 trees per acre over 21 inches dbh, respectively. In proposed Unit 2, many of the large trees in this stand are currently dead resulting from insect and disease vectors. The remaining large live tree density in proposed Unit 2 averages 5.0 trees per acre, which is half of the tree density that is required to meet the old-growth definition. Ocular estimates in proposed Unit 3 indicated that the unit did not meet the minimum old-growth definition.

A more complete sampling of the proposed harvest units occurred to quantify timber volume. In addition, data on the snags and live trees proposed for harvesting and the snags planned for retention were tallied. An average of 12.1 snags per acre occur on all proposed units. Presently, snag densities are consistent with what would be expected under historic conditions. The current density approximates the mean snag density of 15 snags per acre (range 2-43) found in old-growth stands (*Green et. al 1992*) and lies between the mean densities found by *Harris (1998)* on uncut plots (18.3 snags per acre) and cut plots (9.8 snags per acre) sampled in the warm, moist habitat group. However, the number of large and very large snags greatly exceeds those reported in *Harris (1998)*, while small and medium snags are underrepresented (*TABLE A-1 - CURRENT SNAG-DENSITY AND SIZE-CLASS DISTRIBUTION COMPARED TO THOSE THAT WOULD BE EXPECTED UNDER HISTORICAL CONDITIONS REPORTED BY HARRIS [1998]*). The abundance of large and very large snags is primarily due to the effects of insects and diseases in these stands, while the underrepresentation of medium to small snags could be due to the sampling design. Obviously cull snags, nontarget species (grand fir, Engelmann spruce), and staubs of less than 20 feet tall were not counted. Since many of the smaller snags are nontarget species and tend to deteriorate much quicker than larger snags, many of the smaller snags were not included in the data set. Because of these reasons, the snag density estimates are expected to underestimate the existing and retention densities, especially in the smaller size classes.

TABLE A-1 - CURRENT SNAG-DENSITY AND SIZE-CLASS DISTRIBUTION COMPARED TO THOSE THAT WOULD BE EXPECTED UNDER HISTORICAL CONDITIONS REPORTED BY HARRIS (1998)

SNAG CLASS	SNAGES PER ACRE				HARRIS (1998)	
	DF	WL	WWP	TOTAL	UNCUT	CUT
9 to 14.9	0.5	0.3	0.0	0.8	13.2	6.7
15 to 20.9	2.6	0.6	0.1	3.3	3.9	2.0
21 to 26.9	2.8	0.6	0.0	3.4	0.9	0.6
27+	1.0	0.3	0.0	1.4	0.3	0.5
Unclassified snags	2.2	1.7	0.1	4.0	0.0	0.0
Total	9.1	3.6	0.2	12.1	18.3	9.8

Effects – Coarse Filter

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

  No additional disturbance would occur in the area and the amount and distribution of deadwood would not be altered by DNRC-related projects. In the near future, canopy cover would decline due to recent insect and disease activity, resulting in an increase in the number of large snags. If insect and disease mortality continues, most to all large trees would be killed within several years. This situation could result in a pulse of snag recruitment in the proposed harvest units, especially in the large and very large size classes. This pulse of snags would provide large amounts of foraging and nesting structures in the near-term, but in the very distant future, snags, especially large shade-intolerant snags, could become rare. Use of the area by cavity-nesting birds and other deadwood-associated species is expected to follow the abundance of snags. Therefore, these species would benefit from an increase in habitat structure in the near future, but these benefits could wane in the very distant future.

- ***Direct and Indirect Effects of the Action Alternative on Coarse Filter***

  Under this alternative, harvesting operations would occur during the grizzly bear denning period (November 16 through March 31) or during 30 days or less in the summer period (June 16 through August 31). During harvesting operations, disturbance could affect wildlife species using the area. The response of wildlife species could range from apparently unaffected to displacement from the area. If displacement of individuals from the area occurs, negligible effects would be expected, because most species are highly mobile, not reproducing or rearing young, and able to leave the area during this time period. Additionally, the area affected is small and adjacent habitat is available for animals that are displaced.

  Under this alternative, canopy cover changes would be accelerated and snag densities would be decreased. The Action Alternative proposes to focus harvesting on Douglas-fir trees that are currently beetle-infested brood trees, western larch that are heavily infected with mistletoe, and other species experiencing insect or disease mortality. Harvesting of live, infested trees would accelerate canopy cover loss by approximately 1 season, while harvesting of heavily infected western larch would not affect canopy closure substantially. Trees that are infested with bark beetles and would be harvested are expected to lose their needles this summer and are unlikely to contribute to canopy cover by next autumn. Harvesting of these trees also would reduce snag recruitment in the short term. However, if beetle populations are reduced by the removal of brood trees, the unaffected trees are expected to contribute to the snag populations slowly over time. In addition to harvesting, approximately 1.3 miles of new road would be constructed to harvest Unit 2. This road would be constructed approximately one-half mile behind an existing gate, with most of the road length occurring in the unit. The added disturbance and habitat loss related to this road would be minimal.

  Timber cruising indicates that approximately 352 snags would be retained throughout the 89 harvest acres, for an average of 4.0 snags per acre. These estimates do not include snags less than 20 feet long nor distinguish between dbh of the leave snags. Ocular estimates indicate that a majority of the leave snags exceed 21 inches dbh and adequate numbers of live trees would be retained, thereby meeting *ARM 36.11.411(a)* (see *TABLE A-2 - SNAG DENSITIES BY PROPOSED HARVEST UNIT AND OVERALL*).

TABLE A-2 - SNAG DENSITIES BY PROPOSED HARVEST UNIT AND OVERALL

SPECIES	ALL UNITS		UNIT 1		UNIT 2		UNIT 3		UNIT 4	
	CUT	RETAIN	CUT	RETAIN	CUT	RETAIN	CUT	RETAIN	CUT	RETAIN
Douglas-fir	6.9	2.2	3.5	1.1	8.8	2.9	7.6	2.9	9.8	1.8
Western larch	1.9	1.7	3.4	1.1	1.1	2.3	0.0	0.0	0.0	0.0
Western white pine	0.1	0.1*	0.3	0.2	0.0	0.1	0.0	0.0	0.0	0.2*
Total	8.9	4.0	7.3	2.4	9.9	5.2	7.6	2.9	9.8	2.0

** Includes 1 ponderosa pine snag*

In all proposed harvest units, the remaining snag density meets *ARM 36.11.411(a)*. The proposed harvesting of snags would result in decreased foraging and nesting sites for wildlife species. However, the proposed salvage is expected to maintain a diversity of existing snags to provide habitat, albeit reduced amounts, for snag-dependent species. Some additional losses could occur during harvesting; however, due to the scattered distribution of trees and snags, these losses are expected to be minimal. The Forest Officer would be responsible for keeping these losses to the absolute minimum.

In addition to salvaging snags, the proposed harvests would include snag-recruitment trees in the near future. Harvesting these trees is expected to slow infection to other susceptible trees in and around the proposed stands. If effective, reduction in mortality of large Douglas-fir and, to a lesser extent, other species, would result in maintenance of higher canopy closure and provide snag recruitment in a steadier stream through time. These situations are expected to provide habitat for snag-associated species more consistently over time. Additionally, the slower mortality would allow more time for live trees to grow and contribute to the canopy closure and snag recruitment. However, these trees would be primarily shade-tolerant species. Followup harvests to promote reproduction of shade-intolerant trees is recommended in the future.

The loss of feeding or reproduction habitat is not expected to substantially affect wildlife species in the area. The retention of snags, nonmerchantable trees, and leave trees would continue to provide foraging sites. The retained amount of snags is expected to meet or exceed the densities expected historically in the large and very large size classes. Additionally, live large trees would be left on site, which could provide snag and log recruitment through time. Many small- to medium-sized trees would be retained, thereby providing a source for recruitment of small- to medium-sized snags. Reductions in small- and medium-sized snags would be shorter lived, while large and very large snags would be retained along with live trees to provide recruitment for the future. Although deadwood resources would be reduced, deadwood retention levels and the potential for future deadwood recruitment would continue to provide adequate habitat in the project area for native species that rely on deadwood.

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

  No additional disturbance to deadwood habitat would occur. Other DNRC projects, such as the Goat Squeezer Timber Sale Project, would continue in nearby areas. Douglas-fir bark beetle populations would continue to cause mortality in and around the project area. The increased tree mortality in Douglas-fir would provide additional foraging opportunities for wildlife species. The mortality of these large trees reduces the potential for heartrot infection. Unless the affected tree was already infected with heartrot, additional nesting trees and hollow logs for use by wildlife species are not expected. Additionally, continued increased mortality would reduce snag and coarse woody debris over the long term. The

recently killed trees would continue to provide wildlife forage and a source of Douglas-fir bark beetles, which would infect other trees. This project falls within the Three Creeks analysis area and is under concurrent consideration.

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

  The loss of deadwood resources would be additive to past reductions, primarily salvage harvests, on Swan River State Forest. The Goat Squeezer Timber Sale Project is currently active. All these actions incorporated standards for snag and log retention. These standards were designed to retain deadwood for wildlife and ecological resources. This alternative would continue to remove deadwood from Swan River State Forest; however, as discussed earlier, mitigations to retain deadwood and structure are expected to conserve adequate amounts of deadwood habitats. This project falls within the Three Creeks analysis area and is under concurrent consideration. If this alternative is selected, consideration of a reproduction harvest under Three Creeks could establish shade-intolerant species to provide snags in the distant future.

FINE-FILTER ANALYSIS

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species federally listed as threatened or endangered, species listed as sensitive by DNRC, and species managed as big game by DFWP. These species are addressed below.

THREATENED AND ENDANGERED SPECIES

➢ **BALD EAGLE**

The bald eagle is classified as "threatened" and is protected under the Endangered Species Act. Strategies to protect the bald eagle are outlined in the *Pacific States Bald Eagle Recovery Plan (USFWS 1986)* and *Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group, 1994).* Management direction involves identifying and protecting nesting, feeding, perching, roosting, and wintering/migration areas *(USFWS 1986, Montana Bald Eagle Working Group, 1994).*

No nesting activity in or near the project area is documented. The nearest documented nest sites are located on Flathead Lake, 18 miles west and over the Swan Divide, and on Swan River, approximately 20 miles north of the project area. Potential nesting habitat exists along the portion of Swan River that runs through Swan River State Forest. The project area lies nearly 3 miles from Swan River. Since no breeding activities occur in the area and the project lies far from likely breeding habitat, and important nesting and perching structure provided by the existing large trees and snags would be left, no effects to bald eagles are expected. Therefore, bald eagles were not considered further in this analysis. If a bald eagle nest were discovered within 1 mile of the project area before or during operations, DNRC would apply stipulations outlined in *ARM 36.11.429.*

➢ **CANADA LYNX**

Canada lynx are listed as "threatened" under the Endangered Species Act. Currently, no recovery plan for Canada lynx exists. Several reports have been written to summarize the research on Canada lynx and develop a conservation strategy (*Ruediger et al 2000*).

Canada lynx are associated with forests of subalpine fir, generally between 4,000 to 7,000 feet in elevation, in western Montana (*Ruediger et al 2000*). Lynx habitat in western Montana consists primarily of young coniferous forests with plentiful snowshoe hares, stands with abundant coarse woody debris for denning and cover for kittens, and densely forested cover for travel and security. Additionally, the mature forests provide habitat for red squirrels, an alternative prey source. These conditions are found in a variety of habitat types, particularly within the subalpine fir series (*Pfister et al 1977*). However, lynx are poor competitors with other predators and are rarely found on ungulate winter ranges, presumably because low snow loads allow use of the area by many other predators, such as bobcats, coyotes, and mountain lions. These predators are able to outcompete and prey upon lynx (Buskirk et al 2000). Since this project occurs on elk winter range, lynx are not expected to use the area, nor are they

expected to be affected by this project. Canada lynx will no longer be considered in this document.

➢ **GRAY WOLF**

The gray wolf is listed as "threatened" under the Endangered Species Act. Currently, the gray wolf population that inhabits Montana, Wyoming, and Idaho meet the recovery standards listed in the Northern Rocky Mountain Wolf Recovery Plan (*USFWS 1987*). Delisting this species in Montana is hinged upon the U.S. Fish and Wildlife Service's (USFWS) approval of each state's management plan. Presently, the Montana and Idaho wolf-management plans are approved, but Wyoming's wolf-management plan has not yet been approved. The delisting process will be initiated following approval of Wyoming's wolf-management plan.

The gray wolf is a wide-ranging, mobile species. Adequate habitat for wolves consists of adequate vulnerable prey and minimal human disturbance, especially at den and/or rendezvous sites. Primary prey species in northwest Montana are white-tailed deer, elk, moose, and mule deer. The distribution of wolves is strongly associated with the winter ranges of white-tailed-deer. Wolves in northwest Montana typically den in late April. Wolves choose elevated areas in gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas for dens and rendezvous sites.

The project area contains elk winter ranges, which could provide winter prey for wolves. Within the project area, the topography, access to water, and proximity to the big game winter range adhere to the description of denning and/or rendezvous-site habitats. Wolves could use the project area as part of their home range or enable them to be transient to the area; however, no recent denning or rendezvous sites or recent use has been documented in or near the project area (*T. Meier, personal communication, USFWS, 1/28/04*). Wolves or their habitat are not expected to be affected by this project because wolves presently do not use the area. If wolves used the area, the timing of this project avoids critical denning periods and would be unlikely to affect denning behaviors. If a den or rendezvous site were discovered within 1 mile of the project area, DNRC would follow the stipulations outlined in *ARM 36.11.430* to protect the den or rendezvous site. Since wolf use of the area is not suspected, the gray wolf was not considered further in this document.

➢ **GRIZZLY BEAR**

Grizzly bears are listed as "threatened" under the Endangered Species Act. The Grizzly Bear Recovery Plan defines 6 recovery areas (*USFWS 1993*). This project is proposed in grizzly bear habitat in the North Continental Divide Ecosystem Recovery Area, which is divided into subunits. Each subunit approximates the size of a home range for a female bear and is separated from other subunits based on landscape features. This project is proposed in the South Fork Lost Subunit.

Commitments made in the SVGBCA apply to this project (*ARM36.11.431(1)(a)*). This project is proposed to be completed during the denning period of 2004/2005. If the harvests cannot be completed during the winter period, a 30-day harvest period during the summer period (June 16 through August 31) could occur. The project would affect approximately 3 acres of grizzly bear preferred habitat. All stipulations in the SVGBCA would be upheld.

Effects to Grizzly Bears

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

  No additional direct or indirect effects would occur.

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

  If the proposed project were conducted during the winter period, no direct effects would be expected. If an extension into the summer period were granted, the proposed harvesting and associated road construction and use could result in direct effects to grizzly bears by displacing or preventing bear use of important habitats and indirect effects by altering habitat components. However, any displacement would be short term and affect a relatively small area. These effects are

within the stipulations in the SVGBCA and are expected to result in no to minor direct effects to grizzly bears.

In the proposed harvest units, trampling of vegetation and construction of skid trails could slightly alter small pockets or strips of hiding cover, visual screening, and/or forage. These areas would not likely affect the area's ability to provide habitat for grizzly bears appreciably. Since hiding cover, visual screening, and forage resources are not expected to be altered substantially; no change in bear use of the area is expected. Therefore, these effects are expected to be negligible.

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

  Under this alternative, no cumulative effects are expected.

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

  During the implementation of this project, several other DNRC projects could be active in the subunits. The Goat Squeezer Timber Sale Project may be active concurrently with this project during the winter period. Also, activities on Plum Creek Timber Company lands are possible throughout the activity period. This sale could add to the overall disturbance to grizzly bears in the South Fork Lost Subunit if the activities occur outside the winter period. However, the increase is expected to be minor and within the stipulations in the SVGBCA.

SENSITIVE SPECIES

When conducting forest-management activities, the SFLMP directs DNRC to give special consideration to the several "sensitive" species. These species are sensitive to human activities, have special habitat requirements that may be altered by timber management, or may become listed under the Federal Endangered Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met. The following sensitive species were considered for analysis. As shown in *TABLE A-3 – LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROJECT*, each sensitive species was either included in the following analysis or dropped from further analysis for the stated reasons.

- **Fisher**

  Due to their use of mature and late-successional forested habitats, fishers are listed by DNRC as a sensitive species (*DNRC 1996*). DNRC's strategy to conserve fishers in a managed landscape is aimed at protecting valuable denning and resting habitat near riparian areas and maintaining travel corridors.

  Fishers are generalist predators that use a variety of habitats and structural stages, but are disproportionately found in stands with dense canopy (*Powell 1982, Johnson 1984*). Fishers appear to be highly selective of resting and denning sites. In the Rocky Mountains, fishers appear to prefer late-successional coniferous forests for resting sites and use riparian areas disproportionately to their availability. Fishers tend to use areas within 155 feet of water. Such areas contain large live trees, snags, and downed trees, which are used for resting and denning sites and dense canopy cover, which is important for snow intercept (*Jones 1991*).

  On State trust lands in the project area, field reconnaissance determined these stands could provide fisher habitat.

  To assess cumulative effects, the project area would be considered in the context of the surrounding lands.

Effects to Fishers

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

  No additional human disturbance would occur; therefore, no direct effects to fishers are expected. Under the No-Action Alternative, fisher habitat quality could increase due to the deadwood component and increase in shade-tolerant trees. Due to the small amount of habitat affected, these changes to fisher habitat are expected to result in negligible effects.

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

  Some displacement could occur; however, the effects of this displacement are expected to be minor. The risk of displacement is approximately proportional to the amount of habitat affected. Areas along perennial streams provide high-use fisher habitat and travel corridors. To reduce effects to fishers, this project proposes minimal harvesting within 100 feet of these areas. Any increases in disturbance are expected to be minimal and short term.

TABLE A-1 - LISTED SENSITIVE SPECIES FOR THE NWLO SHOWING THE STATUS OF THESE SPECIES IN RELATION TO THIS PROJECT

Species	Determination - Basis
Black-backed woodpecker	No further analysis conducted - No recently (less than 5 years) burned areas in the project area would be affected.
Boreal owl	No further analysis conducted - All harvest areas occur below 5,000 feet elevation.
Coeur d'Alene salamander	No further analysis conducted - No moist talus or streamside talus habitat occurs in the project area.
Columbian sharp-tailed grouse	No further analysis conducted - No suitable grassland communities occur in the project area.
Common loon	No further analysis conducted - No large lakes occur in the project area.
Ferruginous hawk	No further analysis conducted - No suitable grassland communities occur in the project area.
Fisher	***Included*** - Potential fisher habitat occurs in the project area.
Flammulated owl	No further analysis conducted - Ponderosa pine habitats did not occur in the project area.
Harlequin duck	No further analysis conducted - No harvesting would occur in potential habitat along perennial streams.
Mountain plover	No further analysis conducted - No suitable grassland communities occur in the project area.
Northern bog lemming	No further analysis conducted - No sphagnum or other fen/moss mats occur in the area.
Pileated woodpecker	***Included*** - Western larch/Douglas-fir and mixed-conifer habitats occur in the area.
Townsend's big-eared bat	No further analysis conducted - No caves or mine tunnels occur in the project area.

The proposed project is not expected to reduce canopy cover over what is expected under the No-Action Alternative. The proposed prescription could reduce mortality in these stands, thereby preserving canopy cover over the No-Action Alternative. Removing deadwood used by fishers and their prey would occur over approximately 89 acres. The proposed harvest prescription and mitigations attempt to retain snags and downed wood throughout all the proposed units, especially within 100 feet of perennial streams, is expected to result in negligible effects to fishers.

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

  Under the No-Action Alternative, additional deadwood material would be accumulated in the area.

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

  This project would further reduce deadwood structure for fisher habitat. The Goat Squeezer Timber Sale Project is expected to reduce fisher habitat quality and quantity. In these projects, deadwood material would be retained, especially around perennial streams. Therefore, the total reduction in deadwood structure is not expected to substantially affect fishers; therefore, minor cumulative effects are expected.

➢ **PILEATED WOODPECKERS**

Pileated woodpeckers are listed by DNRC as sensitive and 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 include large snags or decayed trees for nesting and downed wood for feeding, which 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*).

Potential pileated woodpecker nesting habitat was identified by searching the SLI database for *old stands* with basal areas of more than 100 square feet per acre, more than 40-percent canopy cover, and below 5,000 feet in elevation. Based on these parameters and field reconnaissance, the project area provides potential nesting habitat for pileated woodpeckers in the proposed stands. These acres are relatively connected to other nesting stands. Younger-aged stands could provide feeding or nesting habitat of lower quality.

Effects to Pileated Woodpeckers

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

  No additional disturbance effects to pileated woodpeckers would occur; therefore, no additional direct effects are expected.

  In the near future, many of the large western larch and Douglas-fir are expected to die and contribute to the nesting and foraging habitat. Douglas-fir snags could provide marginal nesting structure in these stands due to the relatively rapid decay of the sapwood (*Parks et al 1997*). Under this alternative, a pulse of snag recruitment is expected to increase the amount of pileated feeding habitat. Over time, these will deteriorate to the point that they no longer provide feeding habitat. With few live recruitment trees adding to the snag component over time, nesting and feeding habitat is expected to increase in the short-term, but decrease in the distant future. In the distant future, the smaller live trees would gain in size and provide large snag recruitment; however, these trees are shade-tolerant species, which provide a more inferior nesting structure than shade-intolerant species.

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

  Timber harvesting would occur outside of the pileated woodpecker nesting season; therefore, no direct effects to reproducing pairs or their nestlings are expected. Harvesting during the winter and summer could displace feeding woodpeckers. The effects of harvesting disturbances are unknown; however, *Bull et al. (1995)* observed a discernible woodpecker roosting near a harvest unit consistently throughout harvesting. If displacement of woodpeckers occurred, there appears to be abundant habitat in and adjacent to the project area; therefore, negligible negative direct effects would occur.

  Salvage harvesting would remove primarily Douglas-fir and western larch. The harvests would focus on insect-infested brood trees to reduce spread and mortality due to forest insects. If successful, many live large trees would die over a period of time instead of most of these trees dying out in the next several years. Under this alternative, current snag levels would be reduced heavily (refer to the *Deadwood Resource* section in the *Coarse-Filter Analysis*), resulting in a decrease in foraging and nesting structure. However, snag recruitment would continue to provide feeding habitat over time. In all stands, at least 2 large snags per acre, on average, would be retained where they currently exist and canopy closure would be reduced slightly. Therefore, pileated woodpecker foraging and nesting sites are expected to decrease in the short-term, but some structure would be retained.

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

  No additional reductions in foraging and nesting habitat or movement corridors would occur in the short-term.

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

  Foraging and, to a lesser extent, nesting structure would be removed. This would be additive to the reductions of deadwood by unauthorized firewood cutting in the area, resulting in decreased habitat for pileated woodpeckers. Due to the topography and location of the proposed units, illegal firewood cutting is expected to be a minor concern. Current and recruitment of nesting and foraging material are expected to be retained. If the expected amount of deadwood were left on site, the effects to pileated woodpeckers would be minimal.

BIG GAME

DFWP delineated major winter ranges for big game species in the State. The project area lies in mule deer and elk winter ranges. White-tailed deer, mule deer, elk, and moose use the area in the nonwinter period. Typically, moose winter in other areas farther away. The big game analysis focuses on elk winter-range habitat.

This project could affect thermal cover and downed-wood loading on the winter range. Thermal cover is an important component on a winter range, especially the winter range for white-tailed deer. Thermal cover provides areas of lower snow loads that allow animals access to forage and to conserve energy while moving. Additionally, the closed canopy also reduces heat-loss expenditures to the environment. Excessive downed-wood material can inhibit movement in stands and prevent access to forage.

Effects to Elk

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

  No additional direct effects are expected.

  Many of the trees proposed for harvesting are expected to die and lose their crown by next winter. Additionally, if these brood trees are not removed, additional large trees (with large crowns) are expected to die within the next several years, further reducing overstory canopy closure and contributing to the downed-woody-debris component of these stands. In the near term, this alternative is expected to reduce overstory canopy cover and increase downed-woody-debris loading in these stands. These conditions are expected to reduce the snow intercept and forage access. However, these effects to the overstory cover would be dampened by an increasing understory and midstory. Elk habitat would be negatively affected to a minimal degree under this alternative.

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

  Harvesting activities during the winter of 2004 could draw elk into the proposed harvest units to capitalize on the forage value of logging slash. In the short-term, the harvesting operations could increase this winter's forage availability, thereby reducing winter mortality to an unknown, but expected small, degree.

  Under this alternative, canopy cover losses would be accelerated, a short-lived increase in forage could occur, the future downed-woody-debris load would be reduced, and additional winter disturbance due to the new road could occur. However, the effects related to reduced overstory would be dampened by an increasing understory and midstory. Timber harvesting would reduce canopy cover during the late winter; however, this cover would be expected to be lost by the following winter due to tree mortality caused by insect infestations under the No-Action Alternative. Additionally, removal of brood trees is expected to curb mortality in these stands, thereby conserving canopy cover. Harvesting activities would increase the amount of forage available to big game during harvesting by putting material (green tops) on the ground where animals can access the forage. Harvesting would also reduce the amount of coarse-woody-debris accumulation in the future. The reduction of coarse woody debris could result in easier travel and access to forage by big game. The new road could receive snowmobile use into the future. This use would occur during the time when elk are on winter range. This increased disturbance is expected to result in additional avoidance of habitats adjacent to the new road. Additionally, elk energy expenditures could increase due to snowmobiles. Overall, this alternative is expected to result in a beneficial effect in the short-term by providing forage in late winter and in the longer term by reducing canopy-cover loss and downed-woody-debris accumulations. However, if snowmobile use occurs on the new road, elk energy expenditures could result in increased mortality or decrease reproduction. Since the road affects a small portion of the winter range, these effects are expected to be minimal.

Cumulative Effects to Elk

The reduction in thermal-cover loss under both alternatives would be cumulative to the ongoing Goat Squeezer Timber Sale Project and current insect-induced tree mortality. However, the Action Alternative could slow or reduce canopy cover to a small, albeit probably negligible, amount.

APPENDIX D

FOREST INSECT AND DISEASE REPORT

INTRODUCTION

This report discusses the primary causes of damage and mortality that are currently, or have recently been, affecting mature western larch (*Larix occidentalis*), Douglas-fir (*Pseudotsuga menziesii*), western white pine (*Pinus monticola*), and grand fir (*Abies grandis*) within the proposed Cilly Bug Salvage Timber Sale Project on Swan River State Forest, Montana Department of Natural Resources and Conservation (DNRC). Details of the proposed salvage sale are presented in the Cilly Bug Salvage Timber Sale Proposal, available from Roger Ziesak of Swan River State Forest.

A walk-through inspection of the Cilly Bug project sale area, in addition to a recent report on wood-borer damage to western larch in northwest Montana (*Gibson 2004*), revealed that the major pathogens and insects either causing, or contributing to, the damage and mortality are, by tree species:

- Western larch
  - Western larch dwarf mistletoe (Pathogen = *Arceuthobium laricis*)
  - Flatheaded fir borer (*Melanophila drummondi*)
- Douglas-fir
  - Douglas-fir beetle (*Dendroctonus pseudotsugae*)
  - Brown cubical root and butt rot (Pathogen = *Phaeolus schweinitzii*)
- Western white pine
  - White pine blister rust (Pathogen = *Cronartium ribicola*)
  - Mountain pine beetle (*Dendroctonus ponderosae*)
- Grand fir
  - Fir engraver (*Scolytus ventralis*)
  - Indian paint fungus (Pathogen = *Echinodontium tinctorium*)

In addition to the pathogens and insects listed above, the prolonged drought prior to 2004 would have caused physiologic stress in these mixed-conifer stands. Drought stress can either exacerbate the damage being caused by the pathogens and insects already affecting these trees or predispose them to damage from insects that take advantage of stressed trees.

RELEVANT BIOLOGY OF AND MANAGEMENT STRATEGIES FOR THE PRIMARY PATHOGENS AND INSECTS

- ***Western larch dwarf mistletoe***

  Western larch dwarf mistletoe, caused by *Arceuthobium laricis*, is considered the most important disease of western larch in the Inland West (*Beatty et al. 1997*). Dwarf mistletoes are parasitic plants that obtain moisture and nutrients from their hosts, resulting in a reduction in tree vigor, growth, and seed production. Dwarf mistletoe infections greatly decrease the growth of western larch; 10-year basal-area growth of trees in western Montana classed as lightly, moderately, and heavily infected was decreased 30 percent, 42 percent, and 65 percent, respectively, compared to that of an uninfected western larch (*Pierce 1960*).

  The life cycle of dwarf mistletoe is generally 4 to 6 years in length, depending on the species. Dwarf mistletoes spread when seeds from the female mistletoe plants are forcibly dispersed, often for 10's of feet, in the late summer and fall; seeds that land on susceptible hosts germinate the following spring and infect the host tissues. Infections on western larch eventually cause branches to form dense clumps of twigs and branches, also known as "witches brooms". In western larch, these brooms are brittle and prone to break off under snow load, thus leading to gradual, top-down decline of the tree as more and more branches are lost. Dwarf mistletoe infection increases moisture stress in its host, all the more so when there is a drought in progress.

  Similar to most of Swan River State Forest, incidence and severity of western larch dwarf mistletoe appears to be highly variable in the Cilly Bug Salvage Timber Sale project area.

This variation is most likely due to a history of complex, mixed-severity fire regimes in these forests. Such fires would leave both mistletoe-infected and noninfected trees to provide seed for the next generation. Depending on the spatial distribution of the infected, mature trees, the regeneration might: 1) remain free of infection, 2) have a substantial lag time prior to infection, or 3) become infected early in development. The earlier a tree becomes infected by dwarf mistletoe, the greater the impacts.

Severity of mistletoe infection is most commonly based on the Hawksworth dwarf mistletoe rating (dmr), in which the live crown of each tree is divided into thirds and rated individually for presence and amount of infection (*Hawksworth 1977*). The scores for each third (0 = no infection; 1 = less than 50 percent of branches infected; 2 = greater than or equal to 50 percent of branches infected) are then added together. A *Hawksworth* dmr of 0 designates an uninfected tree, a dmr of 1 to 2 is considered a "light" infection, a dmr of 3 to 4 is considered a "moderate" infection, and a dmr of 5 to 6 is considered a "severe" infection.

Due to the seeding habit of dwarf mistletoe, spread and intensification are at their worst when an infected overstory exists over regeneration of the same tree species. Removal of the most severely infected trees in these stands would be a way to salvage recent and near-future mortality in severely infected western larch, as well as to take the first step in a silvicultural strategy to promote vigorous, non- or lightly-infected western larch regeneration in these stands.

- ***Flatheaded fir borer***

Wood borers are not generally considered primary mortality factors of healthy, vigorous trees. Instead, they very commonly attack trees that have been weakened or recently killed by other causes, such as fire, disease, or bark beetle attack. However, the flatheaded fir borer is capable of killing seemingly healthy trees growing on dry sites or affected by severe drought. Over the last several years in northwest Montana, a seemingly abnormal amount of mortality has been observed in western larch, and a recent report has implicated the flatheaded borer in much of the mortality (*Gibson 2004*). Western larch is one of the hosts for flatheaded fir borer, and drought and/or dwarf mistletoe infection are considered predisposing factors for attack. However, as *Gibson (2004)* pointed out, as long as a drought persists, there is little that can be done to mitigate the damage by the flatheaded fir borer.

- ***Douglas-fir beetle***

Douglas-fir bark beetle is a native, common, and potentially very damaging bark beetle of Douglas-fir in the Northern Rocky Mountains (*Schmitz and Gibson 1996*). Mortality due to Douglas-fir bark beetle usually occurs in small groups within dense, mature stands of Douglas-fir, but during outbreaks of Douglas-fir bark beetle, 100-tree groups are not uncommon. The first indication of successful attack by Douglas-fir bark beetle in the spring and early summer is an accumulation of reddish-orange frass, produced as beetles bore into the inner bark of the tree, in bark crevices up and down the stem, and at the base of the tree. Due to wind and rain, the frass may be dispersed over the course of the summer, so close inspections are required when examining trees with green foliage in the late summer or fall for evidence of attacks. Numerous long, clear, narrow pitch streamers may be seen coming from well up the bole of Douglas-fir bark beetle-attacked trees, but these are not consistently present. Attacks by bark beetles are generally concentrated at the mid-bole of trees, so evidence of current attacks, such as frass and beetle galleries underneath the bark, are not always readily visible at eye-level.

The Douglas-fir bark beetle has one generation per year, with broods overwintering mostly as adults. Adult emergence and flight occurs from late April to early May, depending on temperature and elevation. Dispersing adults seek out and attack suitable hosts, mate, and lay eggs, thereby producing the next generation of beetles. Foliage of trees that were successfully attacked in the spring can start turning color by August of the same year, but, depending on various factors, can remain green till the following spring or early summer. Therefore, Douglas-fir bark beetle brood trees, or those containing overwintering

adults and larvae, that are removed during winter and early spring salvage operations may still have green crowns. Once a tree has died from bark beetle attack, it is no longer suitable as habitat.

Characteristics of stands that are highly susceptible to attack by Douglas-fir bark beetle form the basis for a Douglas-fir bark beetle hazard-rating system that categorizes stands as having either low, moderate, or high hazard for Douglas-fir bark beetles. These stand characteristics, and their values for highest hazard, are:

- Stand basal area - greater than 250 square feet per acre
- Percent Douglas-fir - greater than 50 percent
- Average stand age - greater than 120 years
- Average dbh of Douglas-fir - greater than 14 inches

Although Douglas-fir bark beetle and other bark beetle hazard-rating systems can indicate the stands most likely to be attacked, they cannot indicate when such stands will be attacked.

Management of Douglas-fir bark beetle generally falls into 2 broad categories, silvicultural control or direct control (*Schmitz and Gibson 1996*). Silvicultural control is based on changing the stand conditions so they are less attractive to bark beetles; without these changes there is a tendency for reoccurrence of attacks until the bark beetles themselves have altered the stand conditions, often to the detriment of old-growth structure in Douglas-fir stands. Periodic thinnings can reduce the density of Douglas-fir and the overall proportion of bark beetle-susceptible trees, but caution must be exercised due to the impact thinning can have in promoting damage by other pathogens, particularly the root diseases. Timely salvage of windthrown or otherwise-damaged trees removes high quality brood trees. Without the salvage of such trees, beetle populations can build quickly and make successful attacks on adjacent, standing trees.

- ***Red-Brown Butt Rot***

  Red-brown butt rot, caused by the root-infecting pathogen *Phaeolus schweinitzii*, is a very common disease in older stands. Any conifer can be a host, but it is found most often in mature Douglas-fir. Instead of affecting trees in expanding mortality centers, as root diseases such as Armillaria typically do, red-brown butt rot tends to affect trees on an individual basis (*Hansen and Lewis 1997*). The fungus can, however, cross from tree to tree at root grafts and contacts. Most damage occurs in stands older than 80 years of age. The pathogen infects via small roots and causes decay in the interior of roots. This decay often extends into the butt log an average of about 8 feet, making such trees much more susceptible to stem collapse or windthrow. Since such trees are most often green when they fall, they can provide prime habitat for Douglas-fir bark beetle. Management options are limited; rotations can be shortened in order to minimize loss of merchantable volume and structural integrity, or less-affected host species can be emphasized.

- ***White Pine Blister Rust***

  Western white pine has declined as a component of the species mix in which it historically occurred on Swan River State Forest. The primary cause is white pine blister rust, a disease caused by the nonnative fungus *Cronartium ribicola*, which can infect and kill western white pine of all ages and sizes. Large dominant or co-dominant western white pine that become infected by blister rust are often top-killed since the fungus first infects via needles, then grows down the infected branch till it infects and girdles the bole. The portion of the crown above such a bole infection will die once the stem is girdled.

  Retention of various numbers of mature, seed-bearing western white pine is encouraged in order to maintain genetic diversity of the species and promote natural regeneration where possible (*Schwandt and Zack 1996*). Once mature western white pine are top-killed by rust, however, their seed-producing capacity is often very limited or eliminated, and such trees can then be considered for salvage or retention as snags

(*Schwandt and Zack 1996*). Unfortunately, western white pine are also very susceptible to attack by the mountain pine beetle, even when they exist as relatively isolated individuals or small groups in mixed-conifer stands; damage is chronic in the Inland Empire.

- ***Mountain pine beetle***

  Mountain pine beetle is a native North American bark beetle with 4 major hosts, one being western white pine (*Amman et al. 1989*). Historically, when extensive stands of mature western white pine still existed, mountain pine beetle outbreaks could kill a large majority of trees just as mountain pine beetles do today in extensive stands of lodgepole pine (*Pinus contorta*). The occurrence of pitch tubes along the bole is one way to determine if attacks by mountian pine beetles have occurred. Pitch tubes on successfully attacked trees are generally very numerous, 1/4 to 1/2 inch in diameter, and consist of cream- to dark-red-colored masses of resin mixed with frass. Pitch tubes on unsuccessfully attacked trees are widely scattered over the bole of the tree, 3/4 to 1 inch in diameter, and mostly cream-colored. Confirmation of mountain pine beetle attacks can be done by looking for the characteristic gallery patterns on the inner side of the bark. Bark beetles attacking western white pine also introduce aggressive blue-stain fungi that grow into the sapwood and contribute to the death of the tree.

  Mountain pine beetles have 1 generation per year, sometimes lasting longer at higher elevations. The beetles overwinter mostly as larvae within the egg galleries, then maturate and emerge as adults to attack more trees from June through August. The foliage of trees that have been successfully attacked during the current year can change color anywhere from a few months to a year later. Therefore, mountain pine beetle brood trees attacked the previous summer and removed during late-winter or spring salvage operations may still have green foliage.

- ***Fir Engraver***

  The fir engraver is a wide-ranging bark beetle in the western United States that has grand fir as one of its primary host species (*Ferrell 1986*). For the past several years, the fir engraver has been killing grand fir in Swan Valley at levels not seen for decades (*Steve Kohler, DNRC forest entomologist [retired], personal communication*). Nonoutbreak populations of fir engraver beetle are closely associated with trees affected by root disease or other localized factors that stress trees (*Goheen and Hansen 1993*). They can attack vigorous trees, but often only damaging instead of killing them (*Ferrell 1986*). However, when grand fir become stressed during periods of severe drought, such as that occurring for several years prior to 2004 in western Montana, the fir engraver can begin killing trees across a landscape, and the association with localized stress factors, such as root disease, becomes much less distinct (*Goheen and Hansen 1993*).

  Management of the fir engraver is problematic. In general, silvicultural practices that promote the vigor of grand fir stands, thinning, for example, will also reduce the chances of extensive damage during periods of drought (*Ferrell 1986*). Management practices aimed at reducing the impact of root disease will also help lessen the long-term impacts of the fir engraver. Such practices include the promotion of less root-disease-susceptible species, such as western larch, western white pine, and ponderosa pine, in areas with extensive root disease.

- ***Indian Paint Fungus***

  Indian paint fungus, so called because Native Americans used the interior of the fruiting body to make pigment, is a true heartrot that very commonly infects true firs and hemlocks. It is the predominant cause of heartrot and volume losses in these species in western North America (*Hansen and Lewis 1997*). True heartrots are generally confined to the heartwood of trees, consistently produce fruiting bodies or conks on the stems of living trees, and do not rely on mechanical wounding as their principal infection court (*Etheridge and Hunt 1978*). Large diameter grand fir with decay caused by Indian paint fungus provide important habitat, both when standing and downed, for various species of cavity-nesting birds and mammals (*Bull et al. 1997*).

  Echinodontium tinctorium spores infect trees via the exposed stubs of small, broken-off

branchlets. The spores become overgrown by the tree and can lay dormant for decades (*Maloy 1991*). Heaviest infections tend to occur in advanced regeneration growing under an infected overstory. Growth of the fungus is reactivated when the tree is wounded, either naturally or mechanically, develops frost cracks, or is otherwise altered physiologically. The fungus causes extensive decay of the heartwood and, over time, these trees become much more susceptible to stem breakage. A rule-of-thumb is that 1 conk on the stem of a tree indicates approximately 16 feet of extensive decay in either direction, while several conks on the stem of a tree indicate that the tree is nonmerchantable.

To reduce losses from this pathogen, management recommendations include: (1) keeping rotations of susceptible species under 150 years; (2) not avoiding or delaying early thinnings; (3) selecting the most vigorous, nonwounded trees as residuals; and (4) minimizing wounding of susceptible hosts when thinning, prescribed burning, or performing any silvicultural treatments (*Filip et al. 1983*).

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APPENDIX E

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CILLY BUG SALVAGE TIMBER SALE PROJECT

ACRONYMS

ARM	Administrative Rules of Montana
BMP	Best Management Practices
dbh	Diameter at Breast Height
DEQ	Department of Environmental Quality
DFWP	Montana Department of Fish, Wildlife and Parks
dmr	dwarf mistletoe rating
DNRC	Department of Natural Resources and Conservation
EA	Environmental Assessment
EAC	Environmental Assessment Checklist
EIS	Environmental Impact Statement
FI	Forest Improvement
mbf	thousand board feet
MCA	Montana Codes Annotated
NWLO	Northwestern Land Office
SFLMP	State Forest Land Management Plan
SLI	Stand-level Inventory
SMZ	Streamside Management Zone
SVGBCA	Swan Valley Grizzly Bear Conservation Agreement
TMDL	Total Maximum Daily Load
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WMZ	Wetland Management Zone

Land Board	State Board of Land Commissioners

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