CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Upper Flower Timber Sale
Proposed Implementation Date:	2010
Proponent:	Libby Unit, Department of Natural Resources and Conservation (DNRC)
Location:	Sec 16 (50 acres) and Sec 20 (560 acres) T30N R31W; approximately 3 air miles south southwest of Libby, MT.
County:	Lincoln

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC), Libby Unit is proposing a commercial timber harvest in the Flower Creek drainage. Under the proposed Upper Flower Timber Sale, DNRC would harvest and sell approximately 4.7 million board feet (34,000 tons) of timber from 5 harvest units totaling 610 acres using ground based and skyline logging equipment. This proposed action would produce an estimated $627,000 for the Public Buildings trust (PB) and $53,000 for the Common Schools trust (CS) at an estimated stumpage of $20.00 per ton. Additional activities would include the construction of approximately 5.1 miles of new road. Post timber harvest operations on 104 acres could include scarification as well as planting of Western white pine, Ponderosa pine, Western Larch or Western red cedar. Logging slash would be treated to meet state laws and best management practices. Timber sale activities could begin during the calendar year of 2010. Site specific objectives for the project area are: maintain and improve forest health, reduce fuel loading, increase forest productivity, create and improve transportation infrastructure to be used for land management and fire suppression on these trust parcels, and acquire permanent legal access where currently there is none.

To acquire permanent legal access to State sections 16 and 20 in T30N R31W, DNRC would enter into a Reciprocal Access Agreement (RAA) with Cabinet View Country Club, which would acquire legal access for all lawful purposes through a parcel in section 15 and would access the southeast corner of State section 16. As part of this RAA, the State of Montana would be granting an easement in State section 16 for an existing pipeline and pumping station that Cabinet View Country Club needs to legally access and exercise their water right. Another RAA would be entered into with Mike D. Chapman and Kurt M. Spencer that would acquire legal access for all lawful purposes through a parcel in section 21 and would access the east side of State section 20. As part of this RAA, the State of Montana would be granting a utilities easement in State section 16. DNRC would also enter into a cost share supplement with the United States Forest Service (USFS) to acquire access rights on existing roads to State section 20 and grant access rights through State section 20 on existing roads and roads to be constructed. DNRC and USFS would share in construction and maintenance expenses.

Lands involved in this proposed project area are held by the State of Montana in trust for specific beneficiary institutions such as the common schools trust and public buildings trust (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article 1 Section 11). The Board of Land Commissioners 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 (Sections 77-1-202, MCA). DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996) and the Administrative Rules for Forest Management (ARM 36.11.401 through 456) as well as other laws applicable to timber harvest activities on State lands.

II. PROJECT DEVELOPMENT

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

Provide a brief chronology of the scoping and ongoing involvement for this project. List number of individuals contacted, number of responses received, and newspapers in which notices were placed and for how long. Briefly summarize issues received from the public.

Public notices were placed in the Western News in March and April of 2009. Scoping letters were sent to adjacent landowners and other interested parties on the Libby Unit mailing list for scoping notices. Those involved in the project development from DNRC include: Garrett Schairer, wildlife biologist; Tony Nelson, soil and hydrology specialist; Patrick Rennie, archeologist; Jeremy Rank, project leader and forester. The City of Libby and the Cabinet View Country Club have been involved in coordination of access needs. The US Forest Service and DNRC are cooperating to meet mutual access needs. Montana Department of Environmental Quality (DEQ) has been informed of the proposed project's updates, as the municipal water supply of the City of Libby is involved. City of Libby, Forest Service and DEQ were involved from the inception of the proposed project and their input concerning silvicultural prescriptions and road design has been incorporated into the action alternative. Comments and concerns were addressed and incorporated in the design of the project.

2. OTHER GOVERNMENTAL AGENCIES WITH JURISDICTION, LIST OF PERMITS NEEDED:
Examples: cost-share agreement with U.S. Forest Service, 124 Permit, 3A Authorization, Air Quality Major Open Burning Permit.

DNRC would need to obtain a 124 permit from MT Dept. of Fish, Wildlife and Parks that would allow for CMP installations in stream crossings during road construction and maintenance.

DNRC would enter into a cost share supplement with the US Forest Service. This cost share supplement would acquire access to State section 20 via road #s: 128, 4730, 7725 and 7750.

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

DNRC is a member of the Montana/Idaho Airshed Group, which regulates prescribed burning, including both slash and broadcast burning, related to forest management activities done by DNRC. As a member of the Airshed Group, DNRC agrees to burn only on days approved for good smoke dispersion as determined by the Smoke Management Unit.

3. ALTERNATIVE DEVELOPMENT:
Describe alternatives considered and, if applicable, provide brief description of how the alternatives were developed. List alternatives that were considered but eliminated from further analysis and why.

No Action: Under the No Action alternative, no activity would be undertaken. No timber would be harvested, no road construction or improvements would occur and no cost shares or reciprocal access agreements would be entered into. This alternative would not secure legal access and would not generate revenue for the Public Building or Common School trusts. Effects of the No Action alternative are shown in the Checklist and Attachments and can be used to compare effects of the proposed action.

Action: The Action alternative is described in Section 1, Type and Purpose of Action. No other action alternatives were identified during project scoping or analysis; therefore only forest product removal and sale, Cost Share Agreement and Reciprocal Access Agreements are being analyzed for in the EA Checklist. Mitigations would be incorporated into the proposed action.

Through a cooperative effort, the road design incorporated as part of the action alternative was revised several times to meet the needs of DNRC, US Forest Service and City of Libby. The road design that is proposed meets the needs of each participant while minimizing expense, stream crossings, and miles of road constructed.

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 direct, indirect, and cumulative effects to soils.

Direct and Indirect effects of Action Alternative

Soil Physical Properties

Direct impacts would be expected on up to 78 of the total 611 acres proposed for harvesting. Ground-based site preparation would also generate direct impacts to the soil resource. Approximately 5 miles of new road would be constructed with the Action Alternative. These activities would leave up to 12.8 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP, and well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC 1996).

Cumulative Effects of Action Alternative

Soil Physical Properties

None of the acres with previous timber sale operations would be entered. As a result, cumulative effects to soils would be the same as those listed above under Direct and Indirect Effects of Action Alternative.

For detailed analysis, please refer to Attachment B, Soils Analysis. For a complete list of Soil Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

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 direct, indirect, and cumulative effects to water resources.

Direct and Indirect Effects of Action Alternative

Sediment Delivery

The Action Alternative would improve erosion control and BMPs on approximately 4.7 miles of existing road. Approximately 5 miles of new road would be constructed with the Action Alternative. Proposed new construction would require the installation of 4 new stream crossings on small unnamed tributaries to Flower Creek. Risk of sediment delivery would be increased at these sites for 2 to 3 years after project completion because of exposure of bare soil. This risk would decrease to near pre-project levels as the sites revegetate.

Water Yield

The Action Alternative would increase the annual water yield in the Flower Creek watershed by an estimated 0.3% over the current level. This level of water yield increase would not be sufficient to create unstable channels.

Cumulative Effects of Action Alternative

Sediment Delivery

The installation and improvement of erosion control and surface drainage features on existing roads would also affect the cumulative sediment delivery to project area streams. This would increase the risk of sediment routing to streams in and around the proposed project area. Over the long term, cumulative risk of sediment delivery to project area streams is projected to be lower than existing conditions with the installation of more effective surface drainage and erosion control features on the existing road system.

Harvesting of trees within a SMZ would have a low risk of adverse cumulative effects to downed woody material or sediment delivery in project area streams. Tree retention requirements of the SMZ Law and Forest Management Rules would ensure a future supply of woody material to the creeks. Equipment restrictions in the SMZ Law and Forest Management Rules would prohibit the use of ground based equipment within 50 feet of any stream, which would minimize the risk of bare soil erosion or transport reaching a stream channel.

Water Yield

The removal of trees proposed in the Action Alternative would increase the water yield in the Flower Creek watershed from its current level of approximately 1.6% over unharvested to an estimated 1.9%. The water yield increases expected from the Action Alternative leave the watershed well below its established threshold of concern. Estimated water yield increases would not be sufficient to create unstable stream channels or increased in-channel erosion.

For detailed analysis, please refer to Attachment C, Watershed and Hydrology Analysis. For a complete list of Water Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

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6. AIR QUALITY:

What pollutants or particulate would be produced (i.e. particulate matter from road use or harvesting, slash pile burning, prescribed burning, etc)? Identify the Airshed and Impact Zone (if any) according to the Montana/Idaho Airshed Group. Identify direct, indirect, and cumulative effects to air quality.

The project area is located in Montana Airshed 1 and inside the Libby impact zone. Smoke would be generated from the burning of slash; however, adherence to the Montana/Idaho State Airshed Group regulations requires that burning occur during periods with adequate airshed ventilation. This would reduce the potential for excessive contributions of associated air pollutants. Dust may be created from log hauling on portions of native surface roads during summer and fall months. Contract clauses would provide for the use of dust abatement if necessary to reduce dust near any affected residences. Due to the temporary nature of truck operations and burning operations with the proposed action, there would be a low risk of cumulative effects.

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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 direct, indirect, and cumulative effects to vegetation.

The project area is bordered by the USFS, City of Libby ownership and small private ownership. The project area currently is dominated by Ponderosa pine and Mixed Conifer cover types. Silvicultural prescriptions would promote historic stand conditions. Approximately 480 acres would be maintained in the Ponderosa pine cover type, approximately 30 acres would be maintained in the Western larch/Douglas-fir cover type, and approximately 100 acres would be converted from mixed conifer cover type to Western larch/Douglas-fir cover type. This treatment would assist Libby Unit in meeting its unit wide desired future condition cover types.

Implementation of the proposed action would alter stand conditions considerably. Silvicultural systems would emulate appropriate natural disturbance regimes (primarily fire) as required by ARM 36.11.408. Large ponderosa pine scattered throughout the project area would likely survive such an event as relic trees, commonly seen in western forests. Post-harvest stands would vary in density and have a patchy appearance, similar to post-fire stands where fire intensity increased as it encountered heavy fuel loads. The proposed harvest would reduce canopy cover by 50% in the stands where commercial thinning is prescribed, and would reduce canopy cover by 95% in the stands where regeneration harvest is prescribed. Seral ponderosa pine would become more dominant in the over-story, and canopy gaps would encourage regeneration of seral species in the under-story. Growth rates and tree vigor would improve in stands where prescribed treatments were applied.

Rare plants or cover types listed by the Montana Natural Heritage program have not been found within the project area. There are no old-growth stands located within the project area. An integrated weed management approach would be implemented to limit the potential for the spread and introduction of noxious weeds into the project area.

For detailed analysis, please refer to Attachment D, Vegetation Analysis. For a complete list of Vegetation Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

Consider substantial habitat values and use of the area by wildlife, birds or fish. Identify direct, indirect, and cumulative effects to fish and wildlife.

The project area provides habitat for a variety of wildlife species, including a host of species that require mature forests and/or use snags and coarse woody debris. Deer, elk, and moose likely use the project area most of the year, and winter range exists across portions of the project area. Under the action alternative, approximately 604 acres of ponderosa pine, western larch/Douglas-fir, and mixed conifers would be removed, including roughly 560 acres of mature stands with a relatively closed canopy. Many of these acres would continue to support mature trees with an increasingly open canopy following proposed treatment. This would slightly alter habitats for wildlife species requiring closed-canopied, mature forests, while enhancing habitats for species needing more open stands of younger forests. Present and future deadwood material would be reduced during the proposed timber harvesting; however some snags and snag recruits would be planned for retention in the units. The action alternative would reduce thermal cover on 602 acres; however, most of those acres could develop thermal cover in the short-term; thermal cover in the project area would be relatively limited in the near-future.

For detailed analysis, please refer to Attachment E, Wildlife Resources Analysis. For a complete list of Wildlife Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

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 direct, indirect, and cumulative effects to these species and their habitat.

Most of the project area is in the “occupied habitat” area as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger, 2002) and a small amount of the project area is in the Cedar subunit of the Cabinet-Yaak Recovery Area. Some grizzly bear habitats exist in the project area. The action alternative could disturb grizzly bears, but mitigations would largely reduce the effect of disturbance on grizzly bears by avoiding activities during the spring period when grizzly bear use would be the most likely. Hiding cover for bears would be reduced across 604 acres, but no changes to security habitats, open road densities, or public access would occur.

Potential habitat exists in the project area for fisher, flammulated owls, and pileated woodpeckers. Roughly 1 acre of riparian fisher habitats and an additional 174 acres of potential upland fisher habitats would be altered in the proposed units. Harvesting 604 acres would reduce continuously forested habitats for pileated woodpeckers. Roughly 529 acres of potential nesting habitat would be altered, with approximately 102 acres that would receive a regeneration treatment and would be too open to be considered pileated woodpecker habitats. Pileated woodpecker habitats on other 428 acres would receive a commercial thin treatment, reducing quality of the habitat, but these more open habitats would continue to be considered suitable for pileated woodpeckers. Additionally, roughly 242 of the 250 acres of flammulated owl habitats would be altered with the proposed harvesting.

For detailed analysis, please refer to Attachment E, Wildlife Resources Analysis. For a complete list of Wildlife Resource Mitigations, please refer to Attachment F, Summary of Mitigations.

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

Identify and determine direct, indirect, and cumulative effects to historical, archaeological or paleontological resources.

Staff of the Department of Natural Resources and Conservation and Kootenai National Forest inspected the Upper Flower Creek Timber Sale for cultural resources. A historic logging camp locality was documented during inventory work. Features associated with the logging camp include skid trails, a temporary railroad bed, earthen platforms, wood debris and a small trash dump. The features have been documented and mapped and a detailed report of findings is forthcoming. These features were made familiar to the project coordinator. Timber harvest activities will be modified where necessary to avoid directly impacting the remaining cultural features in the site.

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 direct, indirect, and cumulative effects to aesthetics.

Approximately 10% of the harvest area is visible from Libby. Active forest management is prevalent in this area, and is evident on all viewsheds surrounding Libby. Within the project area, harvested stands would look more open with fewer trees per acre. The proposed project would be expected to have a low risk of negatively affecting the aesthetic quality of the area. Some noise from harvesting equipment and log hauling may be heard within the area and on haul routes. This is expected to be short in duration.

Proposed new road construction would likely reduce the visible appeal of the project area by exposing bare soil and creating unnatural patterns on the landscape. Revegetation efforts associated with weed control would reduce the visibility of new roads. The appearance of the project area from a distance would likely be very similar to management patterns on adjacent property. Approximately 95% of the canopy would be removed in regeneration harvest units, and approximately 50% of the canopy would be removed in the commercial thinning units. The short term effect on aesthetics would likely be negative due to the appearance of fresh slash, stumps and skid trails. Natural revegetation and slash decomposition would reduce the effects within 2-4 years. Retaining the majority of large trees throughout the project area would also reduce impacts to visible appearance.

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 direct, indirect, and cumulative effects to environmental resources.

No impacts are likely to occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

List other studies, plans or projects on this tract considered in the cumulative impacts analyses.

Environmental Analysis for the Flower Creek Timber Sale, 2008 (DNRC)
Categorical Exclusion for the DNRC Upper Flower Cost Share, 2009 (USFS)

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.

Human health and safety would not be impacted by the proposed timber sale or associated activity. There are no unusual safety concerns associated with the proposed timber sale.

15. INDUSTRIAL, COMMERCIAL AND AGRICULTURE ACTIVITIES AND PRODUCTION:

Identify how the project would add to or alter these activities.

Commercial logging would occur on approximately 610 acres of land over a 2-3 year period.

16. QUANTITY AND DISTRIBUTION OF EMPLOYMENT:

Estimate the number of jobs the project would create, move or eliminate. Identify direct, indirect, and cumulative effects to the employment market.

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on employment.

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:

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

Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on tax base and tax revenues.

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 direct, indirect, and cumulative effects of this and other projects on government services

Due to the relatively small size of the timber sale program, there would be no measureable direct, indirect or cumulative impacts from the proposed action on government services.

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.

The DNRC operates under the State Forest Land Management Plan (SFLMP, DNRC 1996) and Administrative Rules for Forest Management (ARM 36.11.401 through 450, DNRC 2003). The SFLMP established the agency's philosophy for management of forested trust lands. The Administrative Rules provide specific guidance for implementing forest management projects.

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 direct, indirect, and cumulative effects to recreational and wilderness activities.

The area is used frequently for hiking, hunting, cross-country skiing, snowmobiling and general recreating. Roads through the area are closed to motorized use yearlong or seasonally depending on the road. There would be no change in road closure status on existing roads. Newly constructed roads would be restricted to motorized use yearlong and be used only for administrative uses. Road #128 runs through State section 20 near the south section line and is a popular access route into the Cabinet Mountain Wilderness. When using this access route recreationists would be driving through the proposed harvest unit. The selection of either alternative would not affect the ability of people to recreate on this parcel, and use is expected to remain the same following this project.

21. DENSITY AND DISTRIBUTION OF POPULATION AND HOUSING:

Estimate population changes and additional housing the project would require. Identify direct, indirect, and cumulative effects to population and housing.

There will be no measurable direct, indirect or cumulative impacts related to population and housing due to relatively small size of the timber sale program, and the fact that people are already employed in this occupation in the region.

22. SOCIAL STRUCTURES AND MORES:

Identify potential disruption of native or traditional lifestyles or communities.

The communities and lifestyles of this area have traditionally been and still are dependent on forest management and timber production for employment and other benefits received from this type of land use and management. The action alternative would be consistent with current and traditional lifestyles in this area.

23. CULTURAL UNIQUENESS AND DIVERSITY:

How would the action affect any unique quality of the area?

No impacts related to cultural uniqueness and diversity would be expected under either alternative.

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 direct, indirect, and cumulative economic and social effects likely to occur as a result of the proposed action.

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, terms of sale, or anything that could affect a buyer's willingness to pay for.

No Action: The No Action alternative would not generate any return to the trust at this time.

Action: The timber harvest would generate additional revenue for the Common Schools Trust and Public Buildings Trust. The estimated return to the Common Schools Trust for the proposed harvest is $53,000 based on an estimated harvest of 2,650 tons and an overall stumpage value of $20.00 per ton. The estimated return to the Public Buildings Trust for the proposed harvest is $627,000 based on an estimated harvest of 31,350 tons and an overall stumpage value of $20.00 per ton. Forest Improvement fees would generate $184,500. Costs, revenues, and estimates of return are estimates intended for relative comparison of alternatives, they are not intended to be used as absolute estimates of return.

EA Checklist Prepared By:	**Name:** Jeremy Rank	**Date:** 4/26/2010
	Title: Management Forester – Libby Unit MT DNRC	

V. FINDING

25. ALTERNATIVE SELECTED:

Upon review of the Checklist EA and attachments, I find the Action Alternative as proposed meets the intent of the project objectives as stated on page 1, Type and Purpose of Action. It complies with all pertinent environmental laws, best management practices and the DNRC State Forest Land Management Plan. The No Action Alternative does not meet the project objectives. For these reasons I have selected the Action Alternative for implementation on this project.

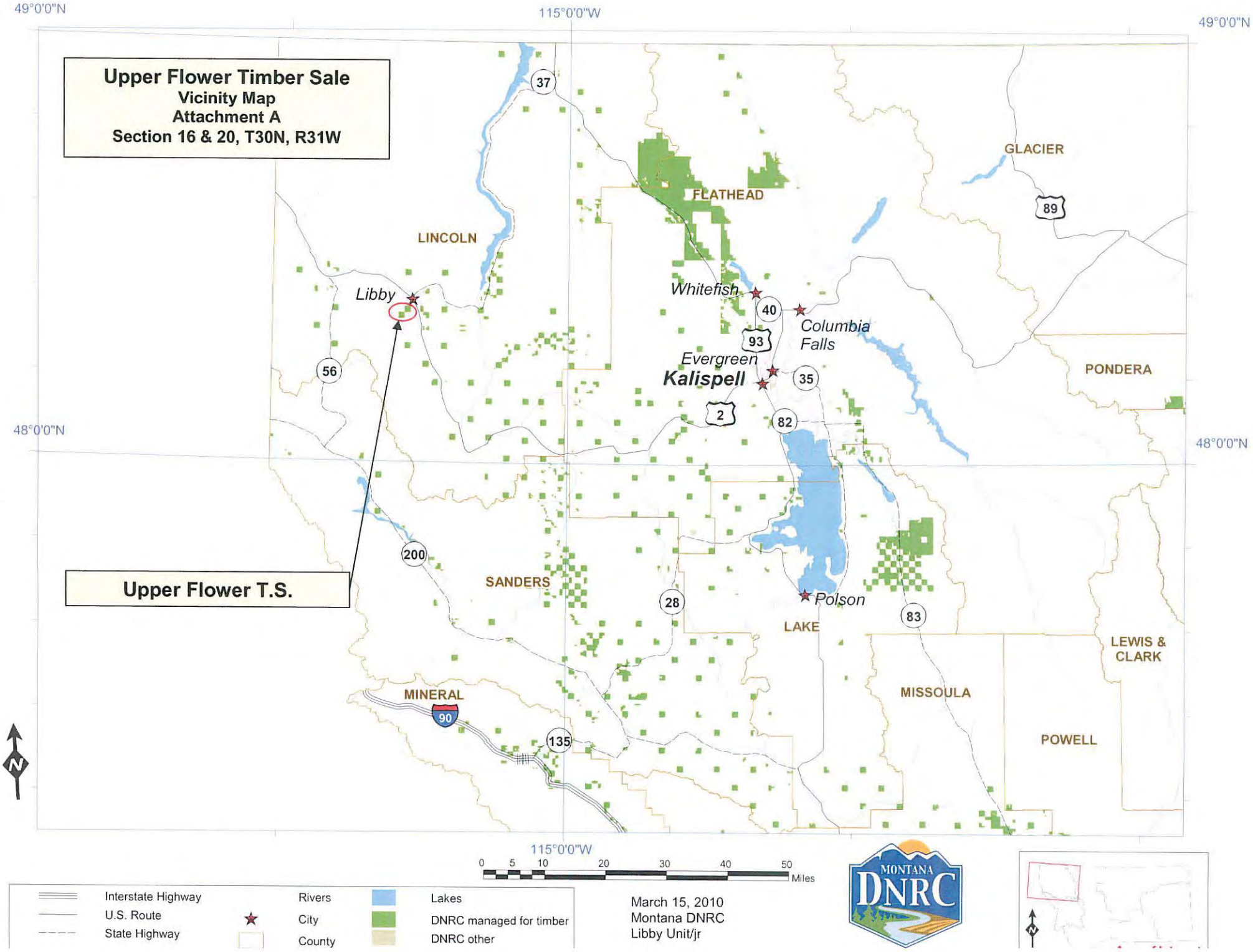
26. SIGNIFICANCE OF POTENTIAL IMPACTS:

After a thorough review of the scoping documents, Department policies, standards, guidelines, and the State Forest Land Management Plan, I find all the identified resource management concerns have been fully addressed in this Checklist EA and its attachments. Specific mitigation measures for each resource concern are listed in Attachment F. The action alternative provides for income to the trusts and promotes the development of a healthy, biologically diverse, and productive forest. It also provides the opportunity to improve access and road maintenance within the project area. I find there will be no significant impacts as a result of implementing the action alternative. Specific project design features and various resource management specialist recommendations have been implemented to ensure that this project will fall within the limits of acceptable environmental change and result in no significant effects.

27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

[ ] EIS [ ] More Detailed EA [x] No Further Analysis

EA Checklist Approved By:	**Name:**	Dave Marsh
	Title:	Forest Management Supervisor - Libby Unit
Signature: /s/ Dave Marsh		**Date**: 5/4/2010


Upper Flower Timber Sale
Vicinity Map
Attachment A
Section 16 & 20, T30N, R31W
Upper Flower T.S.
49°0'0"N
115°0'0"W
48°0'0"N
LINCOLN
FLATHEAD
GLACIER
PONDERA
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
LEWIS & CLARK
Libby
Whitefish
Columbia Falls
Evergreen
Kalispell
Polson
37
40
93
35
2
82
89
56
200
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83
135
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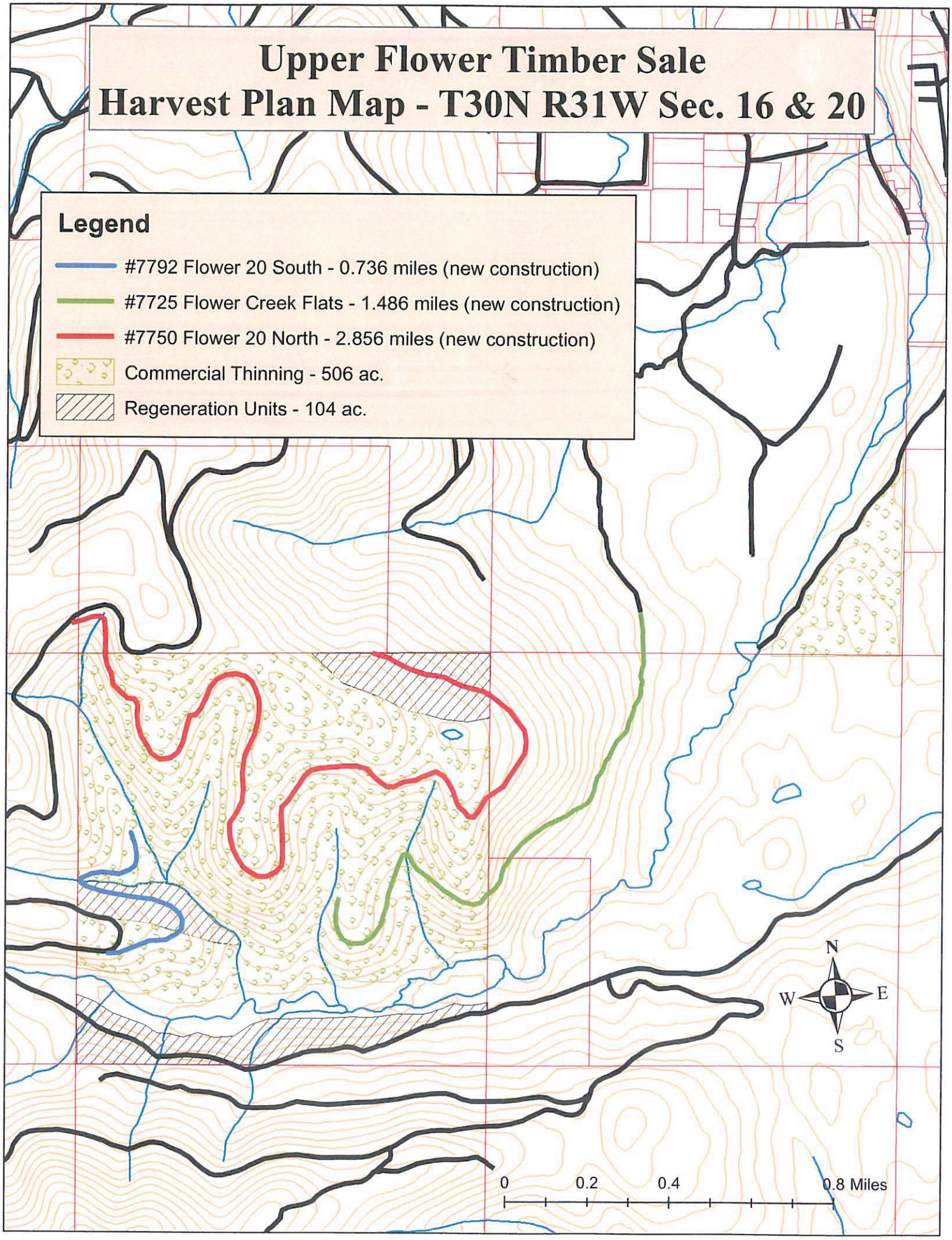
0 5 10 20 30 40 50 Miles
Interstate Highway
U.S. Route
State Highway
Rivers
City
County
Lakes
DNRC managed for timber
DNRC other
March 15, 2010
Montana DNRC
Libby Unit/jr
MONTANA DNRC

Upper Flower Timber Sale
Harvest Plan Map - T30N R31W Sec. 16 & 20



SOILS ANALYSIS
FOR THE
UPPER FLOWER TIMBER SALE

INTRODUCTION

Landform Description

The Flower Creek watershed lies within a valley formed by glaciers and river processes. The dominant landtypes found in the project area include lacustrine terraces, alluvial terraces, kames and kettles, and glaciated mountain slopes. The primary parent material for each of these landtypes is glacial till derived from argillite, siltite and limestone from the Belt Supergroup. Surface soil for each project area landtype is volcanic ash influenced loess.

Soil Physical Properties

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

Slope Stability

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

ANALYSIS METHODS

Soil Physical Properties

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

Slope Stability

Slope stability risk factors will be assessed by reviewing the Kootenai National Forest Land System Inventory (LSI) to identify landtypes listed as high risk for mass movement.

Field reconnaissance will also be used to identify any slopes greater than 60 percent as an elevated risk for mass movement.

ANALYSIS AREA

The analysis area for evaluating soil physical properties and slope stability will include DNRC owned land within the Flower Creek project area. Most of the Flower Creek project is located within portions of the Flower Creek watershed, with a small portion located outside of this watershed with no identifiable surface water features.

EXISTING CONDITIONS

Soil Physical Properties

In the Flower Creek project area, DNRC began commercial timber harvesting 1995. Timber sale records show that approximately 21 acres of timber have been harvested in the proposed project area using ground-based harvest methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Based on DNRC soil monitoring (DNRC, 2004) completed near the proposed project area on previously harvested stands, existing impacts from historic timber management (1920s) were estimated to be approximately 10% of harvested areas. The monitoring in 1987 also found that displacement was found on 0.5% of the harvested area, and compaction was found on approximately 24.5% of the area. Since both the compaction and displacement were found on skid trails, the total impacted soils were estimated at 24.5% of the area. This rate is attributed to a combination of dispersed skidding pattern due to nearly level terrain and because of the drag chain method of scarification done for site preparation. It was also noted that this level of impacts did not meet the analysis criteria. Soil monitoring throughout DNRC land statewide show an average impact of 18.5% on similar slopes and soils. Trails are still apparent, but most are well vegetated and past impacts are beginning to ameliorate from freeze-thaw cycles and root penetration.

Slope Stability

Landtypes in the project area vary from alluvial terraces along Flower Creek to glaciated mountain slopes in the remainder of the project area. The Kootenai National Forest LSI identified no areas of soils at high risk for mass movements in the project area. No slope failures were identified during reconnaissance in the proposed project area, and slopes are less than 60 percent. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated in the remainder of this analysis. A list of landtypes found in the proposed project area and the associated management implications are found in the attached table.

DIRECT AND INDIRECT EFFECTS

Direct and Indirect effects of No Action Alternative

The No Action Alternative would have no direct or indirect effects on soil physical properties. No ground-based activity would take place under this alternative, which

would leave the soil in the project area unchanged from the description in the Existing Conditions portion of this analysis.

Direct and Indirect effects of Action Alternative

Soil Physical Properties

Based on DNRC soil monitoring, direct impacts would be expected on up to 78 of the total 611 acres proposed for harvesting. Soil monitoring conducted on DNRC lands shows that sites harvested on DNRC lands statewide on similar soils with ground-based machinery had a range of impacts from 8.1 to 33.1 percent of the acres treated, with an average disturbance rate of 18.5% (DNRC, 2004). The low range of impacts includes operations on dry soils (below 20% moisture content), and the high range includes operations on wet soils. As a result, the extent of impacts expected would likely be similar to those reported by Collins (DNRC, 2004) for dry soil operations, or approximately 8.1 to 9.7 percent of ground-based harvested acres.

Ground-based site preparation would also generate direct impacts to the soil resource. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. Approximately 5 miles of new road would be constructed with the Action Alternative. *Table III-uu – Summary of Direct Effects of Alternatives on Soils* summarizes the expected impacts to the soil resource as a result of the Action Alternative. These activities would leave up to 12.8 percent of the proposed harvest units in an impacted condition. This level is below the range analyzed for in the *EXPECTED FUTURE CONDITIONS* section of the *SFLMP*, and well within the 20-percent impacted area established as a level of concern in the *SFLMP (DNRC 1996)*. In addition, BMPs and a combination of mitigation measures would be implemented to limit the area and degree of soil impacts as noted in ARM 36.11.422 and the SFLMP (DNRC, 1996).

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

Description of Parameter	**Alternative**	
	No Action	*Action*
Acres of Harvest	0	610
Acres of ground-based yarding	0	352
Avg. acres of ground-based impacts (18.5% harvest)	0	65
Acres of new road construction (5 miles)	0	15
Acres of cable yarding	0	258
Acres of yarding corridors[1]	0	26
Total acres of moderate impacts[2]	0	78
Percent of harvest area with impacts	0%	12.8%

[1] 5-10% of cable yarding units
[2] 50% of cable corridors

CUMULATIVE EFFECTS

Cumulative Effects of No Action Alternative

Soil Physical Properties

This alternative would have no cumulative impacts to physical properties of soils in the project area. The impacts of this alternative would be similar to those described in the Existing Conditions portion of this analysis. No soil would be disturbed and no re-entry of past harvest units would occur. All impacts from past management activities would continue to improve or degrade as dictated by natural and pre-existing conditions.

Cumulative Effects of Action Alternative

Soil Physical Properties

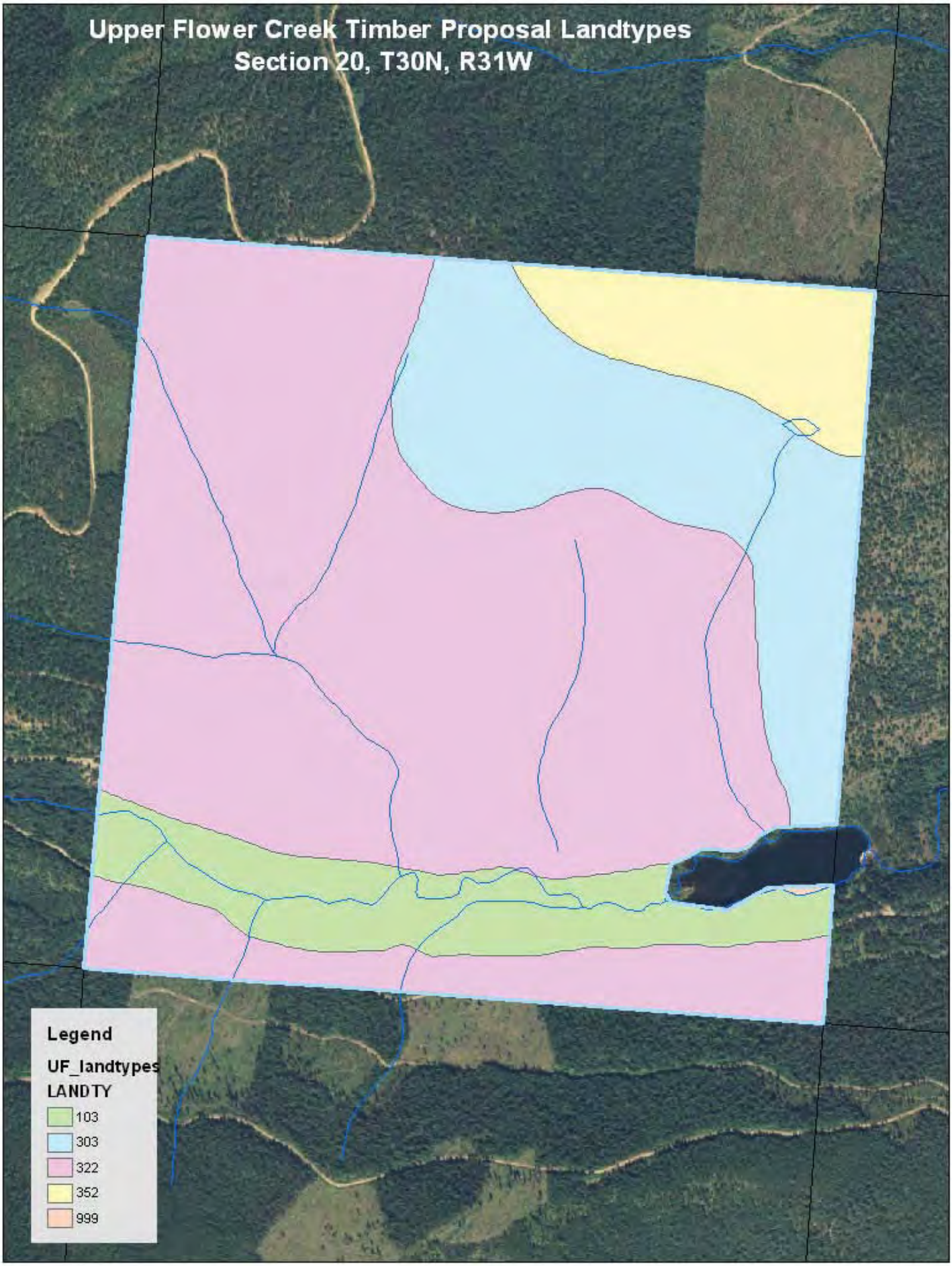
None of the acres with previous timber sale operations would be entered. As a result, cumulative effects to soils would be the same as those listed above under *Direct and Indirect Effects of Action Alternative*. Cumulative impacts to soil physical properties under the Action Alternative would still fall below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP and are well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996).

DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following: 1) mitigating the potential direct and indirect effects with soil moisture restrictions, season of operation, and method of harvest 2) retention of a portion of coarse woody debris and fine litter for nutrient cycling. In previously unharvested stands, cumulative effects to soil productivity from multiple entries would be the same as those listed in the direct and indirect effects sections.

TABLE 3-WW – SOIL MAP UNIT DESCRIPTIONS FOR THE UPPER FLOWER PROJECT AREA

Landtype[1]	Name	Soil & Vegetation Descriptions	Management Considerations			
			K factor**/ erosion potential	Timber	Roads	Comments
103	Alluvial Terraces 0-15% gradient on dominant slopes, 30-60% on terrace risers Elev: 2,000-3,500 ft above sea level	Soils have a surface layer of loess influenced by volcanic ash 4-14 inches thick overlying a medium textured subsoil with rock content of 35 -50 percent. Vegetation is characteristic of a moist, mixed forest with western red cedar, western hemlock, grand fir and Douglas-fir over a forest understory dominated by shrubs and forbs.	0.15 for whole soil	Potential Prod: High Equipment: Tractor / cable Regen. No limitations although rock content can affect planting	Tread erosion of fine material can leave a rough driving surface.	Sediment delivery efficiency is high due to the steep terrain near streams and bodies of water. Channel changes can result in severe sedimentation. Drainage on the terraces consists of short, deeply incised draws or streams.
303	Glaciated mountain ridges 15-35% slopes Elev: 3,500-4,700 ft above sea level	Soils in this landtype are formed mostly in material weathered from metasedimentary rocks with some glacial till overlying bedrock in some locations. Rock outcroppings are common. Surface soils are shallow in this landtype with bedrock typically present within 24 inches of the surface. Surface soils are a very cobbly sandy loam about 6 inches thick. Vegetation is typically Douglas-fir and lodgepolse pine interspersed with grasslands. Northern aspects generally have a higher productivity.	0.10 for Whole soil 0.20 for <2mm	Potential Prod: very low Equipment: Tractor, although rock outcroppings limits operability. Regen: Can be limited by shallow soils and droughtiness.	Roads are difficult due to hard rock. Cut and fill material is extremely stony. Roads are rough due to the large stones and cobbles. Droughtiness limits revegetation.	Due to the amount of rock in this landtype, sediment delivery efficiency and erosion is limited. Surface drainage systems are very rare to non-existent.
322	Moraines 15-35% slopes Elev: 2,500 - 5,000 ft above sea level	Surface soils area 4-14 inch thick layer of loess that has been influenced by volcanic ash. Subsoils ranged from 200-050% rounded rock fragments. Vegetation is a mixed forest of western larch, Douglas-fir, and lodgepole pine. Subalpine fir may be present in some areas. The understory is dominated by low-growing shrubs and forbs.	0.20 for whole soil 0.37 for <2mm particles	Potential Prod: High Equipment: Tractor unless wet areas are identified. Regen: no limitations	Material exposed in cutbanks during road construction tends to slough if the cutbanks are steep. Ruts form readily during wet weather on unsurfaced roads. Crusted surface soils may limit revegetation after construction.	Sediment delivery efficiency is low. Erosion is moderate along skid trails and firelines.
352	Glaciated mountain slopes 20-60% slopes Elev: 2,200-5,600 ft above sea level	Compacted glacial till underlies a volcanic-ash influence loess surface layer up to 14 inches thick. The lower surface soils may have rock fragments that comprise up to 50% of the content. Vegetation is a mixed forest of western larch, Douglas-fir, lodgepole pine and grand fir. The understory is dominated by forbs and low-growing shrubs.	0.15 for whole soil 0.28 for <2mm	Potential Prod: High Equipment: Tractor and cable systems dependent upon slope.	Cutbanks formed during road construction can slough if too steep. Tread erosion of fine material will leave a rough cobbly surface. Crusted surface soils may limit revegetation after construction	Erosion hazard and sediment delivery efficiency is moderate. Trees are susceptible to windthrow due to the restricted root penetration into the compacted glacial till subsoils. Surface drainage features are widely spaced

[1]Kootenai National Forest Land Types. Interpretations taken from: Kuennen, Louis J. and Marci L. Nielsen-Gerhardt. 1995. *Soil Survey of Kootenai National Forest Area, Montana and Idaho*. USDA Forest Service.


Upper Flower Creek Timber Proposal Landtypes
Section 20, T30N, R31W
Legend
UF_landtypes
LANDTY
103
303
322
352
999

WATERSHED AND HYDROLOGY ANALYSIS FOR THE UPPER FLOWER TIMBER SALE

INTRODUCTION

Sediment Delivery

Timber harvesting and related activities, such as road construction, 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 potential recruitment of large woody material to stream channels. 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

Canopy removal 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 was completed using a sediment source inventory. All roads and stream crossings were evaluated to determine existing and potential sources of introduced sediment. In addition, in-channel sources of sediment were identified using channel stability rating methods developed by Pfankuch, and through the conversion of stability rating to reach condition by stream type developed by Rosgen (1990). These analyses were conducted in 2009 by a DNRC hydrologist.

Water Yield

The water yield increase for the watershed in the project area was determined using the equivalent clearcut area (ECA) method as outlined in Forest Hydrology Part II (1976). ECA is a function of total area roaded and harvested, percent crown removal in harvest, and amount of vegetative recovery that has occurred in harvest areas. This method equates area harvested and percent crown removed with an equivalent amount of clearcut area. For example, if 100 acres had 60 percent crown removed, ECA would be approximately 60, or equivalent to a 60 acre clearcut. The relationship between crown

removal and ECA is not a 1 to 1 ratio, so the percent ECA is not always the same as the percent canopy removal. As live trees are removed, the water they would have evaporated and transpired either saturates the soil, or is translated to runoff. This method also calculates the recovery of these increases as new trees vegetate the site and move toward pre-harvest water use.

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

ANALYSIS AREA

Sediment Delivery

The analysis area for direct and indirect effects to sediment delivery is the Upper Flower project area, and the proposed haul routes. The proposed project area is located within the Flower Creek watershed, which is a perennial tributary to the Kootenai River. Analysis will cover stream segments within these watersheds that may be affected by the proposed project and all roads and upland sites that may contribute sediment to Flower Creek. The cumulative effects analysis area will focus on sediment loading to the Flower Creek watershed.

Water Yield

The analysis area for direct, indirect and cumulative effects to water yield is the Flower Creek watershed. The Flower Creek watershed covers 11,918 acres. Portions of the proposed project area lie outside of these watersheds, but these areas have no defined stream channels, and are very low risk of showing measurable or predictable changes in water yield. Precipitation in the project area watersheds ranges from 18 inches in the lower elevations to 70 inches at the ridge tops.

EXISTING CONDITIONS

Regulatory Framework

Montana Surface Water Quality Standards: According to ARM 17.30.609 (1), this portion of the Flower Creek drainage is classified as A-1. Among other criteria for A-1 waters, no increases are allowed above naturally occurring levels of sediment or 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

non-structural controls and operation and maintenance procedures. Appropriate practices may be applied before, during, or after completion of potentially impactive activities.

Designated beneficial water uses within the project area include cold water fisheries and recreational use in the streams, wetlands and lakes. Existing surface water rights in the project area include domestic use, irrigation, municipal and stock watering.

Water Quality Limited Waterbodies: None of the streams in the proposed project area are listed in the 2008 List of Waterbodies in Need of Total Maximum Daily Load (TMDL) Development publication produced by the Montana Department of Environmental Quality (DEQ 2008).

Montana Streamside Management Zone (SMZ) Law: By the definition in ARM 36.11.312 (3), Flower Creek, the tributary in the SW1/4 SW1/4 of the project area, and the lower ~500 feet of the mainstem of the tributary in the NW corner are class 1 streams. Flower Creek has flow for more than 6 months each year, contributes surface water to another body of water and support fish populations. By the Definition in ARM 36.11.312(3) through (5), the tributaries to Flower Creek located in the north and western portions of the project area are class 2 streams. They have a defined channel, generally flow less than six months of the year, do not support fish, and contribute surface flow to another body of water. A class 2 stream is defined as a stream that does not meet the criteria for class 1 or class 3 streams.

Sediment Delivery

According to field reconnaissance in 2009, stream channels in the project area were rated in good condition. Project area streams were rated as B3 and B4 channels by a classification system developed by Rosgen (1990). Channel types rated as “B” are typically in the 2-4% gradient range, and have a moderate degree of meander (sinuosity). Channel bed materials in B3 and B4 types are mainly cobble and gravel. Stream channels in the project area were found to be very stable with very little movement of bed materials. Channel bottom materials are covered with moss, and no areas of down-cut channels were identified during field reconnaissance. Large woody debris was found to be functioning well to slow water flow, lower stream energy and serve as sediment traps. This helps to reduce the ability of water flow to erode channel bed and banks. Little evidence of past streamside harvest was found in the Flower Creek drainage. Where there had been past logging in the riparian area, mainly in an unnamed tributary to Flower Creek, there appeared to be adequate downed woody material to provide grade control and channel stability.

The existing road system in and leading to the proposed project area was reviewed for potential sources of sediment. The road system in the project area is mainly low to moderate standard. No evidence of sediment delivery to a stream was identified during field reconnaissance. Isolated areas were found on the existing road system where erosion control and surface drainage is lacking or in need of improvement. These areas were minor in scope and were not identified as sources of sediment delivery to any body of water.

Water Yield

According to *ARM 36.11.423*, allowable water-yield increase values were set at levels to ensure compliance with all water-quality standards, protect beneficial uses, and exhibit a low to moderate degree of risk. All allowable water-yield increases in project-area watersheds were set using a low level of risk. This means that the allowable level is a point below which water yields are unlikely to cause any measurable or detectable changes in channel stability. The allowable water yield increase for the Flower Creek watershed has been set at 11% based on channel stability evaluations, watershed sensitivity, and acceptable risk. This water yield increase would be reached when the ECA level in the Flower Creek watershed reaches the allowable level of 3,277 acres. Timber harvesting and associated road construction activities have taken place in and around the project area since the 1920s. These activities combined with the vegetative recovery that has occurred have led to an estimated 1.6% water yield increase over an unharvested condition in the Flower Creek watershed. Table 3-vv summarizes the existing conditions for water yield in the project area watersheds.

TABLE 3-VV – CURRENT WATER YIELD AND ECA INCREASES IN FLOWER CREEK

	Flower Creek
% WYI[1]	1.6%
Allowable % WYI	11%
Existing ECA[2]	1180
Allowable ECA[2]	3,277
Remaining ECA[2]	2,097

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

DIRECT AND INDIRECT EFFECTS

Direct and Indirect Effects of No Action Alternative

Sediment Delivery

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

Indirect effects of No Action Alternative would be an increased risk of erosion and sediment transport from upland road segments that do not meet applicable BMPs. These sites would continue to pose a risk of sediment delivery to streams until other funding became available to repair them.

Water Yield

The No Action Alternative would have no direct or indirect effects on water yield. Water quantity would not be changed from present levels.

Direct and Indirect Effects of Action Alternative

Sediment Delivery

The Action Alternative would reduce erosion by implementing BMPs on approximately 4.7 miles of existing road. In some cases, the addition of erosion control measures may increase the risk of sediment routing from upland sites in the short term by creating bare soil. However, as these sites re-vegetate, the long-term risk of sediment routing to a stream would be reduced to levels lower than the existing condition.

Approximately 5 miles of new road would be constructed with the Action Alternative. These roads would be constructed using all applicable BMPs. Proposed new construction would require the installation of 4 new stream crossings on small unnamed tributaries to Flower Creek. These crossings would install culverts sized to carry at least a 25-year magnitude storm, and would meet all applicable BMPs. These projects would generate sediment to the stream during activity if installed while the stream is flowing. If installations were done while the streams are dry, very little sediment would be generated during installation. This sediment would be minimized by application of all applicable BMPs. Risk of sediment delivery would be increased at these sites for 2 to 3 years after project completion because of exposure of bare soil. This risk would decrease to near pre-project levels as the sites revegetate.

The proposed Action Alternative would have a very low risk of sediment delivery to streams as a result of proposed timber harvest activities. Harvesting activities are proposed on approximately 45 acres within designated SMZs. These harvesting activities would be a selective treatment and would retain well over 50 percent of the trees within the SMZ, would follow all requirements of the SMZ Law and ARM 36.11.425 through 36.11.427, and would have a low risk of affecting recruitment of large woody material to project area streams. The SMZ law, ARM 36.11.425 through 36.11.427, and all applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams.

Water Yield

The Action Alternative would increase the annual water yield in the Flower Creek watershed by an estimated 0.3% over the current level. This level of water yield increase would not be sufficient to create unstable channels.

CUMULATIVE EFFECTS

Cumulative Effects of No Action Alternative

Sediment Delivery

The cumulative effects of the No Action Alternative on sediment delivery would be very similar to those described in the existing conditions portion of this analysis. All existing sources of erosion and sediment transport from upland road segments would continue to recover or degrade as dictated by natural and pre-existing conditions until a source of

funding became available to repair them. Sediment loads would remain at or near present levels.

Water Yield

The No Action Alternative would have no cumulative effects on water yield. Existing timber harvest units would continue to re-vegetate and move closer to pre-management levels of water use and snowpack distribution.

Cumulative Effects of Action Alternative

Sediment Delivery

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

Harvesting of trees within a SMZ would have a low risk of adverse cumulative effects to downed woody material or sediment delivery in project area streams. Tree retention requirements of the SMZ Law and Forest Management Rules would ensure a future supply of woody material to the creeks. Equipment restrictions in the SMZ Law and Forest Management Rules would prohibit the use of ground based equipment within 50 feet of any stream, which would minimize the risk of bare soil erosion or transport reaching a stream channel.

None of the cumulative impacts described above are expected to adversely affect downstream beneficial uses. All activities would comply with applicable laws, ARM 36.11.423, and 36.11.425 through 36.11.427.

Water Yield

The removal of trees proposed in the Action Alternative would increase the water yield in the Flower Creek watershed from its current level of approximately 1.6% over unharvested to an estimated 1.9%. These water yield increases, and the associated ECA levels, include the impacts of all past management activity, existing and proposed roads, proposed timber harvesting and vegetative hydrologic recovery in the watershed. The water yield increases expected from the Action Alternative leave the watershed well below its established threshold of concern. There is a low risk of adverse cumulative impacts to water quality as a result of the Action Alternative. Estimated water yield increases would not be sufficient to create unstable stream channels or increased in-channel erosion. A summary of the anticipated water yield impacts of the Action Alternative to the Flower Creek watershed is found in table 3-ww.

TABLE 3-WW – WATER YIELD AND ECA INCREASES IN THE FLOWER CREEK WATERSHED

	Alternative	
	No Action	**Action**
Allowable WYI	11%	11%
% WYI	1.6%	1.9%
Acres Harvested[1]	0	610
ECA Generated[2]	0	306
Total ECA[2]	1180	1,486
Remaining ECA[2]	2,097	1,792
Allowable ECA[2]	3,277	3,277

[1] Refers only to acres harvested within the Flower Creek watershed
[2]Equivalent Clearcut Area, including roads (expressed in acres)

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Upper Flower Environmental Assessment
VEGETATION ANALYSIS

INTRODUCTION
This analysis is designed to describe the existing condition of the vegetation resources and identify the anticipated effects that may result from the proposed action.

ISSUES
The following list of issues was developed from interdisciplinary team input and public scoping comments:

- Timber harvesting could rectify the imbalance of current cover types compared to desired future conditions and stand health.
- Timber harvesting could affect any identified sensitive, threatened, or endangered plant species.
- Thinning and timber harvesting could reduce the probability of a stand replacement or catastrophic wildfire.
- Timber harvesting and associated activities could cause the spread of noxious weeds.

The following sections disclose the existing conditions and the anticipated indirect, direct and cumulative effects to these vegetative resources from the proposed actions. Past, current, and future planned activities on all ownerships within each analysis area have been taken into account for the cumulative effects analysis.

ANALYSIS AREAS
The analysis area for direct and indirect effects is the "project area", which consists of the state managed portion of section 16 & 20 in T30N R31W. The parcels range from 2,450 to 3,430 feet elevation and encompass all aspects with slopes of varying steepness. The parcels are dominated by Ponderosa pine and mixed conifer cover types. The analysis area for cumulative effects to cover types and age class includes all forested state land within the Libby Unit. The cumulative effects analysis area for stand health and noxious weeds includes the project area and the roaded lands managed for timber resources (approximately the lower 1/3 of watershed) in the Flower Creek drainage (approx 3600 acres).

ANALYSIS METHODS
To assess the existing condition of the proposed project area and surrounding landscape, a variety of techniques were used. Field visits, scientific literature, stand level inventory (SLI) data, aerial photographs, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following effects analysis.

***Forest/Timber Analysis Methods* –**

The methods used to analyze current and desired future stand conditions, old-growth timber stands, and stand health are as follows:

- *Current & Desired Future Conditions:* The DNRC site–specific model (ARM 36.11.405), was used to determine the characteristics of the desired future condition and to evaluate the potential

direct, indirect, and cumulative effects. This model assigns a desired future condition in terms of cover type for each stand identified in the DNRC's Stand Level Inventory (SLI). At the administrative unit level, the aggregate acreage of each desired future cover type describes a broad picture of the desired future condition for that unit. This provides a basis for comparison of current and desired future conditions at both the project and landscape (administrative unit) levels. Current conditions are described by DNRC's 2009 SLI for the Libby Unit. Field observations and tree data collected during the summer of 2009 were gathered to verify and further refine descriptions of specific forest stand characteristics within the project area. This data is available at the Libby Unit.

- *Old Growth Timber Stands:* the methods to identify old growth timber stands, as defined by ARM 36.11.403 (48), are based on the Libby SLI data. The process uses the SLI to identify stands that may meet the minimum criteria (number of trees per acre that have a minimum DBH and minimum age) for a given habitat type group as described in Green et al. (1992). Field surveys during the summer of 2009 were used to verify that no stands meet the minimum criteria set forth by DNRC's old-growth definition.
- *Stand Health:* the analysis on stand health is qualitative, and discusses the conditions of timber stands, including how various natural and man-caused disturbances and site factors including the presence of forest insects and diseases have affected and may continue to affect timber stand development.
- *Cover Types and Age Classes* - Climatic Section M333B - Lower Flathead Valley (Losensky 1997) Scale was used in this analysis for comparing historic conditions related to the distribution of forest cover types and age classes, to current conditions within the project area. The Lower Flathead Valley geographic area includes Flathead Lake west to the Montana border, from the Canadian border south to Missoula, MT (Losensky 1997).

Sensitive Plant Analysis Methods **–**

The Montana Natural Heritage Program (MNHP) database was consulted by DNRC for information regarding occurrence of plant species of special concern and the potential for sensitive plants and their habitats within the project area

Noxious Weed Analysis Methods **–**

During field reconnaissance, DNRC personnel assessed road conditions leading into the project area, possible road locations, various susceptible timber stands, stream conditions, and generally evaluated noxious weed occurrence, extent and location.

EXISTING CONDITIONS

Introduction and History

The State Forest Land Management Plan (SFLMP) directs DNRC to promote biodiversity by taking a coarse filter approach thereby favoring an appropriate mix of stand structures and compositions on State land. Components used to determine an appropriate mix of stand conditions at the landscape level include cover type proportions, age class distributions, stand structural characteristics, and the spatial relationships of stands- i.e. size and location on the landscape.

Records show that a large timber sale occurred during 1925 & 1926 where ~9.5 million board feet of Ponderosa pine and western white pine were removed. Approximately 95% of the project area was logged using a combination of rail, horse, and crawler tractors. These logging operations are well documented (Mark White; Kootenai National Forest) in printed and photographic history. In 1945, Pacific Power and Lights was granted an easement to construct water impound yard to capture, stockpile and supply water to meet Libby's domestic water needs. The dam was constructed and lake filled and to this day supplies water to the residents of Libby. A 1931 wildfire burned approximately 100 acres through old logging slash and residual ponderosa pine. The fires of 1910 came to within ½ mile of this project area.

Cover Types

Project Area

The Upper Flower project area comprises 1280 acres (~4%) of the Libby Unit landscape. Stand level inventory (SLI) data specific to project area is summarized below for cover types and age class distribution. Site review observations and stand measurements were used to update, confirm or refine the SLI data for this section.

Table 1 displays current and desired future cover types for the Upper Flower project area. The project area reflects the forest cover type shift similar to the landscape level, as species compositions are trending towards shade tolerant species dominating the composition of theses timber stands.

Table 1: Current and Desired Future Conditions for Upper Flower (Section 16 & 20, T30N, R31W)

	Cover Type	Current Cover Type (Acres)	Desired Future Condition (Acres)	Current – DFC (Acres)
T30N R31W Sec. 20 Flower Creek	PP	370	427	57 acre deficit
	MC	170	61	109 acre surplus
	WL/DF	57	90	33 acre deficit
	Non forested	44	44	
	SUBTOTAL	*642*	*642*	
T30N R31W Sec. 16 Flower Creek	HW	22	22	
	LP	8	0	8 acre surplus
	MC	220	66	154 acre surplus
	PP	57	83	26 acre deficit
	WWP	67	88	21 acre deficit
	WL/DF	268	383	115 acre deficit
	SUBTOTAL	*642*	*642*	

LP=Lodgepole pine, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, HW=hardwoods. The Current Type minus Desired Future Conditions above lists the surplus and deficit acres for each cover type.

Libby Unit

Estimate of current and desired future conditions were determined at the Landscape level for the entire Libby Unit in 2009 (Table 2).

Table 2: Current and Desired Future Conditions for the Libby Unit

Cover Type	Current Cover Type (Acres)	Desired Future Conditions (Acres)	Current Type Minus (–) Desired Future Cond.
DF	1,866	260	1,606 acre surplus
HW	221	221	0
LP	1,143	182	961 acre surplus
MC	4,805	336	4,469 acre surplus
PP	12,349	18,775	6,426 acre deficit
SUBALP	283	52	231 acre surplus
WL/DF	8,923	8,803	120 acre surplus
WWP	486	1,693	1,207 acre deficit
OTHER	743	497	246 acre surplus
TOTAL	30,819	30,819	

DF=Douglas-fir, HW=hardwood, LP=Lodgepole, MC=Mixed conifer, PP=Ponderosa pine, WL/DF=Western larch/Douglas-fir, WWP=Western white pine, SUB/ALP=subalpine fir, Other=nonstocked, nonforested, noncommercial. The Current Type minus Desired Future Conditions above lists the surplus and deficit acres for each cover type.

The PP and WWP cover types are not as well represented within the Libby Landscape as estimated for the early 1900's. Most notable, is the conversion of over 6,400 acres from the PP cover type, over the last 100 years, to the present over abundance of the MC, DF, and LP cover types.

This cover type shift is typical for Northwest Montana and it does represent a change in stand conditions. Active fire suppression initiated in the early 1900's has interrupted wildfire frequencies and intensities. Fifty or more years of logging practices have favored the removal of commercially valuable western larch (*Larix occidentalis*), ponderosa pine (*Pinus ponderosa*), western white pine (*Pinus monticola*) and Douglas-fir (*Pseudotsuga menziesii*) for railroad ties, mining timbers, and construction lumber. Many open, mature stands dominated by seral species with even-aged patches of immature seral trees in the understory have been replaced with more densely stocked stands in both the overstory and understory that includes a higher percentage of more shade tolerant trees such as, grand fir (*Abies grandis*), Engelmann spruce (*Picea engelmannii*), Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga heterophylla*).

Age Class

Project Area

Table 3 displays the estimated age class distribution for the Upper Flower project area from SLI observations.

Table 3: Upper Flower Project Age Class Distribution by Current Cover Type

Sum of Acres in Age Class Groups (years):							
Current Cover Type		00 - 39	40 - 99	100 – 149	150 +	Old Growth	**Total**
T30N R31W Sec. 20 Upper Flower Creek	PP		46	289	36		370
	MC			170			170
	WL/DF					57	57
	Non Forested						44
	SUBTOTAL		*46*	*459*	*36*	*57*	*642*
T30N R31W Sec. 16 Upper Flower Creek	HW			22			
	LP		8				
	MC		14	181	25		
	PP		57				
	WL/DF		82	149	36		
	WWP	67					
	SUBTOTAL	*67*	*161*	*352*	*62*		*641*

Libby Unit

The Libby Unit's Stand Level Inventory (SLI) 2009 version was used to summarize the estimated age class distribution for current cover types. Table 4 displays this information. This table also displays the Percentage of Analysis Areas by Age Class Groups. The largest disparity comparing current to historic is in the 0-39 and 100-149 age classes, but that could be explained in part by: (1) a significant amount of older-aged stands would have burned and regenerated following the 1910 fires and that is probably reflected in data Losensky used, and (2) the effects of fire suppression increasing the amount of stands in the older age classes in the current age class distribution. What is being shown is probably within the historically occurring natural range of variation.

Table 4: Libby Unit Age Class Distribution by Current Cover Type

Sum of Acres in Age Class Groups (years):								
	No Age Data	Non Forested	00 - 39	40 – 99	100 – 149	150+	Old Growth	Total
DF	303			855	441	266		1866
HW				103	118			221
LP			791	295	56			1143
MC			351	938	1974	756	786	4805
NONFOR		484						484
NONSTKD			246					246

PP	282		2578	3061	3108	2809	510	12349
PP-NC						13		13
SUBALP			23	83	52	79	46	283
WL/DF	160		450	1341	3523	1461	1988	8923
WWP			231		43	112	99	486
TOTAL	746	484	4670	6677	9315	5497	3429	30819
Percent of Analysis Areas by Age Class Groups								
Losensky's M333B (historic)	--	--	36	13	15	36	--	100%
Libby Unit (current)	2	--	15	22	31	29	--	100%

Old Growth

In describing his classification of the age structure of natural stands, Losenksky (1997) notes that old stands represent "a pool of acres of old aged trees, a portion of which may be considered old growth stands. The actual acres which may be considered old growth are somewhat elusive in that our understanding of the concept of old growth is limited and not rigidly defined by nature." It is recognized that stand age is an important criteria for determining old growth but would not realistically determine old growth acreage if used as the sole parameter. The Northern Region USFS publicized their effort to characterize old growth forest communities by cover type in a 1992 Internal Report: *Old-Growth forest Types of the Northern Region* (Green et al. 1992).

As per the State Land Board's decision in February, 2001, the DNRC adopted definitions for old growth by cover types, based on minimum number and size of large trees per acre and age of those trees as described by Green et al. (1992). Older stands within proposed project areas would be assessed for determining actual acreage that meet DNRC's old growth definitions. Old growth would be managed to meet biodiversity and fiduciary objectives in the SFLMP, pursuant to state law and the Forest Management rules, ARM 36.11.401 through 36.11.450.

No stands in the project area meet the criteria for DNRC's old growth definitions. There would be a zero acre reduction in old growth on Libby Unit resulting from the proposed activities.

Stand Health

Project Area

The stands where commercial thinning is proposed are healthy and vigorous. Several overstory ponderosa pine and Douglas-fir trees per acre left from the 1920s era logging have regenerated the site and continue to thrive. An 80 year old forest has regenerated dominated by ponderosa pine and Douglas-fir. These stands have little accumulations of surface fuels and ladder fuels which could elevate a ground fire into

a stand replacement fire. The stands where regeneration harvest is proposed are in serious decline. Mortality and rot is reducing the value of these stands. The 1920s era logging removed most of the seral species. Left behind were the hemlock, grand fir and other shade tolerants that continued to decay and precluded regeneration of shade intolerants. These stands have a heavy fuel loading on the forest floor and abundant ladder fuels making them susceptible to a stand replacement fire.

Adjacent Lands

The two small private owners adjacent to the section 16 proposed harvest unit is used for recreation by the Cabinet View Country Club and as investment property by a group of individuals. Section 20 has a housing subdivision being established adjacent to the proposed harvest unit. The private lands stands are healthy and vigorous.

US Forest Service borders both sections 16 and 20. The Forest Service has managed these adjacent lands for timber production and recreation. Much of the federally managed lands adjacent to the project area share the project area's variation in health and vigor.

Sensitive, Threatened, and Endangered Plants

A review of the records from the Montana Natural Heritage Program indicated no plant species of special concern are identified within the project area. Because no sensitive, threatened, or endangered plants were identified within the project area this issue was dropped from further analysis.

Noxious Weeds

Lincoln County and DNRC have a "Cooperative Integrated Noxious Weed Management Agreement" in compliance with the state law known as the County Weed Control Act (Section 7-22-2151, MCA). An annual coordination meeting between the county Weed Control District and DNRC allows for identification of weed problems; and determines an integrated approach at managing and treating priority areas as related to county and DNRC weed control goals.

Road side activities (construction, travel and maintenance) have been the driver behind noxious weed populations in the project area. In the county tansy ragwort and rush skeletonweed has been identified as a target control species. These species have not been observed within the project area. Spotted knapweed and hawkweed has been observed along road edges of the project area. The road system through section 20 is a cost share road and the US Forest Service does have a noxious weed spraying program to control roadside weed population.

ENVIRONMENTAL EFFECTS

The proposed project actions include the following:

Timber Harvesting Treatments:

Section 20:	104 acres	Seedtree (regeneration) harvest
Section 20:	456 acres	Commercial thin
Section 16:	50 acres	Commercial thin

Road Construction and Maintenance:
~5.078 miles of new construction
~5.9 miles of existing road that may need to be graded

Post harvest treatments:
Slash concentrations in the harvest units could be treated by prescribed fire, masticated, lopped and/or scattered to meet the Hazard Reduction Standards as applied under the State Fire Hazard Reduction Law (76-13-403 MCA) on all harvested acres. Slash at landings on all units could be treated by chipping, grinding, burning or a combination. The seedtree harvest units would require the site to be prepared for the establishment of regeneration by means such as machine scarification, chemical treatment, or prescribed fire. Planting with western larch, ponderosa pine, western white pine and, or western red cedar would be prescribed.

A. Cover Types and Age Classes:

Direct and Indirect Effects on Cover Types and Age Classes

NO ACTION: Short term effects are not anticipated with the no action alternative. In the long term, the units where commercial thinning is prescribed, trees would continue to grow unfettered for up to twenty years before inter-tree competition began to slow growth and cause mortality. The units where seedtree regeneration harvest is prescribed would continue losing value to rot, decay, and mortality. Fuel loading would be expected to increase and those stands would become even more susceptible to a stand replacement fire than they are today. A stand replacing fire would cause a flush of ash, sediment, minerals and nutrients that would be costly for Libby's water treatment plant to filter or treat.

ACTION ALTERNATIVE: Harvesting according the silvicultural prescriptions would result in the overall reduction of acres in the older age class groups. The prescribed 506 acres of commercial thinning would allow these stands to continue growing unfettered. The 104 acres of seedtree harvest would be converted to species that are desirable, merchantable and move the stands towards the desired future condition. The action alternative with its greater road access and thinned timber would help keep any wildfire on the ground where it could be suppressed more readily, preserving Libby's municipal watershed.

Cumulative Effects on Cover Types and Age Classes:

NO ACTION ALTERNATIVE: Without disturbance, the no action alternative would allow the trend of increasing acreages and densities of shade tolerant species to continue. The number of acres with desirable seral species would continue to decline.

ACTION ALTERNATIVE: The action alternative would contribute to moving stand conditions towards more historical condition by decreasing the excess of shade tolerant trees and returning those acres to the historical cover types dominated by the seral species. The action alternative would increase the proportion of forested acres in the 0-39 year age class on state lands with the harvest and planting of 104 acres.

B. Stand Health:

Direct and Indirect Effects on Stand Health:

NO ACTION ALTERNATIVE: Forest stands would continue to develop without disturbance. Stands where commercial thinning is prescribed would continue to grow and be vigorous for approximately twenty years before inter-tree competition begins to reduce growth and cause mortality. Stands where seedtree regeneration harvest is prescribed would continue to decay and loose value while suppressing any quality regeneration.

ACTION ALTERNATIVE: Under this alternative 610 acres would be managed, of which 506 acres would be treated with a commercial thinning harvest retaining the healthiest and most vigorous seral species individuals. There would be a generally open grown pine character (45-60 trees per acre) with small openings on 10-15% of the area where patches of lodgepole, grand fir or root-rot infected Douglas-fir pockets currently exist. Ponderosa pine and Douglas-fir would become more dominant in the over-story, and canopy gaps would encourage regeneration of seral species in the under-story**.** Growth rates and tree vigor would improve in stands where commercial thinning prescriptions were applied. 104 acres would be treated with a seedtree regeneration harvest retaining five to seven trees per acre for seed, wildlife snags and snag recruit trees. These stands are decadent with a decaying overstory and suppressed understory. The less desirable climax species that currently occupy these sites would be replaced with more desirable seral species, thus promoting more historic species compositions. The action would result in an improved health and vigor of these stands and a reduction of fuels.

Cumulative Effects on Stand Health:

NO ACTION ALTERNATIVE: Forest stands within the project area would continue to develop, retaining a larger proportion of the surrounding landscape in older, denser forest stands. Fuels would continue to build, value would continue to be lost.

ACTION ALTERNATIVE: 610 acres would receive silvicultural treatments, increasing the acreage of open canopied forest that is more adapted to low intensity ground fires and young, newly established forest in the surrounding landscape. The planted acres would have a species mix that more closely resembles stands in their historic condition before early logging removed the marketable species subset.

C. Noxious Weeds:

Direct and Indirect Effects:

NO ACTION ALTERNATIVE: Ground disturbing activities associated with timber harvesting and road maintenance or construction would not occur. Populations of spotted knapweed and hawkweed would gradually increase in size and distribution along roads. As weed control priorities and funding allows under the US Forest Service's weed control program, spraying along roads may occur within the next 5 years to contain or decrease existing weed populations.

ACTION ALTERNATIVE: Timber harvesting and road construction and maintenance activities would expose mineral soil and promote encroachment and spread of noxious weeds into the forest stands. In order to control and minimize the risk of increasing noxious weed populations, contract clauses would require the timber sale purchaser to: apply grass seed on areas with soil exposed from road construction or maintenance activities; clean off-road equipment so it is free of weed parts and have it inspected prior to moving onto site; and, incorporate slash into skid trails or apply grass seed to heavily used trails that have soil exposed. DNRC would ensure that haul roads are treated with herbicides before and after associated harvest activities.

Cumulative Effects:

NO ACTION ALTERNATIVE: Current noxious weed populations would continue to spread or new weed populations would invade the general area at the current rate given continuance of road and land uses.

ACTION ALTERNATIVE: The risk of additional noxious weed encroachment or invasion is higher under the action alternative. Competition with native plant species could result from the establishment and spread of noxious weeds. A combination of prevention, revegetation, monitoring and herbicide treatment would be implemented to reduce the possible infestation and spread of weeds. DNRC in cooperation with adjacent landowners managing their weed populations in accordance with the state law known as the County Weed Control Act (Section 7-22-2151, MCA) would help to control the number and spread of noxious weeds.

WILDLIFE ANALYSIS

INTRODUCTION

This analysis is designed to describe the existing conditions of the wildlife resources and identify the anticipated effects that may result from each alternative.

Issues

The following list of issues was developed from interdisciplinary team input and public scoping comments:

- Timber harvesting could reduce forested cover, which could reduce the amount of mature forested habitats available to those species that rely on these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.
- Timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependent on these resources, which could alter their survival and/or reproductive ability.
- Timber harvesting and associated activities could alter cover, increase access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing the risk of human-caused mortality.
- Timber harvesting and associated activities could alter flammulated owl habitat by reducing canopy closure and increasing tree spacing, but could remove snags needed by flammulated owls for nesting.
- Timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.
- Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.
- Timber harvesting and associated activities could remove forest cover on big game winter range, which could reduce the carrying capacity of the winter range.

ANALYSIS AREAS

Existing conditions and environmental effects are described at two different scales: (1) the ’project area‘, which consists of sections 16 and 20 in T30N, R31W, and (2) the ’cumulative effects analysis area‘ which is the broader, surrounding landscape used for assessing cumulative effects to wildlife species and their habitats. The scales of the cumulative effects analysis areas vary according to the species, but generally approximate the size of the home range for the particular species.

ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a ‘coarse-filter approach’, which favors an appropriate mix of stand structures and compositions on state lands (*ARM 36.11.404*). Appropriate stand structures are based on ecological characteristics (e.g., landtype, habitat type, disturbance regime, unique characteristics). A coarse-filter approach assumes that if landscape patterns and processes are maintained similar to those with which the species evolved, the full complement of species would persist and biodiversity would be maintained. This coarse-filter approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across the landscape. DNRC cannot assure that the coarse-filter approach will adequately address the full range of biodiversity; therefore, DNRC also employs a ’fine-filter‘ approach for threatened, endangered, and sensitive species (*ARM 36.11.406*). The fine-filter approach focuses on a single species’ habitat requirements.

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

dismissed from further analysis if habitat did not exist in the project area or would not be modified by any alternative. Past and current activities on all ownerships in each analysis area, as well as planned future agency actions, have been taken into account for the cumulative-effects analysis.

RELEVANT AGREEMENTS, LAWS, PLANS, RULES, AND REGULATIONS

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

COARSE FILTER WILDLIFE ANALYSIS

Of the 108 mammal species found in Montana, 71 are suspected or known to occur in Lincoln County (*Foresman 2001*). The majority of terrestrial vertebrates that were present at the time of European settlement likely still occur in the vicinity of the proposed project area. Eight amphibian and eight reptile species have also been documented in Lincoln County (*Maxell et al. 2003*) and at least 118 species of birds have been documented in the vicinity in the last 10 years (*Lenard et al. 2003*). Terrestrial species that rely on special habitat elements, such as white bark pine (*Pinus albicaulis*), western white pine (*Pinus monticola*), or burned areas, may not be present or may occur in lower abundance due to the decline of these elements across the landscape.

Since the early1900's fire suppression has increased tree densities, and the prevalence of shade-tolerant species, such as Douglas-fir and grand fir. These changes probably benefit wildlife species that rely on shade-tolerant tree species and/or closed-canopy habitats, while negatively affecting species that rely on shade-intolerant tree species and/or open habitats. However, in the vicinity of the project area, the forests are a mosaic of mature and regenerating stands, to the benefit of species relying on mature forests as well as species that use early seral stages either exclusively or seasonally.

MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY

Issue: Timber harvesting could reduce forested cover, which could reduce the amount of mature forested habitats available to those species that rely on these habitats and/or decrease the ability of some wildlife species to move through the landscape, which could alter their ability to use the area and or successfully reproduce.

Introduction

A variety of wildlife species rely on mature to old stands for some or all life requirements. A partial list of these species includes pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*). Wildlife species that require connectivity of forest habitat types between patches or those species that are dependent upon interior forest conditions can be sensitive to the amount and spatial configuration of appropriate habitats. Some species are adapted to thrive near patch edges, while others are adversely affected by the presence of edge or the other animals that prosper in edge habitats. Connectivity of forested habitats facilitates movements of those species that avoid nonforested areas and other openings; connectivity under historical fire regimes likely remained relatively high as fire differentially burned various habitats across the landscape.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 12 sections surrounding the state parcels. This scale of analysis would be large enough to support a diversity of species that use mature forested habitats and/or require connected forested habitats.

Analysis Methods

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

Existing Environment

The project area currently contains approximately 676 acres of mature stands (100-plus years in age) of Douglas-fir/western larch, ponderosa pine, and mixed-conifer stands that have a reasonably closed canopy. No stands in the project area meet the definition of old-growth (*Green et al. 1992;* see *VEGETATIVE ANALYSIS-OLD GROWTH*).

In addition to the mature stands in the project area, several younger-aged stands of Douglas-fir/western larch exist due to past timber management. Currently, forested areas cover roughly 53 percent of the project area, facilitating some use by those species requiring connected forested conditions and/or forested interior habitats. However, connectivity within the project area has been reduced with past timber harvesting and the construction of some open roads.

Presently, roughly 52 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting. The network of open roads in the cumulative-effects analysis area, coupled with timber management and land clearing has reduced some of the landscape-level connectivity. Ongoing harvesting associated with the Flower Creek Timber Sale project on DNRC-managed lands would continue reducing forested habitats and altering connectivity. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including USFS-managed lands included in the proposed Flower Creek Project, could continue altering forested habitats and landscape connectivity. Across the cumulative-effects analysis area, some landscape connectivity has largely been retained and some forested, interior habitats exist.

Environmental Effects

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

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

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

Approximately 604 acres of Douglas-fir, western larch/Douglas-fir, ponderosa pine, and mixed-conifer stands would be harvested, including roughly 560 acres of mature stands with a closed canopy. Roughly 102 of these acres of mature, forested habitats would receive a regeneration-type treatment, which would reduce habitat for those species relying on mature, closed-canopy forested habitats. The remaining acres of mature, forested habitats would receive a commercial-thin treatment, which again reduces habitat for species needing a mature, closed-canopied stand; however, these stands could provide lower-quality habitats for those species requiring mature, forested conditions more quickly than some stands receiving regeneration-type treatments due to the anticipated retention levels. Overall, the resultant changes in stand age and density would reduce habitats for species associated with older stands, such as American marten and pileated woodpecker, which benefited from the increasing stand ages and densities caused, in part, by modern fire suppression. In general, under this alternative, habitat conditions would improve for species adapted to the more-open forest conditions, while reducing habitat quality for species that prefer dense, mature forest conditions. However, the project area is near the town of Libby, and as such, may be providing a buffer from the town for those species that require extensive, forested habitats, but likely provides little in terms of connectivity between forested habitats. Thus, minor adverse direct and indirect effects to mature forested habitats and connectivity would be expected that could affect wildlife in the project area since: 1) harvesting would revert succession on roughly 102 acres of mature forested stands, reducing stand age and the amount of forested cover, while reducing canopy closure on another 502 acres; 2) minor changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

Cumulative Effects of the No-Action Alternative on Mature Forested Habitats and Connectivity

Habitats in the cumulative-effects analysis area are a mosaic of habitat types and age classes. Past harvesting has reduced the amount of mature, forested habitats; however, continued successional advances in the cumulative-effects analysis area is advancing stands towards mature forests. This alternative would continue to contribute to the

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

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

Past harvesting in the cumulative effects analysis areas has reduced the amount of mature, forested habitats available. Reductions in mature, forested habitats associated with this alternative would be additive to losses associated with past harvesting activities and ongoing activities, including any potential harvesting that may occur with the proposed USFS Flower Creek Project. Across the cumulative-effects analysis area, some forested habitats would still exist and landscape connectivity would not be appreciably altered. Habitats for forested interior species and old-stand-associated species, such as the American marten, northern goshawk, and pileated woodpecker, would be expected to be reduced; however, some continued use of the analysis area by these species would be expected. Wildlife species favoring earlier seral stage habitats would see another increase in available habitats. Since the parcel is more likely to be serving as a buffer from the human development in the town of Libby and not likely providing landscape connectivity facilitating wildlife travel, the proposed harvesting would have marginal effects on landscape connectivity. Thus, minor adverse cumulative effects to mature forested habitats and connectivity would be expected that could affect wildlife in the cumulative-effects analysis area since: 1) harvesting would remove mature stands, further reducing the amount of forested cover in the cumulative-effects analysis area; 2) no appreciable changes to landscape connectivity would occur; and 3) some changes to wildlife use would be expected.

SNAGS AND COARSE WOODY DEBRIS

Issue: Timber harvesting could reduce snags and coarse woody debris densities, leading to a decline in the quality of habitat for those wildlife species that are dependent on these resources, which could alter their survival and/or reproductive ability.

Introduction

Snags and coarse woody debris are important components of forested ecosystems. The following are 5 primary functions of deadwood in the forested ecosystems: 1) increase structural diversity, 2) alter the canopy microenvironment, 3) promote biological diversity, 4) provide critical habitat for wildlife, and 5) act as a storehouse for nutrient and organic matter recycling agents (*Parks and Shaw 1996*).

Snags and defective trees (e.g. partially dead, spike top, broken top) are used by a wide variety of wildlife species for nesting, denning, roosting, feeding, and cover. Snags and defective trees may be the most valuable individual component of Northern Rocky Mountain forests for wildlife species (*Hejl and Woods 1991*). The quantity, quality, and distribution of snags affect the presence and population size of many of these wildlife species relying on these resources. Snags provide foraging sites for insectivorous species and offer opportunities for primary cavity-nesting species to excavate nests. The cavities created by primary excavators (i.e. woodpeckers) also provide habitat for secondary cavity users, including other birds and small and mid-sized mammals. Snags and defective trees can also provide nesting sites for secondary cavity users where cavities are formed by broken tops and fallen limbs. Larger, taller snags tend to provide nesting sites, while shorter snags and stumps tend to provide feeding sites (*Bull et al. 1997*). Many species that use smaller-diameter snags will also use large snags; however, the opposite is not true. Typically, older-aged stands will have greater numbers of large snags. Finally, snag densities are another important aspect of habitat value for cavity-nesting birds, as many of these species tend to nest in areas where snag densities are high, using one snag for nesting, but having others nearby for foraging or roosting opportunities.

Meanwhile, coarse woody debris provides food sources, areas with stable temperatures and moisture, shelter from the environment, lookout areas, and food-storage sites for several wildlife species. Several mammals rely on deadwood for survival and reproduction. The size, length, decay, and distribution of woody debris affect their

capacity to meet these life requisites. Logs less than 6 feet in length tend to dry out and provide limited habitat for wildlife species. Single, scattered downed trees could provide lookout and travel sites for squirrels or access under the snow for small mammals and weasels, while log piles provide foraging sites for weasels and denning sites for lynx.

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 12 sections surrounding the state parcel. This scale of analysis would be large enough to support a diversity of species that use coarse woody debris resources, from birds to small mammals and meso-carnivores.

Analysis Methods

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

Existing Environment

During field visits to the project area, an average of 1.97 large (>21" dbh) snags per acre were observed (range 0-6.6 per acre), which were largely dominated by western larch, ponderosa pine, Douglas-fir, and grand-fir. Large snags (greater than 21 inches dbh) were more abundant in the older stands and away from open roads where firewood cutting often occurs. Likewise, coarse woody debris is typically abundant in these older stands, with much of the volume coming from larger pieces of downed wood (greater than 10 inches dbh). Medium-sized snags were also variable within the project area, with an average of 13.01 snags (15-21" dbh) per acre, with a similar species mixture. Generally evidence of snag use for feeding and/or cavity building was observed across the project area. Coarse woody debris levels were also variable across the project area, with an average of 9.9 tons per acre (range 0-17.8 tons per acre). Elsewhere in the project area, areas that have been harvested in the past decade or so typically have a couple of snags per acre and abundant coarse woody debris. The network of open roads in portions of the project area has facilitated some firewood gathering, which has affected snag and coarse woody debris levels in the vicinity of those open roads.

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

Environmental Effects

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

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

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

Present and future snags and coarse woody debris would be reduced due to timber harvesting on 604 acres in the project area. Portions of the project area adjacent to open roads or in stands that lack larger snags would not see appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Prescriptions call for a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class; additional large-diameter recruitment trees may be left if sufficient large snags are not present), and 10 to 15 tons of coarse woody debris per acre would be planned for retention in the proposed harvest areas. However, some snags and/or recruit trees could be lost due to safety and operational concerns, but replacements would be identified in order to stay in compliance with *ARM 36.11.411*. Future snag quality in the harvested areas would be enhanced with proposed silvicultural prescriptions that should lead to the reestablishment of shade-intolerant species that tend to provide important habitats, such as long-lasting nesting structures and foraging habitats, for cavity nesting birds. Given the amounts, range of variability in sizes, and decay classes of snags and coarse woody debris present in the project area, prescriptions aiming to maintain a variety of these resources would benefit the suite of species that rely on these habitat components. No changes in human access would occur and, therefore, no changes to the potential risk for snag and coarse woody debris loss due to firewood gathering would occur. Thus, minor adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris and 2) no changes to human access for firewood gathering would occur.

Cumulative Effects of the No-Action Alternative on Snags and Coarse Woody Debris

Snags and coarse woody debris would not be altered in the project area. The species composition of future snags could be altered with changing species composition in the stands due to advances in succession. Snags have been retained during some of the past harvesting on adjacent ownerships and are being retained with the ongoing Flower Creek Timber Sale project on DNRC-managed lands in the cumulative effects analysis area. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including USFS-managed lands included in the proposed Flower Creek Project could continue to alter snag and coarse woody debris densities. Firewood and other forest-product gathering have reduced deadwood resources in the vicinity of the open roads. Snags and coarse woody debris are largely absent from the non-forested habitats in the cumulative effects analysis area and would not be expected to develop in the future. Wildlife species in the cumulative-effects analysis area that rely on snags and coarse woody debris would be expected to persist. Thus, no cumulative effects to snags and coarse woody debris would be anticipated since: 1) no further harvesting would occur, 2) changes in the numbers of snags would be negligible, and 3) no change in the level of firewood gathering would be expected.

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

Some snags and coarse woody debris could be removed from the project area, while others may be recruited. Surrounding lands have experienced gone different management regimes by the differing owners through time, and within each of these management regimes, snags and coarse woody debris have received different levels of consideration; however, harvesting on all ownerships in the vicinity has reduced these deadwood resources. The losses of snags and coarse woody debris associated with this alternative would be additive to the losses associated with past harvesting, ongoing harvesting, land clearing, as well as ongoing firewood gathering. However, the project requirements to retain a minimum of 2 large snags per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), 2 large snag recruits per acre (greater than 21 inches dbh where they exist, otherwise the next largest size class), and 10 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Due to a lack of snags or the risk of firewood gathering, some areas would not meet these requirements. No change in human access would be anticipated; thus, no changes to the potential loss of snags and coarse woody debris to firewood gathering would occur. Wildlife species that rely on snags and coarse woody debris in the cumulative-effects analysis area would be expected to persist at similar levels, albeit slightly lower numbers in proposed units following treatment. Thus, minor adverse effects to wildlife species requiring snags and coarse woody debris would be anticipated in the cumulative-effects analysis area since: 1) a cumulative amount of the cumulative-effects analysis area would be harvested reducing snags and snag-recruit trees while increasing coarse woody debris levels, 2) no changes in access for the general public and associated firewood gathering would be anticipated, and 3) the slightly increased representation of shade-intolerant species that could become snags in the long term.

FINE-FILTER ANALYSIS

In the fine-filter analysis, individual species of concern are evaluated. These species include wildlife species listed as threatened or endangered under the *Endangered Species Act of 1973*, species listed as sensitive by DNRC, and species managed as big game by DFWP. ***TABLE W-1 – FINE FILTER*** summarizes how each species considered was included in the following analysis or removed from further analysis because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE W-1 – FINE FILTER. *Status of species considered in the fine-filter analysis for this proposed project.*

	SPECIES/HABITAT	DETERMINATION – BASIS
Threatened and Endangered Species	Grizzly bear (*Ursus arctos*) Habitat: Recovery areas, security from human activity	The project area partially occurs in the Cedar Grizzly Bear Subunit of the Cabinet-Yaak Ecosystem with the majority occurring in "occupied habitat" area.
	Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zone	The project area contains 19 acres of temporary non-lynx habitats that would not be altered with either alternative. No other lynx habitats were identified in the project area, thus no direct, indirect, or cumulative effects to Canada lynx would be expected to occur as a result of either alternative.
Sensitive Species	Bald eagle (*Haliaeetus leucocephalus*) Habitat: Late-successional forest more than 1 mile from open water	The project area is approximately 2.75 acres away from the nearest known bald eagle nest on Libby Creek. Thus, no direct, indirect, or cumulative effects to bald eagles would be expected to occur as a result of either alternative.
	Black-backed woodpecker (*Picoides arcticus*) Habitat: Mature to old burned or beetle-infested forest	No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene salamander (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loon (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	No suitable lake habitats occur within the project area. Thus, no direct, indirect or cumulative effects to common loons would be expected to occur as a result of either alternative.
	Fisher (*Martes pennanti*) Habitat: Dense mature to old forest less than 6,000 feet in elevation and riparian	Potential fisher habitats occur in the project area.
	Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	Suitable dry ponderosa pine and Douglas-fir stands exist in the project area.

	Gray Wolf (*Canis lupus*) Habitat: Ample big game populations, security from human activities	The project area is over 11 air miles from the annual home range for the Satire pack. The project area lacks white-tailed deer winter range. Thus, no direct, indirect, or cumulative effects to gray wolves would be expected to occur as a result of either alternative.
	Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	No suitable high-gradient stream or river habitats occur in the project area. No direct, indirect or cumulative effects to harlequin ducks would be expected to occur as a result of either alternative.
	Northern bog lemming (*Synaptomys borealis*) Habitat: Sphagnum meadows, bogs, fens with thick moss mats	No suitable sphagnum bogs or fens occur in the project area. Thus, no direct, indirect, or cumulative effects to northern bog lemmings would be expected to occur as a result of either alternative.
	Peregrine falcon (*Falco peregrinus*) Habitat: Cliff features near open foraging areas and/or wetlands	No suitable cliffs/rock outcrops occur in the project area. Thus, no direct, indirect, or cumulative effects to peregrine falcons would be anticipated as a result of either alternative.
	Pileated woodpecker(*Dryocopus pileatus*) Habitat: Late-successional ponderosa pine and larch-fir forest	Mature ponderosa pine, western larch/Douglas-fir and mixed conifer habitats exist in the project area.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	No suitable caves or mine tunnels are known to occur in the project area. Thus, no direct, indirect or cumulative effects to Townsend's big-eared bats are anticipated as a result of either alternative.
Big Game Species	Big game winter range	Big game winter range exists in the project area.
	Elk security habitat	No elk security habitat exists in the project area and no large blocks of security habitat exist that contribute to a larger block of elk security habitat outside of the project area. Thus, no direct, indirect, or cumulative effects to elk security habitat would be anticipated as a result of either alternative.

THREATENED AND ENDANGERED SPECIES

GRIZZLY BEAR

Issue: Timber harvesting and associated activities could alter cover, increase access, and reduce secure areas, which could adversely affect grizzly bears by displacing grizzly bears from important habitats and/or increasing risk to bears of human-caused mortality.

Introduction

Grizzly bears are native generalist omnivores that use a diversity of habitats found in western Montana. Preferred grizzly bear habitats are meadows, riparian zones, avalanche chutes, subalpine forests, and big game winter ranges, all of which provide seasonal food sources. Primary habitat components in the project area include meadows, riparian areas, and big game winter ranges. Primary threats to grizzly bears are related to human-bear conflicts, habituation to unnatural foods near high-risk areas, and long-term habitat loss associated with human development (*Mace and Waller 1997*). Forest-management activities may affect grizzly bears by altering cover and/or by increasing access to humans into secure areas by creating roads (*Mace et al. 1997*). These actions could lead to the displacement of grizzly bears from preferred areas and/or result in an increased risk of human-caused mortality by bringing humans and bears closer together and/or making bears more detectable, which can increase their risk of being shot illegally. Displacing bears from preferred areas may increase their energetic costs, which may, in turn, lower their ability to survive and/or reproduce successfully.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on a 36,292-acre area that includes the portion of the "occupied habitat" adjacent to the Cedar subunit of the Cabinet-Yaak Ecosystem (as well as the 10 acres of the project area within the Cedar subunit) between the Kootenai River and Swamp Creek. This combined area approximates the home range size of a female grizzly bear.

Analysis Methods

Field evaluations, aerial photograph interpretation, and GIS analysis were the basis for this analysis. Open road densities in the cumulative effects analysis area were calculated using a simple linear calculation method and areas that are free of motorized human access that could contribute to security habitats were determined using GIS. Security habitats are areas that are > 0.3 miles (500 meters) from any open road, restricted road, or high use roads and trails and meet a minimum size of 2,500 acres. Factors considered in the analysis include amount of the area with open road densities greater than 1 mile per square mile, the amount of available security habitat, and availability of timbered stands for hiding cover.

Existing Environment

The project area is mostly within "occupied habitat" as mapped by grizzly bear researchers and managers to address increased sightings and encounters of grizzly bears in habitats outside of recovery zones (Wittinger, 2002). However, a small portion (approximately 10 acres) of the project area exists in the Cedar subunit of the Cabinet-Yaak Recovery Area and yet more of the project area occurs outside of both the recovery zone and the "occupied habitat" area and use by grizzly bears is unlikely. Grizzly bears have not been documented in the project area, but use of the project area is possible. Grizzly bears generally use different habitats relative to season. The project area primarily provides habitat for grizzly bears in the spring, due to the lower elevations and the presence of riparian areas in which vegetation greens up earlier in the spring. Summer or autumn habitat values are fairly low in the area.

Managing human access is a major factor in management for grizzly bear habitat. Open road densities in the cumulative effects analysis area are quite high with approximately 5.04 miles/square mile (simple linear calculation). No security habitat exists in the project area, and no security habitat exists in the cumulative effects analysis area due to the existing network of open roads. Considerable hiding cover exists within both the project area and cumulative effects analysis area. Within the cumulative effects analysis area, ongoing harvesting associated with the Six Hills Timber Sale Project and the Crazyman Timber Sale Project are occurring on DNRC-managed lands. Additionally, timber harvesting and human development that is occurring on other ownerships is also likely altering grizzly bear habitats and/or human disturbance levels. The proposed harvesting on USFS lands with the Flower Creek Project could also reduce grizzly bear habitats and/or contribute to elevated human disturbance levels in the cumulative effects analysis area.

Environmental Effects

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

No direct effects to grizzly bears would be expected. No changes to the level of disturbance to grizzly bears would be anticipated. Foraging opportunities might decline due to the lack of diversity in habitat such as forest edge and younger age-class stands. No changes in security core, open-road densities, or hiding cover would be anticipated. Thus, no direct or indirect effects to grizzly bears would be anticipated since: 1) no disturbance or displacement would be expected, 2) no changes in hiding cover would occur, 3) security habitat would not be altered, and 4) no changes in long-term open-road densities would be anticipated.

Direct and Indirect Effects of the Action Alternative on Grizzly Bears

This alternative might affect grizzly bears directly through increased road traffic, noise, and human activity, and indirectly by altering the amount of hiding cover and forage resources. Activities in grizzly bear habitats reduce grizzly bear security, possibly resulting in increased stress and/or energy expenditure to endure the disturbance or to move from the area. These disturbances would only be present during harvesting operations; therefore, the season of disturbance is important in addressing impacts to grizzly bears. The proposed harvesting would likely occur during the non-denning period, which would likely have minor direct effects to grizzly bears; no direct effects to grizzly bears would be anticipated if harvesting occurred during the denning period. Use of the project area by grizzly bears would likely be the greatest during the spring and mitigations to avoid the spring period (April 1 –May

31) would further reduce the likelihood of disturbing and displacing grizzly bears. Overall, the proposed activities would occur in areas where low levels of grizzly bear use would be anticipated or would occur during the time periods when grizzly bears would not be expected to be using the area, leading to negligible disturbance and displacement of grizzly bears.

Hiding cover, defined as vegetation that will hide 90 percent of a grizzly bear at a distance of 200 feet, would be reduced on much of the 604 acres proposed for harvesting. Some hiding cover in the form of brush, shrubs, and sub-merchantable trees would persist in many of the units, albeit at a reduced level from the existing condition; hiding cover would increase through time as young trees and shrub regeneration proceeds over the next 5 to 10 years. Security habitat would not be entered or altered with this alternative.

Approximately 5.02 miles of new roads would be constructed with the proposed activities, including roughly 4.65 miles in the portion of the project area in the "occupied habitat" area and 0.46 miles outside both the recovery zone and "occupied habitat" area; no new road would be constructed in the recovery zone. All newly constructed roads would all be closed to the general public following potential use with this alternative. All existing roads would revert to the existing status after proposed harvesting, thus no changes to long-term open road densities and public motorized access would be anticipated. Some increases in non-motorized human access could occur with the newly constructed roads facilitating additional access. Thus, since 1) negligible disturbance and displacement would be anticipated, 2) hiding cover would be reduced in parts of the project area, but would remain in other parts, and would be expected to recover in the short-term, 3) no changes to security habitats would be expected, and 4) no changes to long-term open road densities would be anticipated; minor adverse direct or indirect effects to grizzly bears in the local area would be expected in the short-term.

Cumulative Effects of the No-Action Alternative on Grizzly Bears

Motorized access to the area and open road densities would remain unchanged. Existing forested stands throughout the cumulative effects analysis area would be expected to persist in to the future; regenerating stands are either presently providing hiding cover and forage resources, or would be expected to do so in the near future. Ongoing harvesting associated with the Six Hills Timber Sale Project and the Crazyman Timber Sale Project on DNRC-managed lands would continue altering grizzly bear habitats; any potential harvesting associated with the USFS Flower Creek Project could alter grizzly bear habitats and/or disturb grizzly bears. Human development and associated disturbance in the portions of the cumulative effects analysis area limits the likelihood of grizzly bear use in those areas; continued moderately high levels of human disturbance in the cumulative effects analysis area would be anticipated. Thus, since 1) no changes in human disturbance levels would be expected, 2) no changes to open road densities would occur, 3) no further losses of hiding cover would occur, and 4) no changes to security habitats would be expected; no further adverse cumulative effects would be expected to affect grizzly bears in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Grizzly Bears

The increased use of road systems during the proposed project would temporarily increase human disturbance to grizzly bears within a portion of the cumulative effects analysis area, should they occur there. Proposed activities would occur in the portion of the cumulative effects analysis area already experiencing moderate levels of human disturbance, largely associated with open roads and private ownerships, and would be away from the more remote portions of the cumulative effects analysis area that are more likely to be used by grizzly bears. Collectively, minor short-term (2-4 years) increases in human disturbance would be anticipated in the cumulative effects analysis area. Continued use of the cumulative effects analysis area by grizzly bears would be anticipated at levels similar to present. Reductions in hiding cover would be additive to the reductions from past timber harvesting, ongoing harvesting, including any potential USFS harvesting associated with the Flower Creek Project, as well as more permanent land-cover changes in the cumulative effects analysis area; however, appreciable amounts of the cumulative effects analysis area are currently providing hiding cover. Early successional stages of vegetation occurring in harvest units could provide foraging opportunities that do not exist in some mature stands. Open road densities would increase in the short-term in the "occupied habitat" portion of the project area, but no changes in long-term open-road densities would be expected in either the recovery zone or the "occupied habitat" areas. The fairly extensive road system would persist and would continue to facilitate human access within the cumulative effects analysis area; a slight increase in non-motorized access to a small portion of the cumulative effects analysis area would occur. Thus, since 1) minor increases in human disturbance levels would be expected within the cumulative effects analysis area, 2) hiding cover would be lost in the short-term on a small portion of the cumulative effects analysis area, but would be expected to recovery fairly rapidly, 3) no changes in long-term open road

densities would occur, and 4) no changes to security habitats would be expected; minor adverse cumulative effects to grizzly bears would be expected in the short-term (2-4 years) and minimal adverse cumulative effects would be anticipated in the long term.

SENSITIVE SPECIES

When conducting forest-management activities, the *SFLMP* directs DNRC to give special consideration to sensitive species. These species may be sensitive to human activities, have special habitat requirements, are associated with habitats that may be altered by timber management, and/or may, if management activities result in continued adverse impacts, become listed under the *Federal Endangered Species Act*. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful 'fine filter' for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the *Montana Natural Heritage Database* documented Townsend's big-eared bats and fisher in the vicinity of the project area. As shown in ***TABLE W-1 - STATUS OF SPECIES CONSIDERED IN THE FINE-FILTER ANALYSIS FOR THIS PROPOSED PROJECT***, the sensitive species portion of this analysis will focus on fisher, flammulated owls, gray wolves, and pileated woodpeckers.

FISHER

Issue: Timber harvesting and associated activities could reduce fisher habitat availability and quality by reducing canopy cover, snag density, and the amount of coarse woody debris.

Introduction

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

Analysis Areas

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 36,292 acre cumulative effects analysis area described in the grizzly bear section above. This scale includes enough area to approximate overlapping home ranges of male and female fishers (*Heinemeyer and Jones 1994*).

Analysis Methods

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

Existing Environment

The project area ranges from 2,450 to 3,430 feet in elevation, with approximately 4.7 miles of perennial streams and at least another 2.3 miles of intermittent streams. DNRC manages preferred fisher covertypes within 100 feet of Class 1 and 50 feet of Class 2 streams, so that 75 percent of the acreage (trust lands only) would be in the sawtimber size class in moderate to well-stocked density (*ARM 36.11.440[1][b][i]*). Approximately 125 acres are in these riparian areas in the project area along the 7.0 miles of Class 1 and 2 streams. Modeling fisher habitats using SLI

data generated an estimate of 365 acres of fisher foraging, resting, denning, and travel habitats (312 upland acres and 53 riparian acres) in the project area (*Heinemeyer and Jones 1994*). Within the riparian areas, the majority of the preferred fisher covertypes (53 of 76 acres, or 70 percent) are moderately or well-stocked and likely support the structural features necessary for use as fisher resting and denning habitats in addition to serving as travel habitats and maintaining landscape connectivity.

Within the cumulative effects analysis area there are roughly 1,597 acres within 100 feet of the 66 miles of perennial streams and 50 feet of the 113 miles of intermittent streams. Within the riparian habitats on DNRC-managed lands in the cumulative effects analysis area, roughly 79.4 percent (158 of 199 acres) of the area in preferred fisher covertypes presently provides structural features necessary for use as fisher resting and denning habitats, which exceeds the required threshold of 75 percent. Additionally, roughly 3,088 acres of upland fisher habitats exist on DNRC-managed lands in the cumulative effects analysis area. Preferred fisher covertypes occur across portions of the cumulative effects analysis area; suitable habitats likely occur on a smaller subset of those lands. The network of open roads in the cumulative effects analysis area coupled with timber management in the past 40 years has reduced landscape-level connectivity. The Six Hills Timber Sale Project and the Crazyman Salvage on DNRC-managed lands is altering approximately 63 acres and 11 acres, respectively, of upland fisher habitats in the cumulative effects analysis area; timber harvesting could continue on other lands within the cumulative effects analysis area, including any lands included in the proposed USFS Flower Creek Project. Across the cumulative effects analysis area, landscape connectivity has been compromised, but some connectivity, particularly along streams and riparian features has been partially retained.

Environmental Effects

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

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

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 10 acres of the 53 acres of riparian fisher habitats in the project area would be included in proposed harvest units. Most of this acreage would not be harvested or only a few individual trees gaps would be created, which would not change the capacity of these areas to support fisher. Only approximately 1 of these acres would be unsuitable following proposed treatment. Furthermore approximately 1 acre of riparian area that is a suitable covertype but lacks the stocking density or structural features necessary for use as fisher resting and denning habitats would be harvested, further setting back the time until that area is suitable for fisher. Additionally, approximately 174 of the 312 acres (56 percent) of upland fisher habitats in the project area would receive treatments, with much of those acres likely being too open for appreciable fisher use following proposed treatments. No changes in open roads would be anticipated, which would not likely alter trapping pressure and the potential for fisher mortality. Minor reductions in connectivity would be expected in a landscape where connectivity is relatively intact (*see WILDLIFE ANALYSIS-MATURE FORESTED HABITATS AND LANDSCAPE CONNECTIVITY*), but activities would avoid riparian areas. Thus, minor adverse direct and indirect effects would be anticipated that would affect fisher in the project area since: 1) harvesting would largely avoid riparian areas; 2) harvesting would reduce or remove upland fisher habitats and mature upland stands in preferred covertypes; 3) minor reductions in landscape connectivity would occur, but those areas associated with riparian areas would largely remain unaffected; 4) harvesting would reduce snag and coarse woody debris levels; however, some of these resources would be retained; and 5) no appreciable changes in motorized human access levels would be anticipated.

Cumulative Effects of the No-Action Alternative on Fishers

Fisher denning and resting habitats would be retained. Suitable fisher foraging, denning, and resting habitats occur across the cumulative effects analysis area. No changes in forest connectivity would be anticipated; however current

landscape connectivity in the area has been compromised through past harvesting activities. Ongoing harvesting, including any potential harvesting associated with the USFS Flower Creek Project, could continue altering fisher habitats. Road access within the cumulative effects analysis area would not change; therefore, fisher vulnerability to trapping would remain unchanged. Thus, since: 1) no changes to existing habitats on DNRC ownership would occur, 2) landscape connectivity afforded by the stands on DNRC ownership would not appreciably change, 3) no changes to snags, snag recruits, or coarse woody debris levels would be expected, and 4) no changes to human access or potential for trapping mortality would be anticipated, no further cumulative effects to fishers would be anticipated in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Fishers

Approximately 1 acre of potential riparian fisher habitats in the cumulative effects analysis area would be harvested. This negligible reduction in fisher habitats would not appreciable change the amount of the preferred fisher covertypes meeting structural requirements for fishers in the cumulative-effects analysis area. Following the proposed treatments, stocking density and structural attributes on 78.9 percent of preferred fisher covertypes would exist, would each exceed the 75-percent threshold established in *ARM 36.11.440(1)(b)(i)*. Roughly 174 acres of the 3,088 acres of potential upland fisher foraging and travel habitats would be harvested. These reductions would be additive to the losses associated with past timber harvesting on all ownerships in the cumulative-effects analysis area as well as any potential reductions associated with the proposed USFS Flower Creek Project. No appreciable changes in landscape connectivity in the cumulative-effects analysis area would be anticipated. No appreciable changes in human disturbance and potential trapping mortality would be anticipated. Thus, minor adverse cumulative effects would be anticipated that would affect fisher in the cumulative-effects analysis area since: 1) harvesting would remove upland fisher habitats and mature upland stands in preferred fisher covertypes, but considerable upland habitats would persist; 2) negligible changes to preferred covertypes or fisher habitats associated with the riparian areas in the cumulative-effects analysis area would be anticipated; 3) negligible changes in landscape connectivity in the cumulative effects analysis area would be anticipated; 4) harvesting in a relatively small portion of the cumulative effects analysis area would partially reduce snags and snag recruits, while increasing the coarse woody debris levels, largely in the smaller-sized pieces; and 5) no appreciable changes to motorized human access would occur.

FLAMMULATED OWL

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

INTRODUCTION

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

Analysis Areas

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the 12 sections surrounding around the project area. This area includes enough area to support several pairs of flammulated owls (McCallum 1994).

Analysis Methods

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

Existing Environment

The stands in the project area are largely Douglas-fir, mixed conifers, western larch/Douglas-fir, and non-stocked types and these stands are largely ponderosa pine and western larch/Douglas-fir appropriate types. Within the project area there are approximately 250 acres of flammulated owl habitats. The current conditions may be partially

a result of the encroachment by Douglas-fir in the past. During field visits, 1.97 large snags >21" dbh per acre (*see WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS*) were observed in the project area.

Presently, roughly 52 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting. Existing and regenerating forested stands are largely dominated by western larch/Douglas-fir, ponderosa pine and mixed conifers. Some of the stands harvested in the recent past may be suitable foraging habitats for flammulated owls. Ongoing harvesting associated with the Flower Creek Timber Sale project on DNRC-managed lands would continue to alter limited flammulated owl habitats. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area would continue altering flammulated owl habitats; proposed harvesting associated with the USFS' Flower Creek Project would likely alter flammulated owl habitats in the cumulative effects analysis area as well. Human developments and agricultural clearing are common on some of the private ownerships in portions of the cumulative effects analysis area, limiting flammulated owl habitats. Meanwhile modern fire suppression has allowed Douglas-fir in-growth to create denser stands of ponderosa pine, Douglas-fir, and mixed conifers in portions of the cumulative effects analysis area, which has reduced habitat quality for flammulated owls. Collectively, the flammulated owl habitats in the cumulative effects analysis area are somewhat limited.

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on flammulated owls

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

Direct and Indirect Effects of the Action Alternative on flammulated owls

Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively affect flammulated owls should they be using existing habitat during the nesting period. Proposed timber harvest would open the canopy on approximately 242 acres while favoring ponderosa pine, Douglas-fir, and western larch. Elements of the forest structure important for nesting flammulated owls, including snags (a minimum of 2 snags per acre > 21 in. dbh where they exist, otherwise the next largest size class), coarse woody debris (10-15 tons per acre), numerous leave trees, and snag recruits (> 21 in. dbh where they exist, otherwise the next largest size class) would be retained in the proposed units. Realistically, however, some snags would likely be removed due to safety and/or logistical concerns (*see WILDLIFE ANALYSIS-SNAGS AND COARSE WOODY DEBRIS*), which further affects flammulated owls now and into the future. The more open stand conditions, the retention of fire adapted tree species, and the maintenance of snags would move the proposed project area toward historical conditions, which is preferred flammulated owl habitat. Thus, since 1) harvesting would open denser stands up, 2) elements of forest structure (snags, snag recruits, and CWD) used for foraging and nesting by flammulated owl would be retained, 3) prescriptions would lead to more open stands with scattered mature ponderosa pine, and 4) prescriptions could promote future development of ponderosa pine within the units, minor positive direct and indirect effects would be expected to affect flammulated owls in the project area.

Cumulative Effects of the No-Action Alternative on flammulated owls

Flammulated owl habitats would persist in the state parcels. Portions of the cumulative effects analysis area has been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and reversing a portion of the Douglas-fir encroachment, however retention of large ponderosa pine was not necessarily a consideration in many of these harvest units; thereby minimizing the benefits to flammulated owls. Ongoing harvesting associated with the Flower Creek Timber Sale Project would continue to alter flammulated owl habitats; no further harvesting would occur on DNRC-managed lands and existing flammulated owl habitats would not appreciably change. Ongoing harvesting in the cumulative effects analysis area could continue to alter flammulated owl habitats; additionally, flammulated owl habitats may be further altered with the proposed USFS Flower Creek Project. Other portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats are not expected to change any time in the future. Collectively, stands would continue maturing and

becoming more densely stocked, which would reduce habitat quality for flammulated owls. Thus, since 1) no harvesting would occur, 2) no changes to potential nesting habitats would be anticipated, and 3) long-term, succession-related declines in foraging habitats coupled with advancing succession leading to denser stands, negligible adverse cumulative effects would be expected to affect flammulated owls in the cumulative effects analysis areas.

Cumulative Effects of the Action Alternative on flammulated owls

Proposed harvesting would add to the amount of the cumulative effects analysis area that has been recently harvested, which would add to the amount of foraging habitats available, but possibly at the expense of nesting habitats. Collectively, stands across the cumulative effects analysis area would continue maturing and becoming more densely stocked, which would reduce habitat quality for flammulated owls. Those stands that have been harvested in the recent past would continue providing potential foraging habitats in the short-term. Ongoing harvesting in the cumulative effects analysis area could continue to alter flammulated owl habitats; additionally, flammulated owl habitats may be further altered with the proposed USFS Flower Creek Project. The portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats would not be expected to change any time in the future. Thus, since 1) harvesting would reduce flammulated owl nesting habitats while potentially increasing foraging habitats, and 2) an increase in the amount of the cumulative effects analysis area would be more representative of historic conditions, negligible beneficial cumulative effects would be expected to affect flammulated owls in the cumulative effects analysis area.

PILEATED WOODPECKER

Issue: Timber harvesting and associated activities could remove canopy cover and snags needed by pileated woodpeckers to forage and nest and/or displace nesting pileated woodpeckers from active nests, resulting in increased mortality to pileated woodpecker chicks.

Introduction

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

Analysis Areas

Direct and indirect effects were analyzed for activities conducted in the project area. Cumulative effects were analyzed on the 12 sections surrounding the state parcel. This scale includes enough area to support a couple of pairs of pileated woodpeckers (*Bull and Jackson 1995*).

Analysis Methods

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

Existing Environment

In the project area, potential pileated woodpecker nesting habitat exists on approximately 593 acres that are dominated by Douglas-fir, ponderosa pine, Douglas-fir/western larch, and mixed conifers. Additionally, 237 acres

of sawtimber stands dominated by mixed conifers and western larch/Douglas-fir exist in the project area that may be lower-quality foraging stands. Although nesting habitat is defined differently than foraging habitat, nesting habitat also provides foraging opportunities for pileated woodpeckers.

Removal of large western larch, ponderosa pine, and western white pine by past timber-harvesting activity has reduced the quality of habitat for pileated woodpeckers. Large live and dead trees are less common than would occur naturally due to these past timber-harvesting activities in portions of the project area. Black cottonwood occurs in some riparian areas in the project area. During field visits, numerous feeding sites and approximately 1.97 large (>21 in dbh) snags per acre were observed; these provide foraging and nesting opportunities for pileated woodpeckers. Additionally, roughly 13 medium-sized snags (15-21 in dbh) per acre were observed, which are likely suitable foraging habitats. Pileated woodpeckers and associated large cavities were detected in the project area.

Presently, roughly 52 percent of the cumulative effects analysis area is not in mature, forested conditions due to residential clearing, human development, agriculture, and other past harvesting, and thus is not likely providing pileated woodpecker habitats. Ongoing harvesting associated with the Flower Creek Timber Sale project on DNRC-managed lands would continue reducing pileated woodpecker habitats. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including any harvesting that may occur with the proposed USFS' Flower Creek Project, could continue altering pileated woodpecker habitats. Collectively, moderate amounts of potential pileated woodpecker habitats exist in the cumulative effects analysis area.

Environmental Effects

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

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

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Pileated woodpeckers tend to be tolerant of human activities (*Bull and Jackson 1995*), but might be temporarily displaced by the proposed harvesting. Harvesting 604 acres would reduce continuously forested habitats for pileated woodpeckers. Roughly 529 acres of potential nesting habitat would be altered, with approximately 102 acres that would receive a regeneration treatment and would be too open to be considered pileated woodpecker habitats. Pileated woodpecker habitats on other 428 acres would receive a commercial thin treatment, reducing quality of the habitat, but these more open habitats would continue to be considered suitable for pileated woodpeckers. Meanwhile, an additional 74 acres of potential foraging habitats would be modified, some to the point of being unusable. Where regeneration harvests are proposed, potential pileated nesting and foraging habitats would be removed for 30 to 100 years, depending on the density of trees retained. Elements of the forest structure important for nesting pileated woodpeckers, including snags (a minimum of 2 snags greater than 21 inches dbh per acre where they exist and would be expected to persist if they are not lost due to firewood gathering), coarse woody debris (10 to 20 tons per acre), numerous leave trees, and snag recruits (a minimum of 2 trees per acre greater than 21 inch dbh where they exist) would be retained in the proposed harvest areas. Some areas currently lack sufficient large snags, while other areas are either close to open roads, where snag loss could continue due to legal and illegal firewood and forest-product gathering. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (*McClelland 1979*), pileated woodpecker densities in the project area would be expected to be reduced on 604 acres, and at least 103 of those acres would be too open to be considered pileated woodpecker habitats following proposed treatments. The silvicultural prescriptions would retain healthy ponderosa pine, western larch, and Douglas-fir while promoting the regeneration of many of these same species, which would benefit pileated woodpeckers in the future by providing nesting, roosting, and foraging habitats. Thus, minor direct and indirect effects would be anticipated that would affect pileated woodpeckers in the project area since: 1) harvesting would reduce the amount of continuous forested habitats available; 2) potential nesting and foraging habitats would

be reduced; 3) several snags and snag recruits per acre would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre in most of the harvest areas would be included, and 4) harvest prescriptions would retain and promote seral species in the proposed harvest areas.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers would occur. Trees would continue to grow, mature, and die, thus providing potential nesting and foraging structure for pileated woodpeckers. Continued use of the cumulative-effects analysis area by pileated woodpeckers would be expected. Ongoing harvesting and proposed harvesting associated with the USFS Flower Creek Project, could continue to remove potential pileated woodpecker habitats while reducing the amount of the cumulative-effects analysis area that would be in mature, forested covertypes. Thus, negligible adverse cumulative effects to pileated woodpeckers in the cumulative-effects analysis area would be expected since: 1) no further changes to existing habitats would occur; 2) no further changes to the amount of continuously forested habitats available for pileated woodpeckers would be anticipated; and 3) long-term, succession-related declines in the abundance of shade-intolerant tree species, which are valuable to pileated woodpeckers, would occur.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Under this alternative, reductions in pileated woodpecker habitat would be expected. Several snags, coarse woody debris, and potential nesting trees would be retained in the project area; however, future recruitment of these attributes may be reduced in a portion of the area by the proposed activities. In the project area, the canopy on at least 102 acres proposed for regeneration-type treatments would likely be too open for appreciable pileated woodpecker use. Use of the remaining 506 acres by pileated woodpeckers would likely be reduced due to increasing openness of the stands. Recently harvested stands, ongoing harvesting, and land clearing associated with the various human developments in the cumulative effects analysis area have reduced pileated woodpecker habitats; reductions associated with this alternative would be additive to those reductions. Additionally, any harvesting that may occur on USFS-managed lands in the cumulative effects analysis area could further alter pileated woodpecker habitats. Continued maturation of stands across the cumulative-effects analysis area is increasing suitable pileated woodpecker habitats. Thus, minor cumulative effects would be anticipated that would affect pileated woodpeckers in the cumulative-effects analysis area since: 1) harvesting would further reduce the amount of continuous forested habitats available in the cumulative-effects analysis area, but forested habitats would persist; 2) potential nesting and foraging habitats would be reduced; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas; however, mitigation measures would retain some of these attributes in several of the harvest areas; and 4) harvest prescriptions would promote seral species in the proposed harvest areas.

BIG GAME WINTER RANGE

Issue: Timber harvesting and associated activities could remove forest cover on white-tailed deer winter range, which could reduce the carrying capacity of the winter range.

Introduction

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

Analysis Areas

Direct and indirect effects were analyzed on the winter range in the project area. Cumulative effects were analyzed on the 12,452-acre elk winter range that includes the project area. This scale includes enough area to support hundreds of elk.

Analysis Methods

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

Existing Environment

Montana Department of Fish, Wildlife, and Parks identified elk (1,053 acres), mule deer (1,145 acres), and moose (878 acres) winter ranges in the project area. These winter ranges are part of much larger elk (12,452 acres), mule deer (12,452 acres), and moose (47,745 acres) winter ranges, respectively. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. In the past, roughly 73 acres in each of these winter ranges in the project area have been harvested by DNRC and is not yet providing winter range attributes. Additionally, the ongoing harvesting associated with the Flower Creek Timber Sale Project in the project area is largely eliminating winter range attributes on approximately 429 acres of mule deer winter range, 429 acres of elk winter range, and 137 acres of moose winter range. Mature ponderosa pine, Douglas-fir/western larch, and mixed conifer stands in the project area are providing attributes facilitating use by wintering big game. Evidence of use by deer and elk was noted throughout the project area during field visits.

Presently, a variety of stands across the winter range in the cumulative effects analysis area are providing thermal cover and snow intercept for big game. Roughly 4,944 acres (40%) of the 12,452-acre elk winter range have been harvested in the last 30 years, likely limiting the usefulness of these acres for wintering big game. Ongoing harvesting associated with the Flower Creek Timber Sale Project on DNRC lands is continuing to remove thermal cover and snow intercept properties on a portion of the larger winter range. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including the proposed USFS Flower Creek Project, could continue altering big game winter range. Human disturbance within the winter range is largely associated with the Town of Libby, timber management, recreational snowmobile use, and numerous open roads, which combined, likely influences wintering big game populations and their habitats.

Environmental Effects

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

No direct effects to big game winter range would be anticipated. No additional disturbance or displacement would be anticipated within the project area. Big game thermal cover would continue to be removed with the ongoing harvesting associated with the Flower Creek Timber Sale Project in the project area; no additional changes to the portions of the winter range outside of the existing Flower Creek Timber Sale Project units would be anticipated. In the longer-term, continued succession could reduce forage production while increasing thermal cover in these stands. No appreciable changes to winter carrying capacity would be anticipated. Since 1) subtle changes in thermal cover due to mortality and successional advances increasing canopy densities would be anticipated, 2) the amount of mature forested habitats on the winter range would not further change, and 3) the levels of human disturbance would remain similar, no direct or indirect effects to big game winter range would be anticipated.

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

Some displacement would be expected as a result of the proposed harvesting operations, particularly if any of the units would be harvested during the winter. However, winter logging provides felled tree tops, limbs, and slash piles that could concentrate feeding big game during nighttime and quiet periods when logging operations are shut down. Increasing short-term forage availability in this manner could partially offset some of the effects associated with temporary displacement caused by logging disturbance. Most of the proposed units are providing big game thermal cover and these attributes would be largely reduced on approximately 500 acres proposed for commercial thinning-type treatments and would be removed on approximately 102 acres proposed for seedtree-type treatments. Thermal cover and snow intercept would be expected to develop in these stands over the next 30-70 years when suitable sized trees (>40 ft. tall) start to provide these attributes again. Limited thermal cover and snow intercept would exist in the project area following proposed treatments. Proposed timber harvesting would not prevent big game movement through the project area appreciably in winter and could stimulate browse production within the units. Thus, since 1) the relatively short-term that logging activities would create disturbance in this area, 2) limited areas of thermal cover and snow intercept exist in the project area outside of the proposed units, and 3) thermal cover and snow intercept characteristics are presently providing habitat for big game species, moderate adverse direct or indirect effects to big game would be expected.

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

No further changes would be anticipated in elk winter range attributes during the short-term. Stands that are providing thermal cover would be expected to continue providing this resource under this alternative. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Harvesting on other ownerships, including any potential harvesting associated with the USFS Flower Creek Project, could continue to displace wintering big game and reduce available winter range habitats. Human disturbance levels would be anticipated to continue at similar levels. Continued winter use of the larger winter range would be expected. Thus, since: 1) subtle changes in thermal cover due to advances in succession that would increase canopy densities would be anticipated over time, 2) the amount of mature forested habitats on the winter range would not change, and 3) the levels of human disturbance would remain similar, negligible beneficial cumulative effects to big game and big game winter range would be anticipated that would benefit big game in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Big Game Winter Range

Reductions in thermal cover and snow intercept in the project area would further reduce the amount of the larger winter range providing these attributes for big game. Similarly, any harvesting that may be occurring on other ownerships in the cumulative effects analysis area, including the proposed USFS Flower Creek Project, could continue altering big game winter range. Those portions of the winter range where timber harvesting occurred in the last 30 years could start developing thermal cover and snow intercept in the next 10-30 years. Harvesting on other ownerships could continue to displace wintering big game and reduce available winter range habitats; displacement associated with this alternative could be additive to any displacement associated with ongoing timber harvesting. Thus, since 1) the relatively short-term that logging activities would create disturbance in a small portion of the cumulative effects analysis area, 2) a small percentage of the winter range in the cumulative effects analysis area would be altered, 3) availability of lower-quality cover on surrounding ownerships that provides some opportunity for big game should they be displaced, minor adverse cumulative effects to big game would be expected.

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Wildlife Mitigations associated with the Action Alternative

- A DNRC biologist will be consulted if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (*ARM 36.11.428* through *36.11.435*) are needed.
- Public access would be restricted at all times on restricted roads that are opened for harvesting activities; signs will be used during active periods and a physical closure (gate, barriers, equipment, etc.) will be used during inactive periods (nights, weekends, etc.).

- Roads and skid trails that are opened with the proposed activities will be reclosed to reduce the potential for unauthorized motor vehicle use.
- Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
- Snags, snag recruits, and coarse woody debris will be managed according to *ARM 36.11.411* through *36.11.414*, particularly favoring western larch, ponderosa pine, and western white pine. Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags.
- Contractors and purchasers conducting contract operations will be prohibited from carrying firearms while operating on restricted roads.
- Harvesting activities would be conducted to limit disturbance to potential spring grizzly bear habitats by restricting harvesting between April 1 and May 31.

Attachment F: Summary of Mitigations Incorporated in the Action Alternative

Soil Resource Mitigations:

1. In order to prevent soil resource impacts, ground based mechanical felling or yarding are restricted to periods when one or more of the following conditions occur:
   a. Soil moisture content at 4" depth less than 20% oven-dry weight.
   b. Minimum frost depth of 3.
   c. Minimum snow depth of 18 inches, loose, or 8 inches, packed.
2. Slash would be retained and distributed on site to contribute nutrients to the soil.
3. Coarse woody debris would be retained on site for maintaining soil productivity.
4. Slash would be trampled and incorporated into skid trails for erosion control.
5. Slopes in excess of 45% would be avoided during skidding or skid with skyline or helicopter logging systems.

Water Resource Mitigations:

1. Streamside Management Zones (SMZs) 50 to 100 feet in width (dependant on slope and benches) would be marked along all streams. Harvesting would be minimal within the SMZs.
2. Road surface drainage and erosion control features would be added or improved on existing roads and installed as part of the road construction to reduce erosion rates and reduce the risk of sediment delivery.
3. Grass seed and fertilizer would be applied to newly disturbed culvert installation sites and road cuts and fills to stabilize erodable slopes and minimize sediment production.

Vegetation Resource Mitigations:

1. Larger diameter snags will be protected as needed to assure retention of 1 snag per acre in all units.
2. Ponderosa pine, western larch, western white pine and Douglas-fir would be favored leave trees in all canopy levels.
3. All trees infected with dwarf mistletoe and blister rust would be removed.
4. To deter further establishment of noxious weeds along roads, grass seed and fertilizer would be applied to areas with soil exposed during road construction and maintenance activities.
5. To minimize noxious weed invasion away from roads, "off road" logging equipment would be inspected and required to be free of weed parts prior to moving onto the site.
6. Grass seed would be applied or slash incorporated into heavily used trails with bare soil exposed to limit establishment of noxious weeds.

Wildlife Resource Mitigations:

1. Consult a DNRC biologist if a threatened or endangered species is encountered to determine if additional mitigations that are consistent with the administrative rules for managing Threatened and Endangered Species (ARM 36.11.428 through 36.11.435) are needed.
2. Restrict public access at all times on restricted roads that are opened using signs during active periods and a physical closure (gate, barriers, equipment, etc) during inactive periods (nights, weekends, etc).
3. Reclose roads and skid trails opened with proposed activities to reduce the potential for unauthorized motor vehicle use.
4. Use a combination of topography, group retention, and roadside vegetation to reduce views into harvest units along open roads.
5. Manage for snags, snag recruits, and coarse woody debris according to ARM 36.11.411 through 36.11.414, particularly favoring western larch, ponderosa pine, and western white pine.