Environmental Assessment

For The

Lower Corona Timber Sale

Section 12 T21N R26W

Prepared By

Dale Peters, Management Forester
Plains Unit, Northwestern Land Office

Montana Department of Natural Resources and Conservation

February 2012

Table of Contents

MEMORANDUM

To: Dale Peters, Management Forester, Plains Unit

From: Larry Ballantyne, Plains Unit Resource Program Manager

Date: March 1, 2010

RE: Lower Corona Timber sale

Primary Objective

The primary objective of the Lower Corona Timber Sale is to harvest approximately 23,000 tons (3.25 MMBF) of sawlogs from Sections 12, T21N, R26W, producing and estimated $ 448,000.00 in revenue for the Public Building (PB) Trust, plus an additional $ 130,000.00 in Forest Improvement (FI) fees. Timber volume and revenue would contribute to the Northwestern Land Office sale program targets for FY 2013.

Secondary Objectives

Minimize losses in timber volume from mortality due to insect and disease conditions present within the sale area.

Promote the continued presence and/or reestablishment of historically appropriate timber types on Trust land included in this project.

Reduce fire hazard and associated risks of loss to State of Montana, United States Forest Service, Confederated Salish and Kootenae Tribes, and privately owned lands in the area.

Management Directives

In planning and preparing this project, management direction of the State Forest Land Management Plan and associated Administrative Rules shall followed. All applicable Streamside Management Zone rules and regulations will be met. Montana Best Management Practices will be applied in all instances.

CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Lower Corona Timber Sale
Proposed Implementation Date:	June, 2012
Proponent:	Plains Unit - Northwestern Land Office Department of Natural Resources and Conservation.
Location:	Section 12, Township 21 North, Range 26 West
County:	Sanders County

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation (DNRC) proposes to sell approximately 23,000 tons (3.25 MMBF**)** of sawlogs from Section 12, T21N, R26W, 9 air miles north of Plains, Montana. This action would produce estimated revenue of $448,000.00 for the Public Buildings (P.B.) Trust Grant and an additional $130,000.00 in Forest Improvement (FI) fees. Under the proposed action, the DNRC harvest activities would maintain and improve forest health, reduce fuel loadings, and increase forest productivity beneficial to future Trust actions. The harvest prescriptions are designed to promote timber types historically found in the area, improve forest health and promote regeneration of the project area (See Attachment I, Area Maps and Project Plan; Attachment III, Harvest Prescriptions). If the Action Alternative is selected, activities would begin July 2012.

In addition to timber harvesting, approximately 2.34 miles of new road would be constructed, 1.83 miles of road would be reconstructed as necessary to meet Best Management Practices (BMPs) and 1.74 miles of United States Forest Service (USFS) would have advanced maintenance preformed. Approximately 1.93 miles of old road and 2.88 miles of all terrain vehicle trails would be abandoned and or obliterated (See Attachment I, Area Maps and Project Plan).

Lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions such as the public buildings trust, public schools, state colleges, universities, and other state institutions (Enabling Act of February 22, 1889:1972 Montana Constitution, Article 1 Section11). The Board of Land Commissioners and the Department of Natural Resources and Conservation are required, by law, to administer these trust lands to produce the largest measure of reasonable and legitimate return over the long run for these beneficiary institutions (Section 77-1-202, MCA). DNRC would manage lands involved in this project in accordance with the State Forest Land Management Plan (DNRC 1996), the Administrative Rules for Forest Management (ARM 36.11.401 through 71), and conservation commitments contained in the Montana Forested State Trust Lands Habitat Conservation Plan (HCP) as well as other applicable state and federal laws.

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 involvement has been solicited through newspaper advertisements and through letters sent to adjacent landowners, as well as other known interested parties and organizations. Public response was received and used to assist in identifying issues surrounding the proposed project.

Eight public comments were received for this project:

1. Jim and Carol Urion, adjacent landowners, concern for continued firewood gathering.
2. Kevin J Williams, adjacent landowner, would also like to sell his timber.
3. Sanders County Board of Commissioners supported the proposed harvest activities.
4. F. H. Stoltze Land & Lumber Co. supported the proposed harvest activities.
5. Linda and Michael Johnson, adjacent landowners, concern for protecting natural resources and habitat, as well as protecting their residence land and privacy.
6. Mr. and Mrs. David Harvey, adjacent landowners, concern to remain open for recreational use.
7. Samuel C. Winston, local resident, concern for continued firewood gathering and hunting access.
8. Paul Harvey, adjacent landowner, concern for continued firewood gathering and hunting access.

Hydrological, soils, wildlife, archaeological, and vegetative concerns were identified by DNRC specialists and field foresters for both the No-Action and the Action Alternatives. Issues and concerns have been resolved or mitigated through project design and/or would be included as specific contractual requirements of the project. Recommendations to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (see Attachment I, Area Maps and Project Plan; Attachment II, Resource Analyses; Attachment III, Harvest Prescriptions; Attachment IV, Mitigations; Attachment V, Consultants and References).

---

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.

USFS cost-share road agreement

Montana Department of Environmental Quality (DEQ)

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

Montana/Idaho Airshed Group

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 in Missoula, MT.

SPA 124 Permit; Montana Stream Protection Act

DNRC would obtain SPA 124 Permit prior to stream restoration. No Class 1 streams would be impacted while developing the timber sale road system.

DNRC has been developing a Habitat Conservation Plan (HCP) under Section 10 of the Endangered Species Act for several years. If successful, the process will culminate with issuance of an Incidental Take Permit (Permit) by the USFWS. The Draft HCP/EIS was distributed for public review in June of 2009. The Final HCP/EIS was distributed for public review in August of 2010. The HCP identifies specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout. As part of a phased-in approach to prepare for HCP compliance, DNRC planned this project to be in compliance with (1) the current rules (ARMs) that govern the forest

management program, and (2) all applicable conservation commitments contained in the Preferred Alternative in the Final EIS/HCP. Should a different Alternative be selected, revisions to the project may be made to comply with the selected Alternative."

Incidental Take Permit – U.S. Fish and Wildlife Service
In December 2011, the U.S. Fish and Wildlife Service issued DNRC an Incidental Take Permit under Section 10 of the Endangered Species Act. The Permit applies to select forest management activities affecting the habitat of grizzly bear, Canada lynx, and three fish species — bull trout, westslope cutthroat trout, and Columbia redband trout — on project area lands covered under the HCP. DNRC and the USFWS will coordinate monitoring of certain aspects of the conservation commitments to ensure program compliance with the HCP.

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.

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 are analyzed in the EA Checklist. Recommended actions to reduce environmental effects would be incorporated into the proposed action.

No Action: Under the No Action Alternative, no activity would be undertaken. No timber would be harvested and no road construction or improvements would occur. The No Action alternative would result in decreased growth rates, continued decline of stand conditions and increased fuel loading within the timber stands. This alternative would not produce revenue for the Public Buildings Trust grant.

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.

A DNRC hydrologist has reviewed the project area, transportation system and harvest plan. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated into the project design. (See Attachment II, Resource Analysis; Soils, Watershed and Hydrology Analysis).

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.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design (See: Attachment II, Resource Analyses; Attachment IV, Mitigations). As detailed in the Hydrology Analysis, no substantial direct, indirect or cumulative impacts to water quality or downstream beneficial uses are expected to result from the implementation of the Action Alternative.

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 is located in Montana State Airshed 2; it is not within a Class 1 Airshed. Efforts would be made to dispose of slash without burning by chipping or grinding logging slash piles. If pile burning should occur, some particulate matter may be introduced into the Airshed from the burning of logging slash. Impacts are expected to be minor and temporary with slash burning to be conducted when conditions favor good to excellent smoke dispersion. All burning would be conducted during times of adequate ventilation within the existing rules and regulations. Thus direct, indirect, and cumulative effects to air quality are expected to be minimal.

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.

Tree removal would cause changes in the vegetative structure of the project area. Silvicultural prescriptions have been developed to keep stands moving towards desired future conditions, while maintaining good tree growth and vigor. Harvest prescriptions also aim to remove diseased and insect infested timber. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment I, Area Maps and Project Plan: Attachment II, Resource Analysis, Vegetation Analysis, Attachment III, Harvest Prescriptions; Attachment IV, Mitigations). No old growth stands as defined by Green et al. (1992) are present in the project area; therefore the action alternative would not affect old growth. No sensitive plants listed by the Montana Natural Heritage Program have been identified in the project area. Measures to minimize noxious weeds, insects and disease are included in the project design (See Attachment IV, Mitigations). Change to cover type distribution across the Plains unit and age class distribution would move slightly toward desired future conditions.

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.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analyses, Wildlife Habitat Analysis, Watershed and Hydrology Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations).
As detailed in the Wildlife Analysis and the Watershed and Hydrology Analysis, no substantial direct, indirect or cumulative impacts to terrestrial, avian and aquatic species and habitats are expected to result from the implementation of the Action Alternative.

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.

Recommendations from DNRC specialists to minimize direct, indirect, and cumulative impacts have been incorporated in the project design. (Attachment I, Area Maps and Project Plan: Attachment II, Resource Analyses, Wildlife Habitat Analysis: Attachment III, Harvest Prescriptions: Attachment IV, Mitigations). As detailed in the Wildlife Analysis, no substantial direct, indirect or cumulative impacts to unique, endangered, fragile or limited environmental resources are expected to result from the implementation of the Action Alternative.

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

The only record of a cultural resource within the project's area of potential effect is a site lead for an old root cellar in the NWSWNW1/4. However, a professional field inventory of cultural resources has not been conducted of the project area. If previously unknown, cultural or paleontological materials are identified during project related activities, all work would cease until and the DNRC Archaeologist would be contacted to assess the resource and plan appropriate mitigations if needed.

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.

Topography is rolling terrain, foothills of the mountains; therefore the majority of the sale area would be hidden from view minimizing visual impacts. Portions of the project would be visible from Upper Lynch Creek Road and Cedar Creek as viewed from the south, traveling north on these roads. Openings or disturbance from harvest operations, with overstory ponderosa pine, western larch and Douglas-fir retained throughout most of the project area would be visible upon likely completion of the project. Prescriptions are designed to mimic historic stand conditions and would not have an adverse visual impact on the area (see: Attachment III, Harvest Prescriptions; Attachment IV, Mitigations).

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 direct, indirect, or cumulative impacts would likely occur under either alternative.

13. OTHER ENVIRONMENTAL DOCUMENTS PERTINENT TO THE AREA:

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

A search of this section's land records did not reveal any recent studies, plans or projects.

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 would not be impacted by the proposed timber sale or associated activity. There are no unusual safety considerations 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.

Timber harvest would provide continuing industrial production in Sanders County.

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.

The Montana Bureau of Business and Economic Research estimates that about 10 jobs are supported for one year for every 1 MMBF that is harvested. For this project, that equates to about 32.5 jobs for one year.

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.

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

Log trucks hauling to the purchasing mill would result in temporary increases in traffic on the designated haul route. (See attachment I: Area Maps). This increase is a normal contributor to the activities of the local community and industrial base and cannot be considered a new or increased source. No changes to the level of government services would be needed as a result of this project, therefore it would not contribute to cumulative effects 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.*

In 1996, the Land Board approved the Record of Decision (ROD) for the State Forest Land Management Plan (SFLMP). The SFLMP provides philosophical basis, consistent policy, technical rationale, and guidance for the management of forested state trust lands. In 2003, DNRC adopted the Administrative Rules for Forest Management (Forest Management Rules; ARM 36.11.401 through 456). The Forest Management Rules are the specific legal resource management standards and measures under which DNRC implements the SFLMP and subsequently its forest management program.

In December 2011, the Land Board approved the Record of Decision (ROD) for the Montana Forested State Trust Lands Habitat Conservation Plan (HCP). Approval of the ROD was followed by the issuance of an Incidental Take Permit (Permit) by the U.S. Fish and Wildlife Service (USFWS). The HCP is a required component of an application for a Permit which may be issued by the U.S. Fish and Wildlife Service or National Marine Fisheries Service to state agencies or private citizens in situations where otherwise lawful activities might result in the incidental take of federally-listed species. The HCP is the plan under which DNRC intends to conduct forest management activities on select forested state trust lands while implementing specific mitigation requirements for managing the habitats of grizzly bear, Canada lynx, and three fish species: bull trout, westslope cutthroat trout, and Columbia redband trout.

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 hunted frequently. Roads through the area that would be closed after the project only access the immediate area, closure of them would not affect the ability of people to recreate on these parcels. Recreational areas and wilderness are not accessed through this tract. Illegal off road vehicle use is expected to decrease while legal use is expected to remain the same with the Action Alternative.

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 would be no measurable direct, indirect, or cumulative impacts related to population and housing due to the relatively small size of the timber sale, 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.

No direct, indirect, and cumulative impacts related to social structures and mores would be expected under either alternative.

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

No direct, indirect, and cumulative 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 for limited access sales. 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 the timber. The effect of the proposed project would produce an estimated return to the Public Buildings (P.B.) Trust Grant of $448,000.00 and $130,000.00 in Forest Improvement (FI) fees under the alternative action. The No Action Alternative does not generate any return to the trust at this time.

EA Checklist Prepared By:	**Name:**	Dale Peters	**Date:**	2/2012
	Title:	Management Forester		

V. FINDING

25. ALTERNATIVE SELECTED:

The Action Alternative is selected for implementation.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

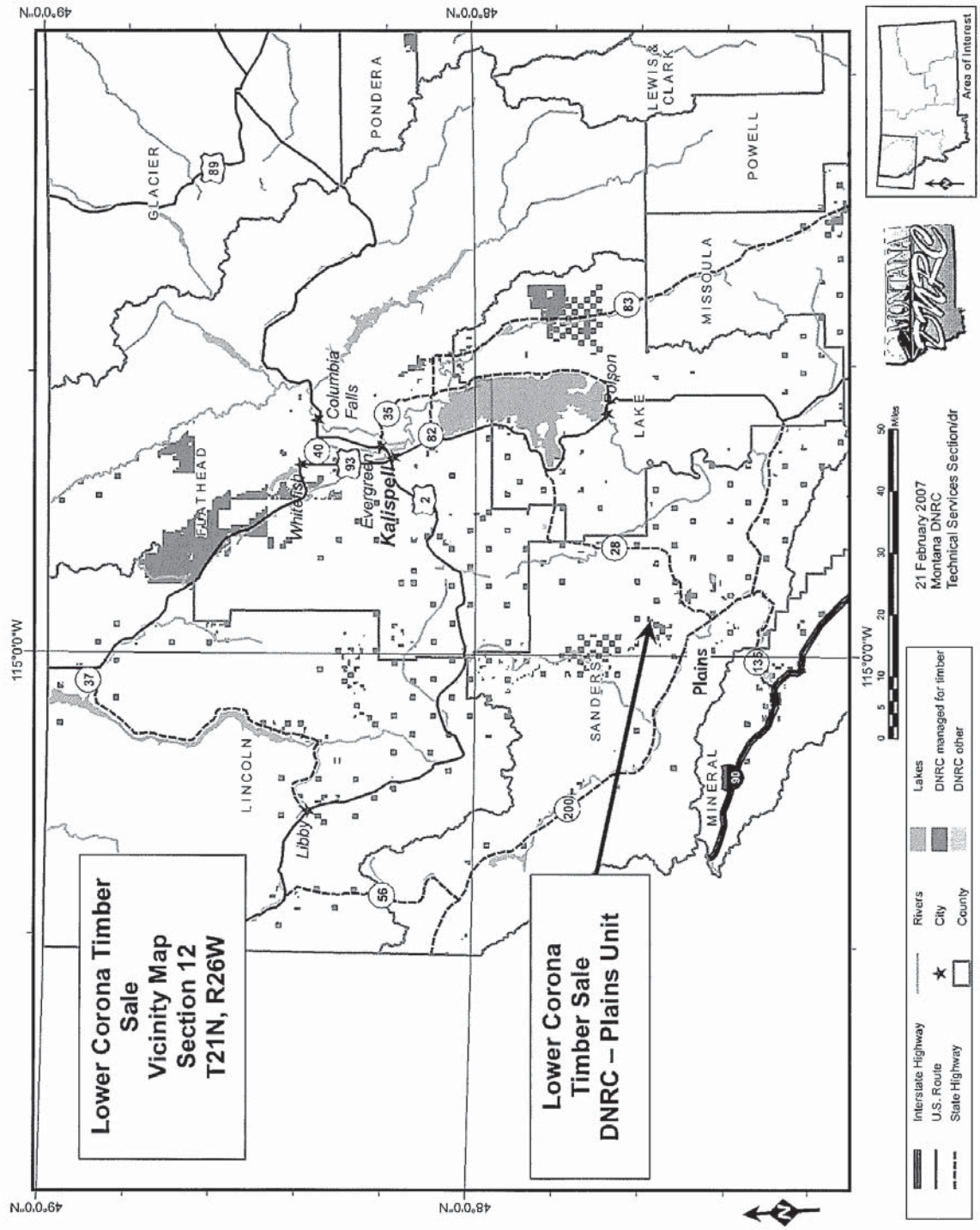
No significant impacts have been identified to occur as a result of implementing the Action Alternative. All relevant and applicable HCP, BMP, and Trust Land Management Plan requirements have been addressed in and by the Action Alternative. Mandated Trust interests are served through implementation of the Action Alternative.

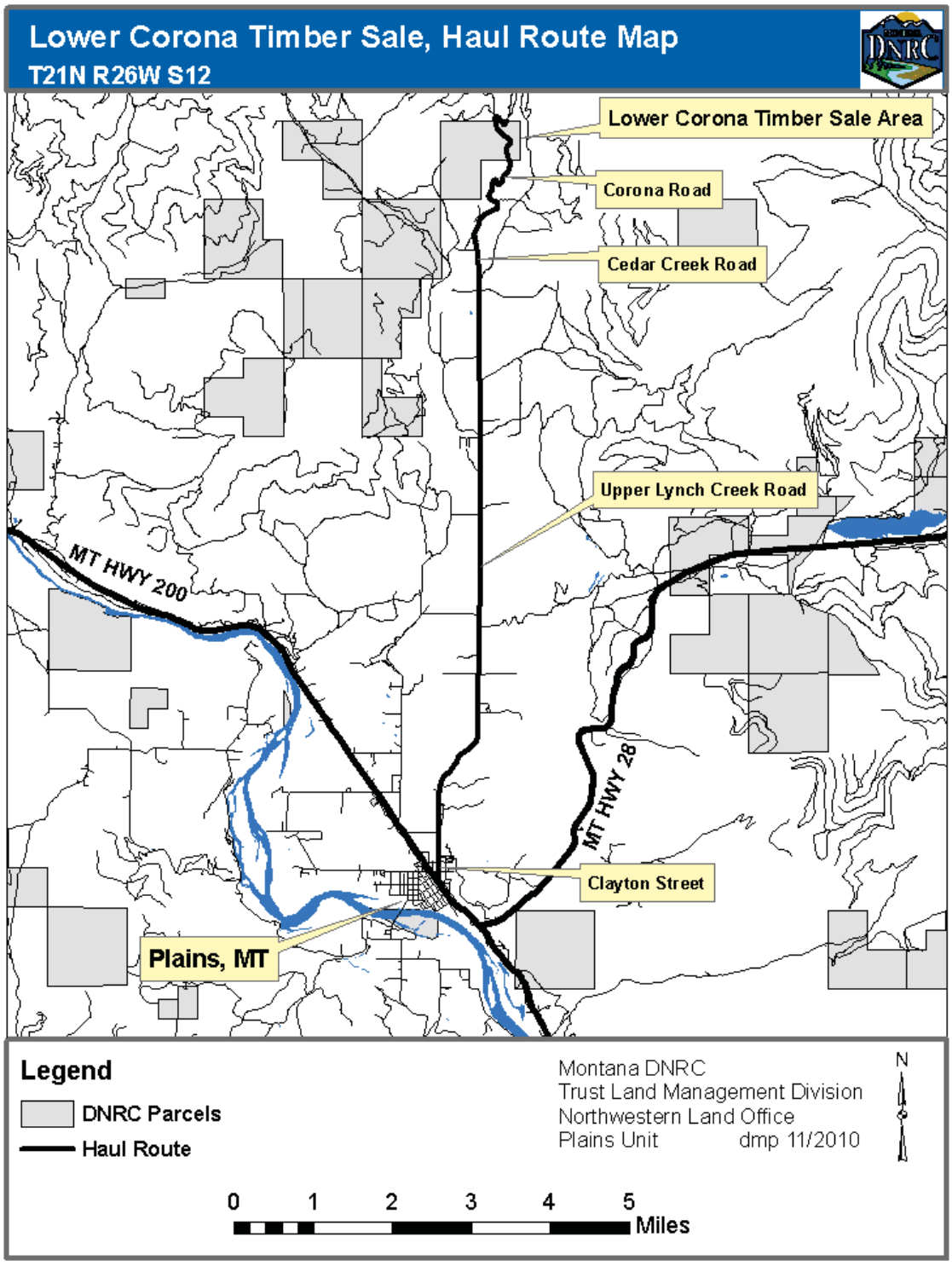
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

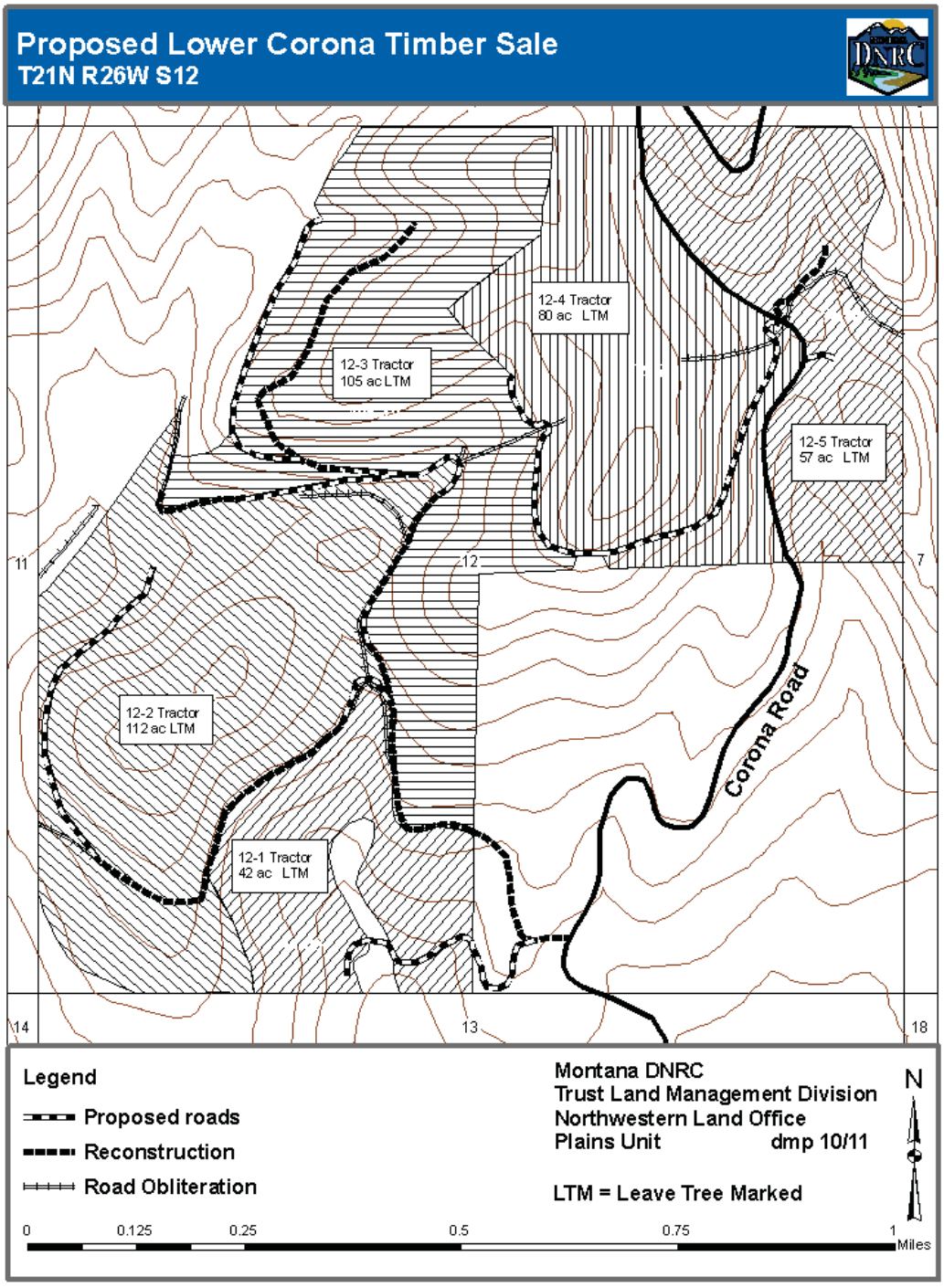
☐	EIS	☐	More Detailed EA	☒	No Further Analysis

EA Checklist Approved By:	***Name:*** Larry Ballantyne **Title:** Plains Unit Manager	
Signature:		**Date:** 2-13-2012

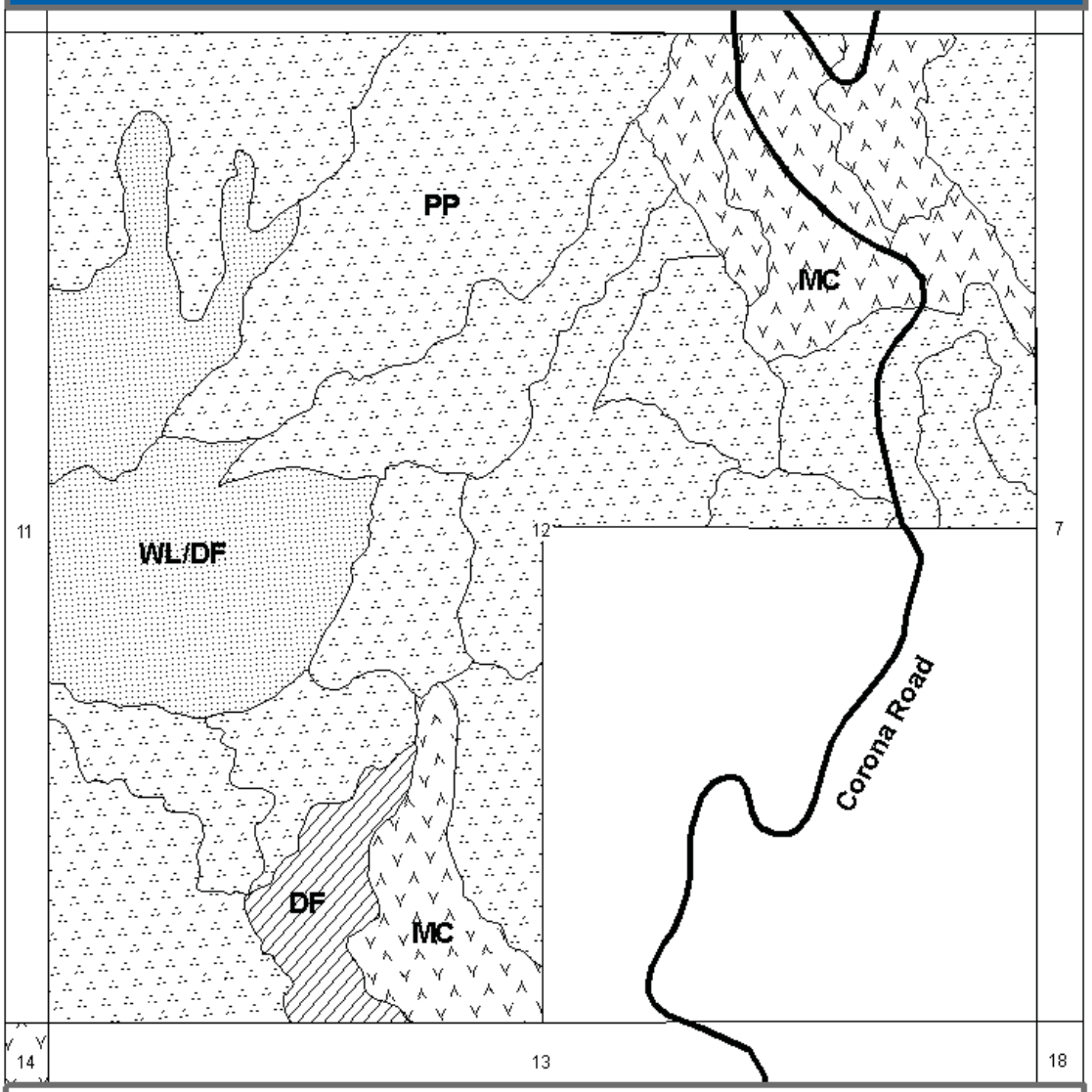
Attachment I
Area Maps and Project Plan


Lower Corona Timber Sale
Vicinity Map
Section 12
T21N, R26W
Lower Corona
Timber Sale
DNRC – Plains Unit
49°0'0"N
48°0'0"N
115°0'0"W
GLACIER
PONDERA
LEWIS & CLARK
POWELL
MISSOULA
LAKE
FLATHEAD
LINCOLN
SANDERS
MINERAL
Columbia Falls
Whitefish
Evergreen
Kalispell
Polson
Libby
Plains
Area of Interest
Interstate Highway
U.S. Route
State Highway
Rivers
City
County
Lakes
DNRC managed for timber
DNRC other
Miles
21 February 2007
Montana DNRC
Technical Services Section/dr


Lower Corona Timber Sale, Haul Route Map
T21N R26W S12
Lower Corona Timber Sale Area
Corona Road
Cedar Creek Road
Upper Lynch Creek Road
MT HWY 200
MT HWY 28
Clayton Street
Plains, MT
Legend
DNRC Parcels
Haul Route
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit
dmp 11/2010
N
0 1 2 3 4 5
Miles


Proposed Lower Corona Timber Sale
T21N R26W S12
12-4 Tractor
80 ac LTM
12-3 Tractor
105 ac LTM
12-5 Tractor
57 ac LTM
12-2 Tractor
112 ac LTM
12-1 Tractor
42 ac LTM
Corona Road
11
12
7
14
13
18
Legend
Proposed roads
Reconstruction
Road Obliteration
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit dmp 10/11
LTM = Leave Tree Marked
N
0
0.125
0.25
0.5
0.75
1
Miles

Current Cover Types; Lower Corona
T21N R26W S12



Legend

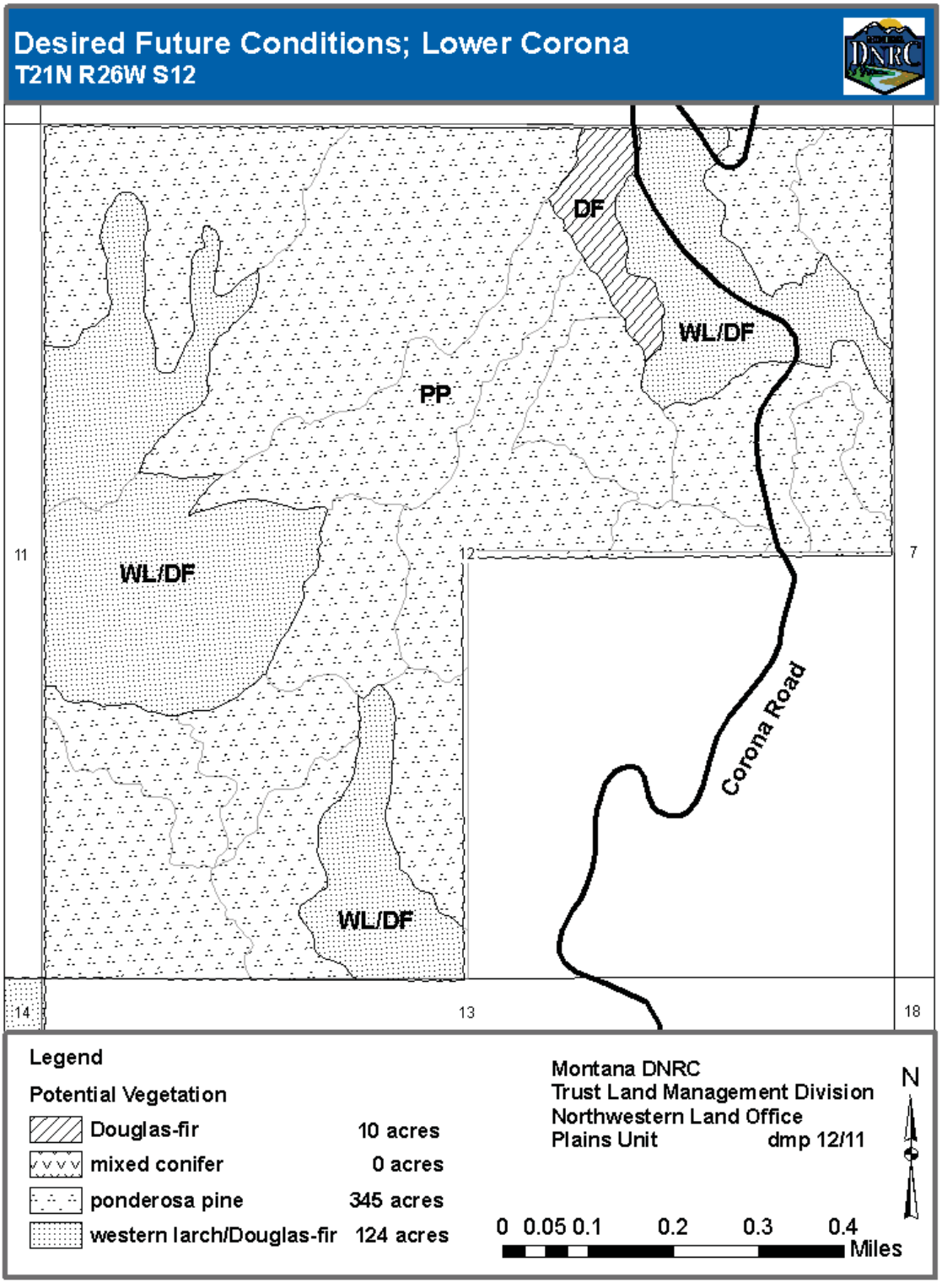
Current Cover

Douglas-fir	15 acres
mixed conifer	74 acres
ponderosa pine	318 acres
western larch /Douglas-fir	72 acres

Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit dmp 12/11

N

0 0.05 0.1 0.2 0.3 0.4 Miles


Desired Future Conditions; Lower Corona
T21N R26W S12
DF
WL/DF
PP
WL/DF
WL/DF
Corona Road
11
12
7
14
13
18
Legend
Potential Vegetation
Douglas-fir 10 acres
mixed conifer 0 acres
ponderosa pine 345 acres
western larch/Douglas-fir 124 acres
Montana DNRC
Trust Land Management Division
Northwestern Land Office
Plains Unit dmp 12/11
N
0 0.05 0.1 0.2 0.3 0.4
Miles

Attachment II
Resource Analysis

Footnote: All proposed road miles, harvest boundaries and acreages are close approximations as this proposal has not yet been implemented on the ground.

Vegetation Analysis

Introduction
This analysis is designed to disclose the existing condition of the vegetative resource and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, issues were developed by the public and internally regarding vegetative conditions. The following concerns were expressed from these comments regarding proposed timber harvesting and related activities:

- Concern for maximizing the return to the Public Buildings Trust Fund by intensively managing for healthy and biologically diverse forests.
- Improve forest health. Minimize losses in timber volume from mortality due to insect and disease conditions present within the sale area.
- Promote the continued presence and/or reestablishment of historically appropriate timber types on Trust Land included in this project.
- Reduce fire hazard and associated risks of loss to State of Montana, United States Forest Service, Flathead Indian Reservation and privately owned lands in the area.
- Concern regarding the impacts to threatened and endangered plant and animal species.
- Concern from local residents as to the continued use of this parcel for gathering of firewood, hunting access and recreation.

Analysis Area
The analysis area for direct and indirect effects is state section 12 of T21N R26W. This section is located 9 air miles north of Plains, Montana, in the Cedar Creek drainage. Cumulative impacts are considered at the scale of the Plains Unit and will adequately allow for the disclosure of existing conditions, direct, indirect, and cumulative impacts.

Analysis Method
The Plains Unit typically prepares two to four timber sales per year. Each proposed project is evaluated for its potential effects on lands managed by the DNRC and the surrounding landscape. Methods used in the analysis included review of stand level inventory (SLI) data, field visits, review of scientific literature, aerial photography, and consultation with other professionals.

Existing Condition
Past and current events have changed the forest conditions on the proposed parcels involved in the project area from what would have been present historically according to Losensky's "Historical Vegetation of Montana" (1997). The area was historically characterized by frequent, low-intensity wildfires prior to the 1900's that maintained open stands of ponderosa pine and western larch with lesser amounts of Douglas-fir and other shade tolerant species. Logging activity has occurred in the past on this section. The earliest section records reveal that 915mbf (796mbf DF and 119mbf PP) was harvested between the years 1936-37, as evidenced by the large diameter stumps that still exist. Christmas tree permits were issued through the years of 1942 – 1959. Several small saw log permits were issued between the years 1956 – 1980, totaling approximately 200mbf. Licensed and unlicensed firewood gathering has occurred on this section since this area has been settled up to the present.

This selective logging of the dominant and co-dominant timber, and lack of low-intensity wildfires has resulted in the development of multi storied stands with an increasing component of Douglas-fir that shows poor quality, genetics, form class, and a high incidence of dwarf mistletoe. Standing wildlife snags are scarce due to the easy access to this section for firewood gatherers.

Table V-1: Current cover types and desired future conditions for section 12 T21N R26W.

Cover Type Section 12	Current Acres	DFC Acres	Current minus (-) DFC*
ponderosa pine	318	345	-27
western larch/Douglas-fir	72	124	-52
Douglas-fir	15	10	5
mixed conifer	74	0	74
Totals	479	479	
*A positive value indicates excess current acreage compared to DFC, and a negative value indicates a deficiency in acreage compared to DFC.			

As shown in Table V-1, Douglas-fir and mixed conifer cover types are currently over-represented in section 12. Ponderosa pine and western larch/Douglas-fir cover types are deficient.

Direct and Indirect Effects

No Action Alternative

No timber harvest or associated activities would occur under this alternative. Timber types would continue to advance towards climax conditions with shade tolerant grand fir continuing to thrive in the understory. Within the next 50 - 100 years this species may replace the current overstory. Growth and vigor of trees present in the analysis area would continue to decline as competition increases. Dwarf mistletoes would be allowed to propagate, thereby perpetuating this pathogen in future generations of timber.

Action Alternative

The proposed action alternative would harvest timber on approximately 398 acres. The proposed harvest would be focused on opening the stand to enhance regeneration of preferred seral species, reducing stocking of shade tolerant climax species, as well as removing species susceptible to dwarf mistletoes. More detailed information for treatment of individual units can be found in Attachment III, Harvest Prescriptions. Gated road closures would prevent the unauthorized removal of snags and snag recruits. Fuel loadings would be reduced by removal of ladder fuels from the understory and intermediate components of the stand, as well as opened crown spacing in the overstory component. Growth and vigor of the remaining trees is expected to increase as residual tree spacing would allow full light to crowns and more available water. Noxious weeds would be monitored and addressed through the Plains Unit integrated weed management program.

Table V-2: Current cover types, desired future conditions, and anticipated post-harvest type distribution for section 12 T21N R26W.

Cover Type Section 12	Current Acres	DFC Acres	Anticipated Post Harvest Acres	Change in Acreage
ponderosa pine	318	345	345	+27
western larch/Douglas-fir	72	124	120	+48
Douglas-fir	15	10	10	-5
mixed conifer	74	0	4	-70
Totals	479	479	479	

As shown in Table V-2, there would be a shift towards the desired future condition of the western larch/Douglas-fir conifer and ponderosa pine cover types while reducing the acres of the mixed conifer cover types represented in this section.

Cumulative Effects

No Action Alternative

Under this alternative, stand structure and species composition on state land across the Plains Unit will move towards a shade tolerant, climax condition. Fuel loadings are expected to increase due to tree mortality from insects and disease outbreaks.

Action Alternative

Across the Plains Unit there would be a slight shift towards Desired Future Conditions. This proposed action, in addition to other timber sales on state land in the Plains Unit, are moving stands toward the Desired Future Conditions through the use of harvest treatments that generally favor the development of early-seral cover types. This change would occur on approximately 150 acres. The Plains Unit has 53,151 Classified Forest acres. This results in a change of less than 1% of the total Classified Forest acres, age/size class distribution and stocking levels on the Plains Unit as a whole. Fuel loading, ladder fuels, insect and disease incidence would be reduced within the project area.

WATERSHED AND HYDROLOGY ANALYSIS
FOR THE
LOWER CORONA TIMBER SALE

INTRODUCTION

Project Area and Project Activities

The gross project area includes 480 acres of Trust Lands near Plains, Montana. Affected watershed includes unnamed tributaries to Lynch Creek. This parcel is within the Clark Fork River watershed. Surface flow of project area streams to Lynch Creek was unconfirmed due to private land access issues, but some stream reaches within the project area are assumed to contribute surface flow to Lynch Creek. The project area is adjacent to land managed by Plum Creek Timber Company, Stimson Lumber Company and non-industrial private ownership. Proposed project activities would include ground based and cable yarding methods to harvest timber on approximately 397 acres within the project area.

Resource Description

Resources potentially at risk in the project area include increased water yield and increased sediment delivery. Water yield increases (WYI) can affect channel stability if dramatically altered, and sediment delivery from both in-channel and introduced sources is a primary component of overall water quality in a watershed.

Issues and Measurement Criteria

The following issues encompass the specific issues and concerns raised through public comment and scoping of the proposed project. For a specific list of individual comments and concerns, please refer to the project file.

Sediment Delivery
Sediment delivery and subsequent water-quality impacts can occur as a result of timber harvesting and related activities, such as road construction and log yarding to landings. Construction of roads, skid trails and landings can generate and transfer substantial amounts of sediment through the removal of vegetation and exposure of bare soil. In addition, removal of vegetation near stream channels reduces the sediment-filtering capacity and may reduce channel stability and the amounts of large woody material. Large woody debris is a very important component of stream dynamics, creating natural sediment traps and energy dissipaters to reduce the velocity and erosive power of stream flows.

Measurement Criteria: Tons of sediment delivery per year using procedures adapted from the Washington Forest Practices (WFP) Board (*Callahan 2000*). Sediment from harvesting activities and vegetative removal will be analyzed qualitatively through data collected during past statewide and DNRC internal BMP field reviews.

Water Yield
Water yield can be affected by timber harvesting and associated activities by affecting the timing, distribution, and amount of water yield in a harvested watershed. Water yields increase proportionately to the percentage of canopy removal (*Haupt 1976*), because removal of live trees reduces the amount of water transpired, leaving more water available for soil saturation and runoff. Water yield is further affected because canopy removal also decreases interception of rain and snow and alters snowpack distribution and snowmelt. Water yield impacts are ameliorated as new trees begin to grow and use water. New growth also begins to return

snowpack distribution to pre-harvest levels as stands grow. Higher water yields may lead to increases in peak flows and peak-flow duration, which can result in accelerated streambank erosion and sediment deposition. Vegetation removal can also reduce peak flows by changing the timing of snowmelt. Openings will melt earlier in the spring with solar radiation and have less snow available in late spring when temperatures are warm. This effect can reduce the synchronization of snowmelt runoff and lower peak flows.

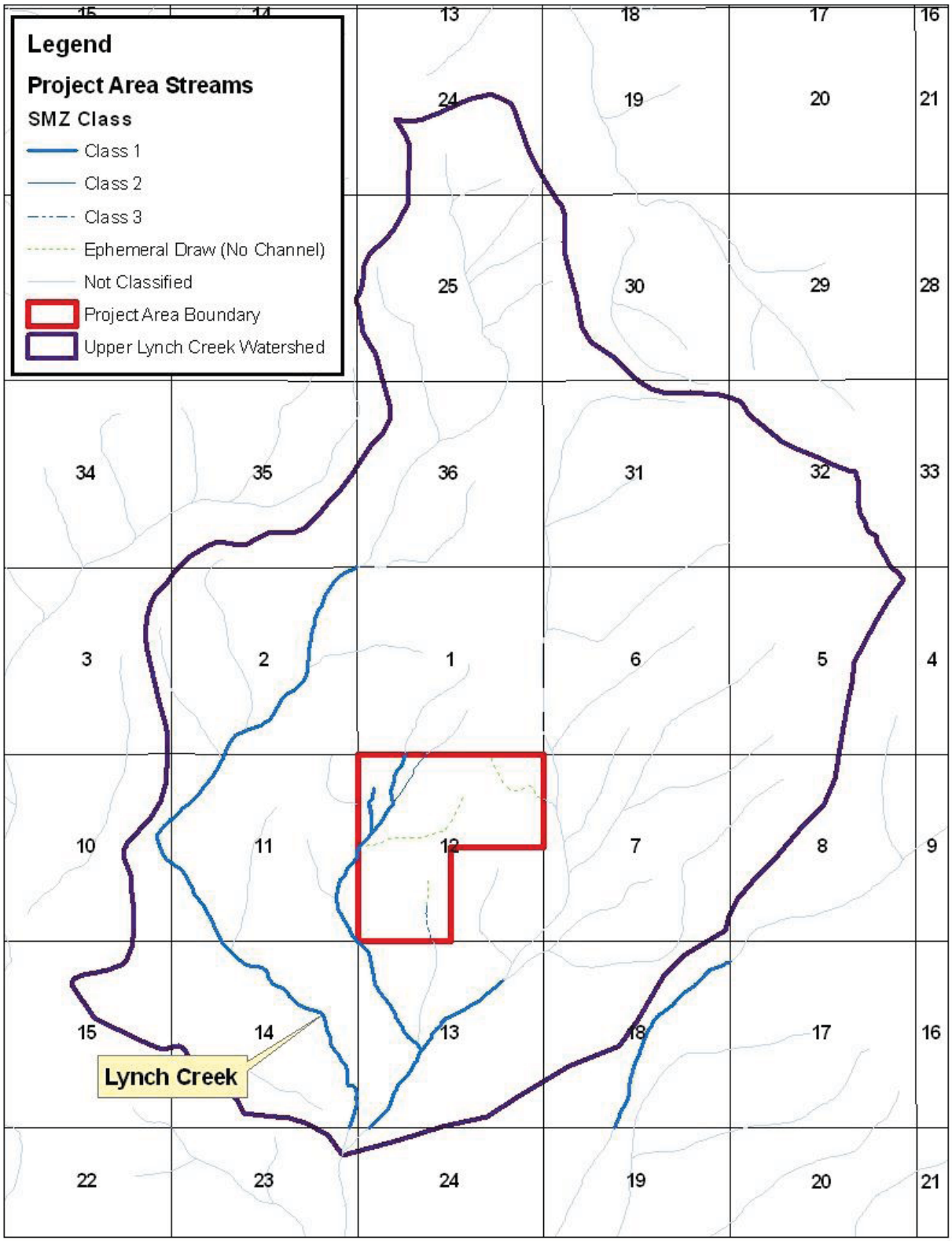
Measurement criteria: Equivalent Clearcut Acres (ECA). All past and proposed timber management activities are converted to ECA using procedures outlined in Forest Hydrology Part II (*Haupt 1976*). Peak flow duration and timing will be addressed qualitatively.

Analysis Area

Sediment Delivery
Analysis area for direct, indirect and cumulative effects to sediment delivery will be analyzed on all existing roads in and leading to the proposed project area. Sediment delivery will be analyzed qualitatively where stream crossings exist within the proposed project area using visual inspection and lineal measurement to determine the road surface area delivering to a stream. Additional sites on proposed haul routes located outside the project area will be assessed qualitatively for their potential to affect downstream water.

Water Yield
Direct, indirect and cumulative effects to water yield will be analyzed in the Upper Lynch Creek watershed. A map of the Upper Lynch Creek watershed and its relation to the proposed project area is found below in ***Figure H-1 – Upper Lynch Creek Watershed***. All existing activities on all ownership and proposed activities related to the Lower Corona project will be analyzed using the ECA method to estimate the water yield changes that may occur as a result of the proposed project. This watershed was chosen as an appropriate scale of analysis for the ECA method, and will effectively display the estimated impacts of proposed activities.

Figure H-1 – Upper Lynch Creek Watershed



Regulatory Framework

Montana Surface Water Quality Standards: According to ARM 17.30.607 (1)(a), the Clark Fork River drainage and its tributaries, including Lynch Creek, is classified as B-1. Among other criteria for B-1 waters, no increases are allowed above naturally occurring levels of sediment, and minimal increases in turbidity. "Naturally occurring," as defined by ARM 17.30.602 (19), 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 activities that may impact the resource.

There are no surface water rights within the proposed project area, or within 1 mile downstream from the proposed project area.

Designated beneficial uses in the proposed project area may include cold water fisheries in Lynch Creek. No other beneficial water uses were identified due to a lack of stream channels or lack of delivery to downstream waters.

Water Quality Limited Waterbodies:
Lynch Creek is listed in the *2010 List of Waterbodies in Need of Total Maximum Daily Load (TMDL) Development* publication produced by the Montana Department of Environmental Quality (DEQ, 2010). This list is compiled by the Montana Department of Environmental Quality (DEQ) as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency (EPA) Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do not fully meet water quality standards, or where beneficial uses are threatened or impaired. These water bodies are then characterized as “water quality limited” and thus targeted for Total Maximum Daily Load (TMDL) development. The TMDL process is used to determine the total allowable amount of pollutants in a water body of watershed. Each contributing source is allocated a portion of the allowable limit. These allocations are designed to achieve water quality standards.

The Montana Water Quality Act (MCA 75-5-701-705) also directs the DEQ to assess the quality of state waters, insure that sufficient and credible data exists to support a 303(d) listing and to develop TMDL for those waters identified as threatened or impaired. Under the Montana TMDL Law, new or expanded nonpoint source activities affecting a listed water body may commence and continue provided they are conducted in accordance with all reasonable land, soil and water conservation practices. Total Maximum Daily Loads have not been completed for the Lynch Creek drainage. DNRC will comply with the Law and interim guidance developed by DEQ through implementation of all reasonable soil and water conservation practices, including Best Management Practices, commitments in the State Forest Land Management Plan, and the Forest Management Rules.

Reaches of Lynch Creek listed in need of TMDL development are located below the proposed project area. Aquatic life, cold water fisheries and primary contact recreation are listed as not supported in the 2010 list. Listed causes of impairment in Lynch Creek are alteration in stream-side or littoral vegetative covers, low flow alterations, phosphorus (total), sedimentation/siltation, water temperature and Total Kjehldahl Nitrogen (TKN). Probable sources are listed as channelization, forest roads (road construction and use), grazing in riparian or shoreline zones and irrigated crop production.

Montana Streamside Management Zone (SMZ) Law:
For a map of the streams and their SMZ classification, please refer to ***Figure H-1***. By the definition in ARM 36.11.312(3), the stream flowing through the northwest corner of the proposed project area and a small tributary to its west will be treated as class 1 streams since they flow more than 6 months per year and are assumed to contribute flow to Cedar Creek and Lynch Creek (the streams are perennial, but connectivity could not be established due to private land access issues). To the east of these streams, there is a class 2 stream (ARM 36.11.312(4)) that has a defined channel, flows less than 6 months per year, and contributes surface flow to another stream. In the southern portion of the project area, there is a class 3 stream (ARM 36.11.312(5)) channel that flows less than 6 months per year and rarely contributes flow to another body of water. All other drainage features found within the proposed project area did not meet the definition of a stream in ARM 36.11.312(20), and are classified as ephemeral draws and swales with no defined channel.

Sediment Delivery
Sediment delivery on this parcel was reviewed by a DNRC hydrologist in 2011. Three stream channels were identified in this section. In the northwest portion of the project area is a perennial class 1 stream with an approximately 5-foot bankfull width. The stream was classified as a B4/5 channel using a classification system developed by *Rosgen* (*1996*). Channel types rated as "B" are typically in the 2- to 4-percent gradient range, and have a moderate degree of meander (sinuosity). Channel-bed materials in B4/5 types are mainly gravel and coarse sand. No areas of unstable or actively down-cut channels were identified during field reconnaissance. Large woody debris was found in adequate supply to support channel form and function. Woody material in a stream provides traps for sediment storage and gradient breaks to reduce erosive energy and work as flow deflectors to reduce bank erosion. No evidence of past SMZ harvesting was found. There is a portion of this stream with an existing drive-through ford on an old road system. This site has been heavily impacted by vehicle traffic, with deep wheel ruts visible amid the streamside vegetation and through the channel. The ford does not receive heavy use, but it is used several times per year. No downstream impacts from this site were identified beyond approximately 50-100 feet downstream from the ford.

There is an unnamed stream to the west of the stream described in the previous section that contributes surface flow to the class 1 stream. This is a class 1 stream that flows more than six months and contributes to another stream. It has a 2-foot bankfull channel width. The channel has a gravel/coarse sand bottom, but is intercepted by an old road and routed down a ditch line for several hundred feet. No areas of channel instability or active down-cut channels were found during field review, and no in-channel sources of sediment were found.

Finally, there is a class 3 stream located in the southern portion of the project area. This channel has approximately 2 foot bankfull channel with a sand/gravel bottom. This stream flows annually during spring runoff, but flows less than six months of the year and does not contribute to another stream, lake or other body of water. No areas of unstable or actively down-cut channels were found during field review, and no in-channel sources of sediment were found.

Sediment delivery from the existing road system was identified in one location. The ford discussed above has approximately 200 feet of road directing runoff to the stream. The road surface is partially vegetated, and rills in the road surface are small and not directing large amounts of runoff or large amounts of sediment delivery to the stream. No other portions of road were found to deliver sediment to a stream in the proposed project area. The existing road system in the proposed project area is low to moderate standard native-surfaced road, and mainly does not meet applicable best management practices for surface drainage or erosion control. Most road grades are generally under 8%, but roads located in draw bottoms may be 10-12%. Much of the existing road system is "two-track" roads made by firewood cutters traveling through the area. These were originally just trails to individual trees that became roads through repeated use. They were never constructed, and many are poorly located in draw bottoms or on steep grades. The remainder of the road system was constructed to access timber harvesting by

the DNRC during past entries. Most of these roads are moderate standard, are built on gentle to moderate grades, and are not causing active erosion or sediment delivery to streams.

Water Yield
According to *ARM 36.11.423*, allowable WYI 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. 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 WYI for the Upper Lynch Creek watershed has been set at 12.9 percent based on channel-stability evaluations, watershed sensitivity, and acceptable risk. This WYI would be reached approximately when the ECA level in Upper Lynch Creek reaches the estimated level of 2,834 acres. A water yield analysis was conducted in the Upper Lynch Creek watershed by a DNRC hydrologist in 2011 using review of aerial photography and DNRC section records in the project area. Timber-harvesting and associated road-construction activities have taken place in the Upper Lynch Creek watershed since the 1930s. These activities, combined with the vegetative recovery that has occurred, have led to an estimated 9.3 percent WYI over a fully forested condition in the Upper Lynch Creek watershed. ***Table H-1 – Current Water Yield*** summarizes the existing conditions for water yield and the associated ECA levels in the Upper Lynch Creek watershed. Estimated water yield and ECA levels are well below the established threshold.

Table H-1 – Current Water Yield. *Water yield and ECA increases in Upper Lynch Creek watershed.*

	Upper Lynch Creek
Existing % WYI	9.3
Allowable % WYI	12.9
Existing ECA	2,047
Allowable ECA	2,834

Fish Habitat
The unnamed tributary to Lynch Creek in the northwest portion of the proposed project area is the only perennial Class 1 stream spatially connected to another body of water. According to the Montana Fisheries Information System, Eastern Brook Trout inhabit Lynch Creek, but presence of native species has not been confirmed by field data. During field reconnaissance in 2011 by a DNRC hydrologist, visual inspection of pools and riffles within the project area did not reveal any fish sightings.

DIRECT AND INDIRECT EFFECTS

No Action Alternative
Direct and indirect effects of the No Action alternative would be similar to the conditions described under the existing conditions for sediment delivery and water yield. The sediment delivery and water yield would be unaffected by the no action alternative, and streams and ephemeral draws in the proposed project area would continue to be affected by natural and pre-existing conditions.

Action Alternative
The proposed action alternative would harvest timber from approximately 1,120 acres. The following are the anticipated direct and indirect impacts:

Sediment Delivery
The action alternative would maintain erosion control and surface drainage on all roads proposed for haul. In addition, road surface drainage would be improved leading to the ford crossing on the unnamed tributary to Lynch Creek found in the northwest portion of the project area, and this portion of road would be blocked from vehicle traffic in order to eliminate vehicle use of the ford.

This would reduce the sediment delivery area at this site to a lineal distance of approximately 50 feet, and would allow the road surface to fully revegetate by restricting traffic. The action alternative proposes to construct approximately 2.3 miles of new road. Most of these reaches of new road are designed to replace existing roads that are located in draw bottoms or in other unsuitable locations. In addition, a new stream crossing would be constructed on the class 3 stream in the south portion of the project area. Short-term risk of low levels of erosion and deposition would be increased for approximately 2 to 3 years after completion due to exposure of bare soil during construction, surface drainage improvement and hauling activities. This risk would return to near current levels as road surfaces and cut and fill slopes re-vegetate. Overall, there is a low to moderate risk of short-term low-level increase in erosion and sediment delivery for about 2-3 years at the new and existing stream crossings. However, water quality standards are expected to be met and there is a low risk of impacts to downstream beneficial uses.

Most of the proposed timber harvesting activities would pose a low risk of sediment delivery to streams since they are located away from streams and do not propose harvesting within the SMZ or RMZ. Less than one acre of unit 2 would propose harvesting within the RMZ adjacent to the class 1 SMZ in the northwest portion of the proposed project area. This activity would pose a moderate risk of sediment delivery to the stream due to proximity to live water. This risk would be minimized through implementation of applicable BMPs, the SMZ Law and Forest Management Rules, as well as operation during periods of dry, frozen or snow-covered conditions. The SMZ law, Administrative Rules for Forest Management, and applicable BMPs would be applied to all harvesting activities, which would minimize the risk of sediment delivery to draws and streams. The Montana BMP audit process has been used to evaluate the application and effectiveness of forest-management BMPs since 1990; this process has also been used to evaluate the application and effectiveness of the SMZ Law since 1996. During that time, evaluation of ground-based-skidding practices near riparian areas has been rated 92-percent effective, and these same practices have been found effective over 99 percent of the time from 1998 to present (*DNRC 1990 through 2010*). Since 1996, effectiveness of the SMZ width has been rated over 99 percent (*DNRC 1990 through 2010*). As a result, with the application of BMPs and the SMZ Law, proposed activities are expected to have a low to moderate risk of low impacts to sediment delivery.

Water Yield

The annual water yield in the Upper Lynch Creek watershed would increase by an estimated 1.7 percent over the current level. This level of projected water-yield increase is an incremental value that refers only to water yield generated by this proposed project and does not include water yield increases from past activities. The cumulative water-yield increase will assess the impacts of the proposed project when added to the impacts of past and planned future activities; this will be discussed in *Cumulative Effects* portion of this analysis. This level of water-yield increase would produce a very low risk of creating unstable channels in any reach of Lynch Creek or its tributaries.

Fish Habitat

Potential impacts to fish habitat in Lynch Creek and in the unnamed class 1 stream located in the northwest portion of the project area would be similar to those reported under the sediment delivery portion of this analysis. Sediment delivery has the highest potential to affect fish habitat by introducing fine sediment to spawning gravels and deposition in pools. There would be a short-term increase in the risk of adverse impacts to fish habitat due to exposure of bare soil as a result of proposed log hauling. This risk would return to near current levels in 2 to 3 years as road surfaces re-vegetate.

CUMULATIVE EFFECTS

No Action Alternative
Cumulative effects of the No Action alternative on sediment delivery and water yield would be similar to the situations described in the existing conditions. The sediment delivery and water yield would be unaffected by the No Action alternative, and the streams and ephemeral draws in the proposed project area would continue to be affected by natural and pre-existing conditions.

Action Alternative
Past activity in and around the proposed project area has mainly consisted of timber management, grazing and agricultural use. On sites where timber was harvested, there has been substantial vegetative and hydrologic recovery with no apparent impact on water yield increases. The anticipated cumulative effects of the proposed action alternative are summarized below.

Sediment Delivery
Risk of sediment delivery and sediment loading to waters downstream from the proposed project area would be slightly increased from current levels in the short term and similar to current levels in the long term. Maintenance and improvement of existing erosion control and surface drainage on the existing road system would yield similar erosion rates to current levels, decrease the sediment loading to Lynch Creek by reducing an existing sediment source and maintain a similar risk of sediment delivery to other areas. Overall, there is a low to moderate risk of short-term low-level increases in sediment loading for about 2-3 years. However, water quality standards are expected to be met and there is a low risk of impacts to beneficial uses.

Water Yield
The proposed timber harvest would increase the water yield in the Upper Lynch Creek watershed from its current level of approximately 9.3 percent over a fully forested condition to an estimated 11.0 percent. This water-yield increase, and its associated ECA level, includes the impacts of all past management activity, existing roads, proposed timber harvesting, and vegetative hydrologic recovery in the Upper Lynch Creek watershed. The water-yield increase expected from this project leaves the watershed well below the established threshold of concern reported in the existing conditions portion of this analysis. This cumulative level of water-yield increase would produce a low risk of creating unstable channels in Upper Lynch Creek or its tributaries.

The proposed project is expected to have a low risk of cumulative impacts to water yield as a result of the proposed timber harvesting. A summary of the anticipated water-yield impacts of the action alternative to the Upper Lynch Creek drainage is found in ***Table H-2 – Upper Lynch Creek Water Yield***.

Table H-2 – Upper Lynch Creek Water Yield. *ECA and percent WYI results for the Upper Lynch Creek watershed.*

	ALTERNATIVE	
	No Action	**Action**
Allowable water-yield increase	12.9%	12.9%
Percent water-yield increase	9.3	11.0
Acres harvested	0	233
ECA generated	0	389
Total ECA	2,047	2,436
Allowable ECA	2,834	2,834

Fish Habitat

The risk of cumulative impacts to fish habitat and fish populations in Lynch Creek or the class 1 stream found in the northwestern portion of the project area from the proposed project is low. All anticipated impacts are short-term, minor and temporary. The risk of any cumulative sediment loading affecting fish habitat or fish populations would be slightly elevated during the period of operation. With erosion control measures in place, these risks are still considered low.

SOILS ANALYSIS
FOR THE
LOWER CORONA TIMBER SALE

INTRODUCTION

Landform Description

The landform and parent materials in the project area are generally quartzite and argillite bedrock soils with small areas of glacial till or glacial drift influence. Wave sorting of gravels by glacial lake Missoula may be found in protected areas. The majority of the bedrock consists of slightly metamorphosed sedimentary rocks formed from sand, silt, clay, and carbonate materials deposited in an ancient shallow sea during the Precambrian period.

Soil Physical Properties

Analysis of soil physical properties 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.

Nutrient Cycling

Nutrient cycling, microbial habitat, moisture retention and protection from mineral erosion are provided by coarse and fine woody debris in forested environments (Harmon et al, 1986). Forest management can affect the volumes of fine and coarse woody debris through timber harvesting and result in changes to potentially available nutrients for long-term forest production.

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.

Nutrient Cycling

Nutrient cycling will be analyzed by disclosing existing levels of coarse woody debris from transects conducted during field reconnaissance. Potential impacts to nutrient cycling will be assessed by evaluating risks to nutrient pools and long-term site productivity from timber sale contract requirements and mitigation measures.

Slope Stability

Slope stability risk factors will be analyzed by reviewing the Web Soil Survey (NRCS, 1996) and the Montana DSL Plains Unit Soil Survey (Collins, 1985) to identify map units 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 Lower Corona parcel.

EXISTING CONDITIONS

Soil Physical Properties

Soil physical properties were assessed in the proposed project area by a DNRC watershed specialist in 2011. The DNRC has conducted timber harvesting since the 1930s. Timber sale records dating back to the 1930s indicate most of the proposed project area has been harvested using primarily ground-based yarding methods. Ground-based yarding can create soil impacts through displacement and compaction of productive surface layers of soil, mainly on heavily used trails. Existing skid trails are spaced at between 80 and 100 feet apart, and none were identified as erosion or sediment sources, and none were identified in unsuitable locations. Trails are still apparent, but most are well vegetated and past impacts are beginning to ameliorate from freeze-thaw cycles and root penetration. Based on pace transects of trail spacing, knife penetration tests for compaction, and ocular estimates of re-vegetation, less than 15% of previously ground-skidded harvest units are in an impacted condition in the proposed project area.

Nutrient Cycling

Nutrient cycling was assessed in the proposed project area by completing 9 transects to estimate the current levels of coarse woody debris. These transects were focused on proposed harvest units. The average coarse woody debris is 5.6 tons/acre, with a range of 0.3 to 7.9 tons/acre and a median of 5.0 tons/acre. These results are at the low end of the recommended range discussed in *Managing Coarse Woody Debris in Forests of the Rocky Mountains* (Graham et al, 1994) on similar habitat types. Douglas-fir habitat types in Montana are recommended to have a range of 5 to 24 tons/acre to maintain forest productivity and nutrient cycling.

Slope Stability

Soil types in the project area are primarily gentle (0-40%) residual soils found on hilly terrain. The Web Soil Survey (NRCS, 1996) and the Montana DSL Plains Unit Soil Survey (Collins, 1985) 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. Because none of the slope stability risk factors are present in the proposed project area, slope stability will not be evaluated on this project in the remainder of this analysis. A list of soil types found in the Lower Corona project area and their associated management implications is found in ***Table S-2***.

DIRECT AND INDIRECT EFFECTS

No Action Alternative

The No Action Alternative would have no direct or indirect effects on soil physical properties or nutrient cycling. 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. On most existing skid trails, compaction has begun to ameliorate through freeze-thaw cycles and re-vegetation. Nutrient cycling from coarse woody debris would stay near current levels as dictated by natural and pre-existing conditions.

Action Alternative

Soil Physical Properties

The effects of the proposed action alternative to soil physical properties were based on DNRC soil monitoring on soils and sites similar to those found in the project area. Based on past monitoring, direct impacts to soil physical properties would be expected on up to 42 of the total 397 acres proposed for harvesting in the Lower Corona project area. 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 3.0 to 21.0 percent of the acres treated, with an average disturbance rate of 10.6% (DNRC, 2009). The low range of impacts includes operations on frozen or snow-covered soils, and the high range includes operations on steep slopes during non-winter conditions. As a result, the extent of impacts expected would likely be similar to those reported by Collins (DNRC, 2009), or approximately 3.0 to 21.0 percent of ground-based harvested acres. The proposal includes 397 acres of ground-based mechanical harvesting.

Direct impacts to the soil physical properties would also be generated by ground-based site preparation. Site-preparation disturbance would be intentionally done, and these impacts are considered light and promote reforestation of the site. The expected impacts to the soil resource as a result of the Action Alternative are summarized in ***Table S-1***. These activities, including road construction and ground based yarding, would leave approximately 12.3 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 S-1 – Summary of Direct Effects of Alternatives on Soils

Description of Parameter	No Action	Action Alternative
Acres of Harvest	0	397
Acres of ground based yarding	0	397
Acres of ground based impacts[1]	0	**42**
Miles of new roads	0	2.3
Acres of new roads[2]	0	**7**
Total estimated acres of impacts	0	**49**
Percent of harvest area with impacts	0%	12.3%

[1] 10.6% of tractor units based on average impacts found on similar soils and sites by DNRC soil monitoring

[2] Assuming an average width of 25 feet, roads are approximately 3 acres per mile

Nutrient Cycling

Direct and indirect effects to nutrient cycling would include an increase in coarse and fine woody debris from the action alternative. Through the timber sale contract, approximately 10-15 tons of coarse woody material would be left on the ground following harvesting activities, as well as fine material for nutrient retention.

CUMULATIVE EFFECTS

No Action

This alternative would have no cumulative impacts to soil physical properties or nutrient cycling 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. Nutrient cycling from coarse woody debris would stay near current levels as dictated by natural and pre-existing conditions.

Action Alternative

Soil Physical Properties

Cumulative effects to soil physical properties may occur from repeated entries into a forest stand where additional ground is impacted by equipment operations. With this alternative, all 397 acres proposed for harvesting have had previous ground-based timber sale operations. Existing skid trails where compaction has begun to ameliorate through freeze-thaw cycles and re-vegetation would return to a higher level of impact due to the Action Alternative. Additional trails may also be required if existing trails are in undesirable locations. Cumulative impacts to soil physical properties under the Action Alternative are still expected to remain below the range analyzed for in the EXPECTED FUTURE CONDITIONS section of the SFLMP and remain well within the 20-percent impacted area established as a level of concern in the SFLMP (DNRC, 1996).

Nutrient Cycling

Risk of cumulative effects to nutrient cycling from nutrient pool loss would be low. This alternative would follow research recommendations found in Graham (1994) for retention of coarse and fine woody debris through contract clauses and site-specific mitigation measures.

DNRC would minimize long-term soil impacts and adverse cumulative effects by implementing any or all of the following: 1) existing skid trails from past harvest activities would be used if they are properly located and spaced 2) additional skid trails would be used only where existing trails are unacceptable 3) mitigating the potential direct and indirect effects with soil moisture restrictions, season of operation, and method of harvest 4) retention of a portion of coarse woody debris and fine litter for nutrient cycling.

Table S-2 – Soil Map Unit Descriptions for the Lower Corona Project Area

Map Unit	Name	Soil & Vegetation Descriptions	Management Considerations			
			K factor**/erosion potential*	Timber	Roads	Comments
30U-7D	Mountain Sideslopes, Moist 0-20% slopes	Soils of this map unit have been formed from volcanic ash over colluviums. Vegetation is dry forest of grand fir over an understory of shrubs and forbs.	K=0.10 to 0.32 Erosion potential is considered low to moderate	Potential Prod: High Equipment: Tractor Regen: None	Roads perform well with standard location, construction and maintenance practices.	Minimize displacement of productive ash surface soils
30U-8B	Mountain Sideslopes, Cool/dry 20-40% slopes	Soils of this map unit have been formed from alpine till or drift derived from argillite and quartzite. Vegetation is dry forest of Douglas-fir over an understory of shrubs and forbs.	K=0.05 to 0.10 Erosion potential is considered low	Potential Prod: Low Equipment: Tractor Regen: Can be limited by drought stress and grass competition	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Road cuts and fills may be difficult to re-vegetate
30U-8C	Mountain Sideslopes, Cool/moist 20-40% slopes	Soils of this map unit have been formed from volcanic ash over till or drift. Vegetation is dry forest of grand fir over an understory of shrubs and forbs.	K=0.10 to 0.20 Erosion potential is considered low to moderate	Potential Prod: Moderate/high Equipment: Tractor Regen: Can be limited by grass competition	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Road cuts and fills may be difficult to re-vegetate
30U-9C	Mountain Sideslopes, Cool/moist 40-60% slopes	Soils of this map unit have been formed from volcanic ash over till or drift. Vegetation is dry forest of grand fir over an understory of shrubs and forbs.	K=0.10 to 0.20 Erosion potential is considered low to moderate	Potential Prod: Moderate/high Equipment: Cable/tractor Regen: Can be limited by grass competition	Roads perform well with standard location, construction and maintenance practices. Slope steepness may increase cost.	Some steep slopes may limit tractor operation.

* Erosion Potential is based on slope and soil erosion factor K**. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 70 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight (low), moderate, severe, or very severe. A rating of slight indicates that erosion is unlikely under ordinary climatic conditions; moderate indicates that some erosion is likely and that erosion-control measures may be needed; severe indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and very severe indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion–control measures are costly and generally impractical. (NRCS, 1996)

**Erosion Factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water. (NRCS, 1996)

References:

Collins, Jeff and Ottersberg, R. 1985. *Plains Unit Soil Survey*. Montana Department of State Lands. Missoula, MT.

Graham, R.T., A.E. Harvey, M.F. Jurgensen, T.B. Jain, J.lR. Tonn and D.S. Page-Dumroese. 1994. Managing Coar4se Woody Debris in Forests of the Rocky Mountains. USDA Forest Service Research Paper. INT-RP-447. 13pp.

Harmon, M.E., J.F. Franklin and F.J. Swanson. 1986. Ecology of Coarse Woody Debris in Temperate Ecosystems. Advances in Ecological Research, Vol. 15. New York Academic Press: 133-302.

NRCS, 1996. MT651-*Soil Survey of Sanders and Parts of Lincoln and Flathead Counties, Montana Parts I and II*. United States Department of Agriculture Natural Resources Conservation Service.

USDA Forest Service. 1989. *Lolo National Forest Land Systems Inventory.* USDA Forest Service and Natural Resources Conservation Service.

WILDLIFE ANALYSIS

INTRODUCTION

This analysis discloses the existing condition of relevant wildlife resources, and displays the anticipated effects that may result from each alternative of this proposal. Considerations and concerns raised by DNRC specialists and public comments received during initial scoping for the proposed project led to the following list of issues:

- Timber harvesting and associated road construction could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.
- Timber harvesting and associated road construction could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.
- Timber harvesting and associated activities could result in the reduction or modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.
- Timber harvesting and associated roads could decrease habitat suitability for fishers through reductions in canopy cover, habitat connectivity, snag and coarse woody debris abundance, and increased risk of trapping mortality.
- Timber harvesting could reduce habitat quality for flammulated owls by modifying forest structure and removing nest snags.
- Timber harvesting and associated activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.
- Timber harvesting and associated activities could negatively affect pileated woodpecker habitat suitability by removing canopy cover and snags used for foraging and nesting and by creating disturbance.
- Timber harvesting and associated activities could reduce security and habitat quality for big game species, especially during the winter season.

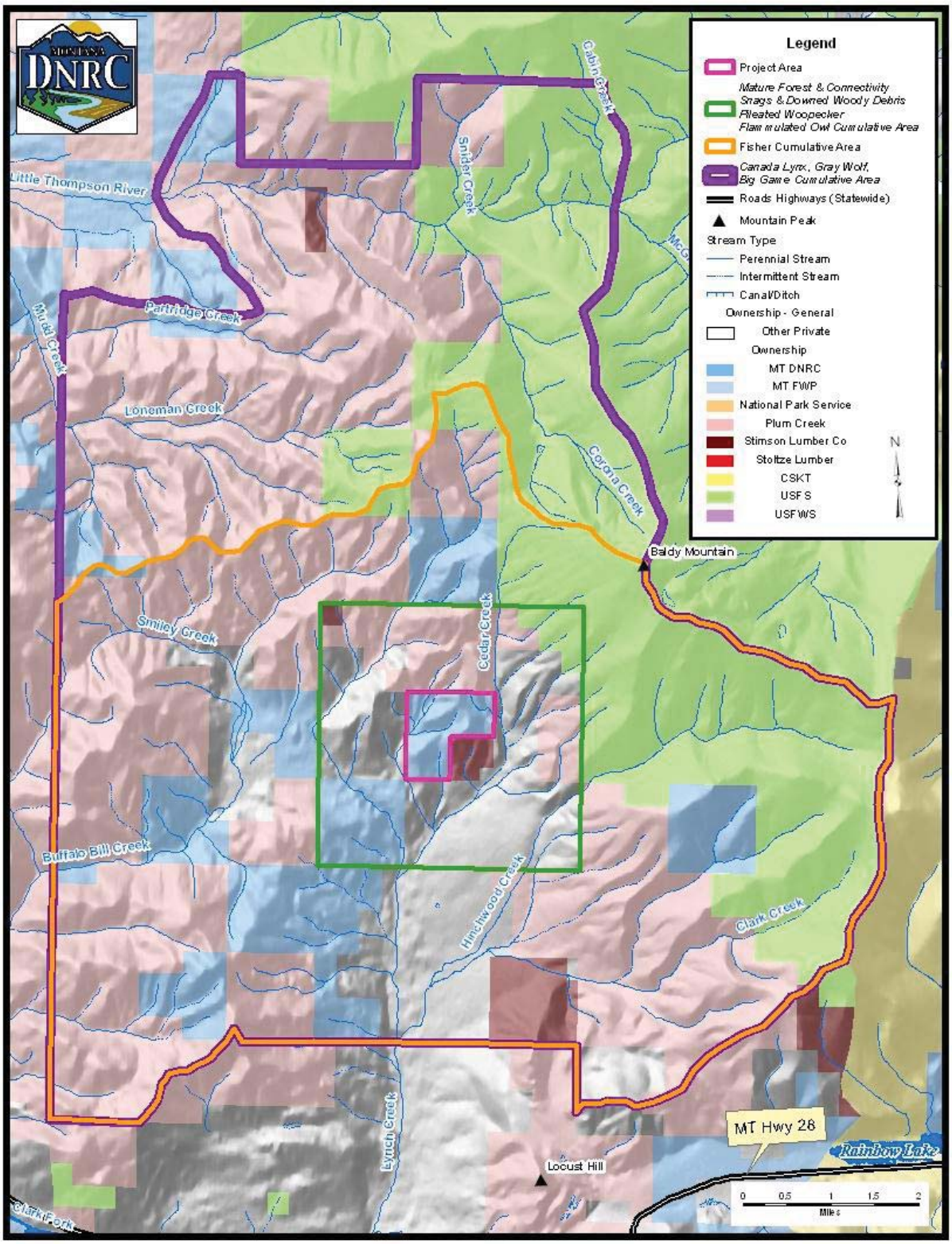
The following sections disclose the anticipated direct, indirect, and cumulative effects to these wildlife resources in the analysis area from the proposed actions. Past and current activities on all ownerships in each analysis area, as well as planned future agency actions, have been taken into account for the cumulative-effects analysis.

ANALYSIS AREA

The discussions of existing conditions and environmental effects will focus on two different spatial scales. The first scale is the "project area" and was used to assess direct and indirect effects to wildlife species and their habitats. The "project area" consists of 480 acres within section 12 in T21N, R26W. Within the project area parcel, slope aspects are variable and elevations range between 3,400 and 3,960 feet.

The second scale is the "cumulative effects analysis area," which refers to the surrounding landscape for assessing cumulative effects to wildlife species and their habitat. Cumulative effects were primarily analyzed on the project area and the surrounding sections directly adjacent to it. This area totals 5,772 acres. The spatial scale of the cumulative effects analysis areas is larger for certain species discussed and is described in the applicable section of this document. In general, cumulative effects analysis areas were delineated to approximate the size of a focal species' home range or to approximate a surrounding landscape in which the proposed activities could most likely have measureable cumulative effects in regards to wildlife habitat. See *FIGURE W-1- WILDLIFE ANALYSIS AREAS* for a map showing the project and cumulative effects analysis areas.

FIGURE W-1 – WILDLIFE ANALYSIS AREAS. *Areas used to assess effects of the action and no-action alternatives on wildlife and wildlife habitat.*



ANALYSIS METHODS

DNRC attempts to promote biodiversity by taking a coarse-filter approach, which favors a 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, DNRC's stand level inventory (SLI) data, aerial photographs, USDA Forest Service GIS data, 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.

COARSE FILTER WILDLIFE ANALYSIS

Of the 108 mammal species found in Montana, 68 are suspected or known to occur in Sanders 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 nine reptile species have also been documented in Sanders County (*Maxell et al. 2003*) and at least 281 species of birds have been documented in the vicinity in the last 15 years (*Lenard et al. 2003*). Altered wildfire regimes due to fire suppression have resulted in widespread increasing tree densities and levels of shade-tolerant species. Thus, tree species such as Douglas-fir and grand fir have become more prevalent on the landscape than they were historically. These departures from historical conditions 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.

MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY

Issue: Timber harvesting and associated road construction could decrease forested cover, which may reduce habitat connectivity and suitability for wildlife species associated with mature forest.

Introduction

A variety of wildlife species rely on older, mature forest to meet some or all of their life history requirements. Mature forests, characterized by abundant large diameter trees and dense canopy cover, play an important role in providing food, shelter, breeding sites, and resting or travel corridors for certain animals. Wildlife use and/or preference of older, mature forests is species-specific; some species use this habitat exclusively, other species only temporarily or seasonally, and some species avoid mature forests altogether. Several species known to be strongly associated with mature forests include pileated woodpeckers (*Dryocopus pileatus)*, American marten (*Martes americana*), brown creepers (*Certhia americana)*, and winter wrens (*Troglodytes troglodytes*).

Forested landscapes in the western United States were historically shaped by natural disturbance events, primarily wildfire, blowdown, and pest outbreaks. Resulting broader landscape patterns were a mosaic of forest patches varying in age, composition and development. Timber harvest, like stand-replacement fire and blowdown, is a disturbance event that can create open patches of young, early-successional habitats. Patch size, age, shape, abundance, and distance to similar patches (connectivity) can be factors influencing wildlife use. The way through which patch characteristics influence wildlife use and distribution are dependent upon the particular species and its habitat requirements. Temporary non-

forested openings, patches, and forest edges created by timber harvest may be avoided by certain wildlife species adapted to mature closed-canopy forest. In contrast, other wildlife species flourish in early seral habitats created by disturbance. Connectivity under historical fire regimes within forest types found in the vicinity of the project area was likely relatively high as fire differentially burned various habitats across the landscape (Fischer and Bradley 1987).

Analysis Area

Direct and indirect effects were analyzed on the project area (480 acres). Cumulative effects were analyzed on the project area and eight sections directly surrounding it (5,772 acres). Land ownership within the cumulative effects analysis area is 19% DNRC, 25% Plum Creek timber, 4% USDA Forest Service, 3% Stimson Lumber, and 48% other private property. 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 and centers evaluation of cumulative effects on those areas most likely to be affected by the proposed action.

Analysis Methods

Mature forested habitats and landscape connectivity were assessed using field evaluations, aerial-photograph interpretation, USDA Forest Service data (VMap 9.1.1), and Geographical Information System (GIS) analysis. Factors considered in the analysis include the level of timber harvesting, amount of mature forested habitats, and connectivity.

Existing Condition

The project area currently contains approximately 442 acres (92%) of mature ponderosa pine, Douglas-fir/western larch, Douglas-fir and mixed-conifer stands that have a reasonably closed canopy (≥40% crown closure). The remaining 38 acres (8%) consist of small forest openings and meadows. No stands in the project area meet the definition of old-growth (*Green et al. 1992;* see *VEGETATION ANALYSIS*). Small portions of the proposed project area underwent minor selective harvest treatments between 1930s – 1980 (see *VEGETATION ANALYSIS*), however virtually the entire project area is in well stocked mature forest comprised of 100+ year-old stands with approximately 40 trees per acre over 15” dbh. Mature stands are well-connected within the proposed project area. Additionally, small, dense patches of regenerating conifers are present and interspersed throughout the area. Roads of all types are prevalent within the project area, with a density of 9.5 miles of road per a square mile. Roads that can be legally accessed by the general public make up a smaller portion of the total roads, with a density of approximately 5.5 miles/sq. mile. Approximately 3.6 miles of open DNRC roads exist in the project area. The Corona Divide county road travels north-south (0.7 miles) through the eastern half of parcel and offers year-round access to the proposed project area. Additionally, roughly 2.8 miles illegal ATV trails/4wd roads are present and periodically accessed by unauthorized motorized traffic from numerous points in the project area. The majority of road miles within the project area are inaccessible by motor vehicles (but not snow machines) during normal winter conditions. Although mature forest cover is abundant, habitat connectivity for species strongly intolerant of human disturbance is likely compromised by this extensive road network.

While mature forest abundance and connectivity within the project area is good, connectivity in the cumulative effects analysis area has been reduced with past timber harvesting, housing development, and road construction. Presently, roughly 32 percent (1,836 acres) of the cumulative effects analysis area is comprised of mature, closed canopy forests. Average patch size of mature forest is 70 acres (27 patches). Streams run through many of the existing patches of mature forest and offer a measure of linear connectivity between dense forest patches. Past timber harvesting and home/road building have converted much of the remaining acres into young forest stands or non-forest, respectively. The majority of the cumulative effects analysis area (65%, 3,727 acres) has been harvested within the last 20 years and consists of young, regenerating forest. Approximately 30 miles of open roads (total density open roads = 5.0 miles/sq. mile) in the cumulative effects analysis area, coupled with timber management and land clearing, has largely reduced landscape-level connectivity in the cumulative effects analysis area. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering forested habitats and landscape connectivity. Across the cumulative effects analysis

area, landscape connectivity has been appreciably compromised for species requiring connected stands of mature forests.

Environmental Effects

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

Under this alternative no timber harvesting activities would occur. Thus, no direct or indirect effects to mature forested habitat connectivity and suitability 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 Habitat and Connectivity

Under the action alternative, approximately 372 acres (77.5%) of mature, forest would undergo harvesting (see *TABLE W-1*). An additional 26 acres of mature, open canopy forested stands would also be harvested. All proposed harvest units would receive regeneration (seed tree) treatments removing over-mature and diseased or suppressed/intermediate trees and leaving 8 – 10 mature trees per acre. Crown closure on these acres would be reduced from >40% to 5-10%. Species that rely on dense, mature forest habitats would experience a reduction in habitat. Roughly 70 acres of mature forest in the parcel would remain unharvested and could provide suitable habitat for species utilizing smaller patches of mature forest. Harvesting under the Action Alternative would create forest stands consisting of an open canopy more characteristic of historical conditions in ponderosa pine forests (Losensky, 1997). After harvesting, the project area would continue to provide a variety of forested habitat conditions for wildlife, but the proportions of these habitats would change. In general, under this alternative, habitat conditions would improve for species adapted to more open forest conditions, while reducing habitat quality for species that prefer dense, mature forest habitats.

***TABLE W-1* – MATURE FORESTED HABITATS.** Existing acres, proposed harvest acres, and proportions of mature forested habitat within the effects analysis areas.

Analysis Area	Total Analysis Acres	Mature Forested Habitat Present (% area)	Proposed Harvest Under Action Alternative (% area)	Mature Forested Habitat Post-Harvest (% area)
Project Area	480	442 (92.1%)	372 (77.5%)	70 (14.6%)
Cumulative Effects Analysis	5,772	1,836 (31.8%)	372 (6.4%)	1,464 (25.4%)

Following proposed harvesting, the majority of the project area would consist of connected stands with a very open canopy (5-10%). Stands would provide habitat characteristics that favor use by species utilizing open forest conditions comprised of large, scattered trees, although certain wildlife species could find the resulting stands too open for appreciable use. Approximately 70 acres of unharvested mature forest would primarily be located in the northwest corner of the project area, offering a connected block of habitat. In addition to unharvested forest in the northwest corner, blocks of 2.6 and 5 acres at the far southwest and northeast corners (respectively) would also be retained to facilitate mature forest connectivity. The 70 acre unharvested block of mature forest in the northwest corner of the project area also contains a perennial stream that would maintain habitat connectivity and movement corridors for wildlife. Approximately 2.2 miles of permanent road and 0.3 miles of temporary road would be constructed with the proposed Action Alternative. During harvest activities, approximately 4.9 miles of

total road would receive traffic. New permanent roads would be restricted to DNRC administrative use after harvesting. Temporary road would be reclaimed and returned to contour at the end of harvest activities. After project completion, barriers would be placed to close 2.8 miles of illegal roads and 2.2 miles of roads currently receiving public motorized use. At the conclusion of the proposed project, total roads within the project area would be reduced from 7.1 miles to 4.6 miles and roads receiving public motorized use would be reduced from 7.1 miles to 2.7 miles. Thus, moderate adverse direct and indirect effects to mature forested habitat connectivity and suitability in the project area since: 1) harvesting would appreciably reduce tree density and existing cover on roughly 372 acres (77.5%) of mature forest stands and 26 acres of mature, open canopy stands; 2) mature forest connectivity would be altered, but connectivity would remain on 70 acres and in riparian areas; 3) post-harvest conditions would be more representative of forest structure under historical fire regimes; and 4) unauthorized motorized use and road density and would be reduced.

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

Under this alternative no timber harvesting activities would occur. Thus, no cumulative effects to mature forested habitat connectivity and suitability 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 Habitat and Connectivity

Past harvesting (<20 years), road building and housing development in the cumulative effects analysis areas has reduced the amount of mature forested habitat available by approximately 65 percent (3,727 acres). Reductions in mature, closed canopy forested habitats associated with this alternative (372 acres, 20% of available habitat in cumulative area) would be additive to losses associated with past harvesting activities and any ongoing activities on neighboring private lands. Across the cumulative-effects analysis area, a minor percentage (25%) of mature forested habitats would exist and landscape connectivity would not be appreciably altered further given the existing condition of the forested landscape on neighboring ownerships. Habitat for forest interior species and species associated with dense, mature stands would remain low in the cumulative effects analysis area, primarily due to past forest management activities. Wildlife species using and preferring young forest stands in the cumulative area would benefit from increases in the project area 10-20 years post-harvest. Some landscape connectivity would be maintained through unharvested riparian areas, and across unharvested corners of the project area (80 acres), but connectivity of dense mature forest would remain low within the cumulative effects analysis area. Overall, connectivity of young forests and forest stands with large, widely scattered trees would increase. Approximately 0.1 miles of new road would be constructed on adjacent private land. Proposed harvesting and associated activities would temporarily (up to 4 years) increase open road density within the cumulative effects area from 3.2 miles/sq. mile to 3.6 miles/sq. mile. After project completion, open road density would decrease to 3.1 miles/sq. mile. Thus, moderate adverse cumulative effects to mature forested habitat suitability and connectivity for wildlife would be expected in the cumulative-effects analysis area since: 1) harvesting would remove 372 acres (20%) of existing mature, closed canopy forest in the cumulative effects analysis area, 2) forest retention along streams and section corners would help maintain some connectivity; 3) current availability of mature, closed canopy habitat is relatively low and minor cumulative changes to wildlife use would be expected; and 4) long-term open road density would not appreciably change or alter current levels of connectivity.

SNAGS AND COARSE WOODY DEBRIS

Issue: Timber harvesting and associated road construction could reduce abundance of snags and coarse woody debris, which could lower habitat quality for species that depend on these structural attributes, and could alter their ability to survive and/or reproduce.

Introduction

Snags and coarse woody debris are important components of forested ecosystems. The following are 5 primary functions of snags and downed logs in forest ecosystems: 1) increase structural diversity, 2) alter

the canopy microenvironment, 3) promote biological diversity, 4) provide important habitat substrate 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 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 them. 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 to 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 species, 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.

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. A number of mammals rely on downed logs and snags for survival and reproduction. The size, length, decay, and distribution of woody debris affect the capacity of various species to meet their life requisites. 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 may provide foraging sites for weasels and secure areas for snowshoe hares.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the project area and eight sections directly surrounding it (5,772 acres, see *FIGURE W-1- WILDLIFE ANALYSIS AREAS*). 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

The abundance of snags and coarse woody debris were quantitatively estimated using 9 systematically placed plots in the proposed project area. Factors considered in the analysis included the level of proposed harvesting and number of snags and coarse woody debris.

Existing Environment

During field visits to the project area, an average of 5.9 (range 0-33) snags ≥8” dbh per acre were observed on vegetation plots. Snag abundance was highly variable; with the majority of plots containing no snags. The average diameter of all snags >8” dbh was relatively small (11.25” dbh, range 8-17”) and species varied. A small number of snags >21” dbh were observed within the project area, but did not fall within sampling plots. The lack of large, high quality snags within the project area can be primarily attributed to past logging practices and extensive firewood gathering. Open roads are spread fairly evenly throughout the project area and facilitate widespread firewood gathering (see *Mature forested habitat and landscape connectivity* section above for detailed road information). Snags and large coarse woody debris were generally less abundant within 200 feet of roads and trails within the project area. Evidence of snag use for wildlife feeding and/or cavity building was observed in snags that were present. Coarse woody debris levels were also variable across the project area, averaging ~5.6 tons per acre (range 0.3-7.9 tons per acre). Similar to snags, coarse woody debris were generally small diameter (=5.3” at transect line, range 3-13”). Historical logging practices did not typically include snag and coarse woody retention protocols. Thus, habitat quality for wildlife utilizing snags and/or coarse woody debris is likely low to moderate within the project area.

Overall, snags exist at current levels to meet DNRC's minimum-retention thresholds (*ARM 36.11.411)*, although size classes are smaller than preferred. Similar to unaltered forested landscapes, snags and coarse woody debris are not evenly distributed across the project area, a characteristic likely intensified by open roads. Snags and coarse woody debris are frequently collected for firewood, especially near open roads, and firewood gathering occurs both in the project and cumulative-effects analysis areas. Outside of the proposed project area, any ongoing harvesting on other ownerships could continue to alter snags, snag recruits, and coarse woody debris levels. On approximately 3,727 acres (65%) of recently (<20 years) harvested land within the cumulative effects analysis area, snag and downed wood levels are likely quite low. Snag and coarse woody debris levels on surrounding parcels within the cumulative area vary widely depending on ownership, harvest and wildfire history.

Environmental Effects

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

No changes in snags or coarse woody debris would be expected as no harvesting would occur. Existing snags would continue to provide wildlife habitats, and new snags would be recruited as trees die. No direct and indirect effects would be expected to affect wildlife species using snags and coarse woody debris since no harvesting would occur that would alter present or future snag or coarse woody debris concentrations.

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

Present and future snags and large coarse woody debris would be reduced due to timber harvesting on 398 acres in the project area. Portions of the project area lacking larger snags would not undergo appreciable changes in the availability of large snags and/or coarse woody debris since these attributes are currently somewhat limited in those areas. Harvest prescriptions call for retention of 2 ponderosa pine, western larch or Douglas-fir snags, and 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 5 to 15 tons of coarse woody debris per acre 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*. Although current snags present in the project area are generally small diameter, live trees/snag recruits >21" dbh exist at levels within the project area to fully meet *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 like ponderosa pine that tend to provide important habitats, such as high-quality nesting structures and foraging habitats. Roughly 74 acres of forest in the northwest corner of the project area would remain unharvested and continue to provide snags and coarse woody debris to wildlife. This corner is also has the lowest road density, and thus lowest firewood gathering risk, in the project area. The potential future risk for snag and coarse woody debris loss due to firewood gathering would be reduced by the closure or obliteration of approximately 4.5 miles of road/2-track currently receiving motorized use and 1.9 miles of proposed new road construction at project completion. At the conclusion of the proposed project, total roads miles within the project area would be reduced from 7.1 miles to 4.6 miles and roads receiving public motorized use would be reduced from 7.1 miles to 2.7 miles. The 2.7 miles of road remaining open at project completion would continue to provide public access through much of the project area. Thus, moderate adverse direct and indirect effects to snags and coarse woody debris would be anticipated that would affect habitat suitability of wildlife species requiring these habitat attributes since: 1) harvesting would reduce snags, snag recruitment trees, and coarse woody debris on 398 acres, 2) availability of snags and coarse woody debris is currently limited in the project area, 3) 74 acres of relatively roadless forest would remain unharvested, 4) human access for firewood gathering would be reduced on 6.4 miles of road, and 5) snags and future recruitment trees would be retained in all proposed treatment areas.

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

Snags and coarse woody debris would not be altered in the cumulative effects analysis area under this alternative. Thus, no cumulative effects to wildlife using snags and coarse woody debris would be

anticipated since no further harvesting would occur that could affect existing snag and coarse woody debris abundance and recruitment.

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

Some snags would be removed from the project area, whereas additional coarse woody debris material may be recruited. Surrounding lands in the cumulative effects analysis area have experienced different management regimes 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 cumulative effects analysis area (3,727 acres, 65%) has reduced these attributes. The losses of snags associated with this alternative would be additive to the losses associated with past harvesting and any ongoing harvesting on neighboring ownerships. However, the project requirements to retain 2 large snags and snag recruits per acre (greater than 21 inches dbh or next largest size class), and 5 to 15 tons of coarse woody debris per acre would mitigate additional cumulative effects associated with this project. Emphasis would be placed on retention of ponderosa pine, western larch, or Douglas-fir snags and snag recruits. Due to a lack of large snags and uneven distribution of those present, some areas could be largely snag deficient for 10+ years. Under the action alternative, unauthorized public access along 6.4 miles of road would be restricted; thus, reducing potential loss of snags and coarse woody debris resulting from firewood gathering. 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, since: 1) snags and coarse woody debris levels are likely limited in much (65%) of the cumulative effects analysis area, 2) 398 acres (6.9%) of the cumulative-effects analysis area would be harvested; reducing snags and snag-recruit trees while increasing or maintaining coarse woody debris levels, 3) there would be slightly increased representation of shade-intolerant species that could become high-quality snags in the long term, 4) a reduction in unauthorized public access and associated firewood gathering would be anticipated, and, minor adverse effects to wildlife requiring snags and coarse woody debris would be anticipated that would affect these species in the cumulative effects analysis area for 30-100 years.

FINE-FILTER WILDLIFE 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 Montana FWP. TABLE W-2 – FINE FILTER summarizes how each species considered was included in the following analysis or removed from further consideration because suitable habitat does not occur within the project area or proposed activities would not affect their required habitat components.

TABLE W-2 – FINE FILTER. *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	***No further analysis conducted –*** The proposed project area is outside (>4.5 miles) of designated grizzly bear recovery areas and non-recovery "occupied habitat" as mapped by Wittinger (2002). Grizzly bear use of the project area is very unlikely given nearby occupied dwellings, high density of roads receiving motorized traffic and a lack of important bear habitats (i.e. avalanche chutes, berry patches). Thus, negligible direct, indirect, or cumulative effects to grizzly bears would be expected to occur as a result of either alternative.

	Canada lynx (*Felis lynx*) Habitat: Subalpine fir habitat types, dense sapling, old forest, deep snow zones	***Included –*** Potential lynx habitat occurs within the project area.
Sensitive Species	Bald eagle (*Haliaeetus leucocephalus*) Habitat: Late-successional forest less than 1 mile from open water	***No further analysis conducted –*** There are no known nest territories in the vicinity of the project area and no large water bodies within 2 miles of the project area that might provide suitable locations for nesting. 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 further analysis conducted –*** No recently (less than 5 years) burned areas are in the project area. Thus, no direct, indirect, or cumulative effects to black-backed woodpeckers would be expected to occur as a result of either alternative.
	Coeur d'Alene salamander (*Plethodon idahoensis*) Habitat: Waterfall spray zones, talus near cascading streams	***No further analysis conducted –*** No moist talus or streamside talus habitat occurs in the project area. Thus, no direct, indirect, or cumulative effects to Coeur d'Alene salamanders would be expected to occur as a result of either alternative.
	Columbian sharp-tailed grouse (*Tympanuchus Phasianellus columbianus*) Habitat: Grassland, shrubland, riparian, agriculture	***No further analysis conducted –*** No suitable grassland communities occur in the project area. Thus, no direct, indirect, or cumulative effects to Columbian sharp-tailed grouse would be expected to occur as a result of either alternative.
	Common loon (*Gavia immer*) Habitat: Cold mountain lakes, nest in emergent vegetation	***No further analysis conducted –*** 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, esp. riparian	***Included*** – Potential fisher habitat occurs within project area.
	Flammulated owl (*Otus flammeolus*) Habitat: Late-successional ponderosa pine and Douglas-fir forest	***Included*** – 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	***Included*** – The project area is near the estimated home range of the Corona wolf pack. Wolves could use the proposed area at any time.
	Harlequin duck (*Histrionicus histrionicus*) Habitat: White-water streams, boulder and cobble substrates	***No further analysis conducted –*** 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 further analysis conducted –*** 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 further analysis conducted –*** 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	***Included*** – suitable mature ponderosa pine, western larch/Douglas-fir habitats exist in the proposed project area.
	Townsend's big-eared bat (*Plecotus townsendii*) Habitat: Caves, caverns, old mines	***No further analysis conducted –*** 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	Elk	***Included*** – Year-round use by deer, elk, and moose is possible. Big game winter range exists in the project area.
	Moose	
	Mule Deer	
	White-tailed Deer	

THREATENED AND ENDANGERED SPECIES

CANADA LYNX

Issue: Timber harvesting and associated activities could result in the reduction or modification of habitat preferred by Canada lynx and decrease the area's suitability for lynx.

Introduction

Canada lynx are listed as "threatened" under the Endangered Species Act. Canada lynx are associated with subalpine fir forests, generally between 4,000 to 7,000 feet in elevation in western Montana (Ruediger et al. 2000). Lynx abundance and habitat use are strongly associated with snowshoe hare populations; thus conditions which decrease habitat quality for snowshoe hares can reduce the availability of prey for lynx. Lynx habitat in western Montana consists primarily of stands that provide habitat for snowshoe hares, either dense, young coniferous stands or dense, mature forested stands (Squires et al. 2010). Forest type, stem densities, natural disturbance history, and time since harvesting play important roles in shaping the suitablilty of young foraging habitat for lynx. Mature subalpine fir stands with abundant coarse woody debris also provide structure important for denning and cover for kittens, and dense cover used for for travel and security. These conditions are found in a variety of habitat types(Pfister et al. 1977), particularly within the subalpine fir series. Historically, northwest Montana contained a variety of stand types with differing fire regimes; this, combined with patchy elevation and snow-depth gradients preferred by lynx, likely formed a non-continuous mosiac of lynx and non-lynx habitats (Fischer and Bradley 1987, Ruggiero et. al. 1999, Squires et al. 2010). Forest management considerations for lynx include providing a mosaic of young and mature lynx habitats and maintaining a network of travel corridors.

Analysis Areas

Direct and indirect effects were analyzed for activities conducted within the 480 acre project area. Cumulative effects were analyzed on an 34,309 acre cumulative effects analysis area generally centered on the project area (see *FIGURE W-1- WILDLIFE ANALYSIS AREAS*). This scale of analysis

approximates the home range size of a lynx (Ruediger et al. 2000). Land owners in the cumulative effects area are DNRC (16%), Plum Creek Timber (44%), USDA Forest Service (21%), Stimson Lumber Co. (2%), and various private owners (17%).

Analysis Methods

To assess lynx habitat, DNRC SLI data were used to map specific habitat classes used by lynx. Lynx habitat (ARM 36.11.403(40)) was assigned to a stand if the SLI data indicated habitat types (Pfister et al. 1977) that are consistent with those reportedly used by lynx (Ruediger et al. 2000). Other parameters (stand age, canopy cover, and amount of coarse woody debris) were used in modeling the availability of the following 6 specific lynx habitat elements:

1) denning,

2) mature foraging,

3) denning/mature foraging

4) young foraging,

5) forested travel/other habitat, and

6) temporary non-lynx habitats.

Denning habitat provides important vegetative and woody structure needed to provide denning sites and security for juvenile lynx, while foraging habitat is important for the survival of both adult and juvenile lynx, however, it is not considered limiting for lynx in most forested landscapes in western Montana (USFS Northern Rockies Lynx Amendment ROD 2007). "Forested travel/other habitat" is a general habitat category that provides for secondary prey items and contains modest levels of forest structure usable by lynx. Temporary non-lynx habitat consists of non-forest and open forested stands that are not expected to be used appreciably by lynx until adequate horizontal cover reestablishes. Factors considered in the analysis include landscape connectivity and the amount DNRC lands within the cumulative effects analysis area in denning, foraging, and unsuitable habitats.

EXISTING ENVIRONMENT

Approximately 268 acres (56%) of lynx habitat occurs in the 480 acre project area. Of this habitat, DNRC's stand level inventory data (SLI) classified 194 acres as mature foraging habitat and 43 acres were identified as denning/ mature foraging habitat. Field assessment of classified denning/mature foraging habitat within the project area revealed a general lack of structural attributes generally used for lynx denning (large coarse woody debris), but the habitat did meet mature foraging classification. Additionally, most of these acres are in close proximity (<0.1 miles) to a year-round open road and numerous two-tracks where coarse woody debris (the most common lynx denning substrate) are typically removed by firewood gathering. Thus, a total of 238 acres (60%) within the project area were considered mature foraging habitat for lynx (*TABLE W-3 – LYNX HABITATS*). Administrative rules of Montana (ARM 36.11.435 (8)(a) & (b)(i)) require a minimum of 10 percent of the current project-scale lynx habitats on DNRC-managed lands to be managed as foraging habitat (young or mature). All classified lynx habitat in this parcel is between 3,400 and 3,960 feet in elevation, and thus near the lower elevational range for general lynx use in northwestern Montana (Ruediger et al. 2000). At these elevations, warmer temperatures, changes in forest habitat types, and shallower winter snow depths decrease habitat suitability for lynx. For instance, a number of stands (212 acres, 40%) within the project area consist of forest habitat types not considered to be preferred lynx habitat (i.e. dry ponderosa pine). Habitat connectivity within the project area is moderately good for the lynx habitat present, as the majority of the area is intact mature, (>40% crown) forest. Because of widespread timber harvesting and unsuitable cover types on private lands directly adjacent to the parcel, however, connectivity of prefered lynx habitat outside of the DNRC parcel is generally low.

DNRC manages approximately 5,415 acres (16%) of the 34,308-acre cumulative effects analysis area. Historical records documented Canada lynx once within the cumulative effects analysis area, located 1 1/4 miles east of the project area in 1921 (Montana Natural Heritage Program). Lynx habitats on DNRC lands within the cumulative effects analysis area occur on 3 separate parcels and are dominated by denning, mature, and forested travel/other habitat (*TABLE W-3 – LYNX HABITAT*). The lack of fire,

including the effects of fire suppression, has likely led to a smaller proportion of young foraging habitat and a greater proportion of mature foraging habitat or forested travel/other habitats on DNRC lands than what was typically present pre-European settlement.

USDA vegetation data and interpretations of aerial photographs within the cumulative effects analysis area show approximately 1,644 acres (5%) as permenantly non-forested, 21,250 acres (62%) in early regenerating forest stands and 9,238 acres (27%) to be mature forest with a reasonably closed (>40%) canopy. The remaining 2,177 forested acres (6%) primarily consist of high-elevation stands with more open overstory canopies that do not likely provide high quality lynx habitat. USDA Forest Service lands (7,179 acres) in the western one-third of the cumulative effects analysis area likely contain the highest-quality habitat in the area: elevation is higher, average snow depth deeper, historic harvest levels were less intensive and habitat connectivity is high. Examination of aerial photography suggests much of the cumulative effects analysis area was harvested within the last 20 years, thus it is likely that most regenerating, non-mature forested stands are not preferred young foraging habitat for lynx due to low stem densities. Non-preferred cover types are prevelent in the southern half of the cumulative effects analysis area . Additionally, connectivity at the cumulative effects analysis level has been compromised by widespread harvesting associated road construction, and private land development.

TABLE W-3 – LYNX HABITAT. Estimates of existing and proposed post-harvest lynx habitat on DNRC lands in the project and cumulative effects analysis area. Percent refers to the percent of the total lynx habitat each habitat category represents on DNRC-managed lands.

LYNX HABITAT CATEGORY	**Acres of lynx habitat (percent of DNRC lynx habitat)**			
	Project Area		**Cumulative Effects Analysis Area**	
	Existing	Post-Harvest	Existing	Post-Harvest
Denning	0.0 (0%)	0.0 (0%)	153.1 (11%)	153.1 (11%)
Denning/Mature foraging	0.0 (0%)	0.0 (0%)	43.0 (3.1%)	43.0 (3.1%)
Mature foraging	238.3 (88.9%)	36.0 (13.4%)	520.7 (37.6%)	318.4 (23%)
Forested travel/other	29.8 (11.1%)	2.5 (0.9%)	380.1 (27.4%)	352.8 (25.4%)
Young Foraging	0.0 (0%)	229.5 (0%)	0.0 (0%)	0.0 (0%)
Temporary non-habitat	0.0 (0%)	229.5 (85.6%)	289.6 (20.9%)	519.1 (37.4%)
Grand Total - Suitable Lynx Habitat	268.0 (100%)	38.5 (14.4%)	943.8 (68.1%)	714.2 (51.5%)

Environmental Effects

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

Under this alternative, no changes in lynx habitat elements would be expected in the project area and landscape connectivity would not be altered. Thus, no direct indirect effects to lynx habitat would be expected to occur in the project area.

Direct and Indirect Effects of the Action Alternative on Canada Lynx

Approximately 230 acres of lynx habitat would be subject to harvesting with this alternative. Activities associated with active logging operations could temporarily displace any lynx using the area for 1-4 years. Proposed seed tree harvest prescriptions on all 230 acres would decrease mature tree abundance to 8-10 trees per acres and reduce overstory crown closure to <10%. Mature foraging and forested travel/other habitat inside harvest units would be converted to temporary non-habitat (*TABLE W-3 – LYNX HABITAT*) for the next 50-100 years. Where operationally feasable, some existing patches of shade-intolerant regenerating and sub-mechantable conifers would be retained, however the total area of regenerating patches would not be expected to be more than 10% of the project area. Growth and infill of retained mature trees and patches of sapling to pole-sized conifers, and post-harvest conifer regeneration following harvest would increase habitat suitability over time. Roughly 39 acres (14.4%) of lynx habitat would remain unharvested to conserve lynx foraging habitat (addresses ARM 36.11.435 (8)(a) & (b)(i)), as well as maintain lynx habitat connectivity with adjacent mature forest in the northwest, southwest, and northeast corners of the project area. This unharvested area includes a 36 acre block of lynx mature foraging habitat with a perrenial stream running into and out of the project area. Existing lynx habitat on DNRC lands in the unharvested portion of the project area (39 acres) would be expected to persist in the absence of future timber harvesting or other natural disturbance that may influence lynx habitat quality. In the proposed harvest units, 5 to 15 tons/acre of coarse woody debris would be retained to provide some horizontal cover and security structure for lynx, although lynx would not be expected to use harvest units appreciably for 20-30 years. Collectively, since: 1) the amount of existing suitable lynx habitat in the project area would be reduced by 87%, 2) mature foraging habitat would be retained to meet ARM 36.11.435 and maintain a moderate level of habitat connectivity, 3) baseline probability of extended lynx use is low-moderate due to unsuitable covertypes and low elevation, and 4) coarse woody debris and patches of regenerating conifers would be retained to increase forest structural complexity in harvest units when they grow back into suitable lynx habitat, minor adverse direct and indirect effects to habitat suitability for Canada lynx would be expected.

Cumulative Effects of the No-Action Alternative on Canada Lynx

No appreciable change in lynx habitats would occur under this alternative and no further changes in landscape connectivity would be anticipated due to DNRC activities at this time. Thus, no cumulative effects to lynx habitat suitability would be expected to occur.

Cumulative Effects of the Action Alternative on Canada Lynx

Under the action alternative, approximately 230 acres (0.6%) of the 34,309-acre cumulative effects analysis area would be altered and converted to temporary unsuitable habitat. Within the cumulative effects analysis area, suitable lynx habitats on DNRC lands (714 acres) would continue to persist (*TABLE W-3 – LYNX HABITAT*). Reductions in suitable lynx habitat and increases in temporary non-habitat in the proposed harvest units would not be expected to appreciably alter lynx use of the cumulative effects analysis area given that surrounding habitat suitability is low. The cumulative effects analysis area contains roughly 5,762 acres (17%) of mature, closed canopy (>40%) forest located above 4,000 feet in elevation that likely serve as suitable lynx habitat. Landscape connectivity in the cumulative effects area would not be appreciably reduced with the proposed activities (see *MATURE FORESTED HABITAT AND LANDSCAPE CONNECTIVITY*), as existing connectivity of suitable lynx habitat would be maintained along the project area corners and features typically used for lynx travel (i.e. riparian areas). Approximately 42 acres (6%) of remaining suitable lynx habitat on DNRC lands within the cumulative effects analysis area could be altered in the next 10 years by the proposed Smiley Face Timber Sale. Additionally, modifications of lynx habitats could be possible with any management that may occur on USDA Forest Service, industrial timberlands, and other non-DNRC lands (28,894 acres, 84%) in the cumulative effects analysis area. Increased levels of motorized activities associated

with the action alternative could temporarily displace lynx should they be present near the proposed project area and associated roads. Thus, since: 1) overall baseline habitat suitability and connectivity for lynx are quite low, 2) existing suitable lynx habitat on DNRC lands would be reduced by 0.6% in the cumulative effects analysis area and remain unsuitable for at least 20 years, 3) habitat connectivity within the cumulative effects area would be minimally affected by proposed activities, and 4) lynx could be temporarily displaced by logging activities in the cumulative effects analysis area, minor adverse cumulative effects to lynx habitat suitability would be expected as a result of proposed activities.

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 could become listed under the *Federal Endangered Species Act* if management activities result in continued adverse impacts.. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful 'fine filter' for ensuring that the primary goal of maintaining healthy and diverse forests is met. A search of the *Montana Natural Heritage Database* documented no sensitive species in the vicinity of the project area. As shown in ***TABLE W-1.***

FISHER

Issue: Timber harvesting and associated roads could decrease habitat suitability for fishers through reductions in canopy cover, habitat connectivity, snag and coarse woody debris abundance, and increased risk of trapping mortality.

Introduction

Fishers are generalist predators that prey upon a variety of small mammals and birds, as well as snowshoe hares and porcupines. 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 low to mid elevation mature 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 does 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 within the project area. Cumulative effects were analyzed on a 34,309 acre cumulative effects analysis area generally centered on the project area (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. This scale includes portions of two HUC12 watersheds likely to receive use by any fishers that may have home ranges which include the proposed project areas.

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 cover types (ARM 36.11.403(60)) below 6,000 feet in elevation with 40 percent or greater canopy closure were considered potential fisher habitat. DNRC manages preferred fisher cover types 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)). Fisher habitat was further divided into upland and riparian-associated areas depending upon the proximity to streams and based upon stream class. Direct and indirect effects were analyzed using field evaluations and GIS analysis of potential habitat. Cumulative

effects were analyzed using field evaluations and GIS analysis of potential habitat and aerial photograph interpretation of potential habitat on all other lands within the cumulative effects analysis area. Factors considered include amount of suitable fisher habitats, landscape connectivity, and human access. Snags and coarse woody debris were assessed using plot data collected during site visits and by reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting.

Existing Environment

The proposed project area ranges from 3,400 and 3,960 feet in elevation. The proposed project area contains roughly 194 acres (40%) of potential fisher habitat, of which 13 acres (3%) are within 100 feet of Class 1 streams and 2 acres are within 50 feet of Class 2 streams. Snags and coarse woody debris were quantified at sampling plots within proposed harvest units and found to be within recommended levels, although size classes were generally small (see *SNAGS AND COARSE WOODY DEBRIS* section above). Mature forested stands occur throughout the proposed project area and along an unnamed class 1 stream (in the northwest corner) and offer habitat connectivity. A number of these mature stands, however, consisted of forest cover types not preferred by fishers (286 acres, 60%) and could reduce the likelihood of extended use by fishers. Fisher riparian habitat connectivity is quite low upstream of the project area, as class 1 and 2 streams quickly (<0.3 miles) fade out into recently harvested stands in the cumulative effects analysis area. Connectivity of riparian fisher habitat downstream (south) of the project area is low to fair, as streams enter developed areas and forest stands not preferred by fishers. Currently there are approximately 4.1 miles of open road and 2.8 miles of illegal road on the project area. Virtually all of these road miles are within close proximity of streams (<300 feet) and are open during the winter months, although snow machines could be required during harsher winters. This extensive road network facilitates firewood gathering within the project area, thus reducing snag and coarse woody debris levels. Roads also offer trappers convenient access to forested riparian areas, which increase trapping risk to fishers should they be using the area. Overall fisher habitat suitability within the project area is low due to inappropriate cover types, lack of connectivity with suitable mature forest outside of the project area, reduced levels of snags/woody debris, and high trapper access.

There no historical records of fisher occurring in the project or cumulative effects analysis areas within the last 30 years (MNHP 2011). Within the cumulative effects analysis area on 5,415 acres of DNRC managed lands, there are 1,415 acres (26%) of moderately or well-stocked fisher cover types. Of these potential habitats, approximately 100 acres (<0.1%) would be considered riparian fisher habitat. Approximately 29 miles of perennial and 80 miles of intermittent streams occur on lands within the cumulative effects analysis area. The forested areas adjacent to these streams could contribute to the total riparian fisher habitats within the cumulative effects analysis area. Of these 109 total stream miles, approximately 440 acres (1.3%) of mature, canopy forested habitat are within 100 feet of perennial streams and 50 feet of intermittent streams, while the remaining miles are located in recently harvested, mature open-canopy forest, or non-forested (i.e. burned) areas. Streams in harvested areas on private and USFS ownerships have narrow strips of forest habitat adjacent to them, usually no wider than 300 total feet. These forested riparian strips could provide habitat and connectivity for fishers, particularly in the form of travel corridors. Roughly 6,842 acres (20%) of mature (≥40% canopy closure) forest on non-DNRC lands within the cumulative effects analysis area could provide additional upland fisher habitats, however it is likely that many of these acres are in cover types not preferred by fishers. Within the cumulative effects analysis area there is a network of existing roads that may facilitate trapper access within the area, although most are not plowed, which limits motorized vehicle use in upper elevations during typical winter conditions. Within the cumulative effects analysis area, past harvesting has limited snag and coarse woody debris densities in about 21,250 acres (62%) of the area. Timber harvest and firewood gathering has reduced snag densities on along open roads to well below two snags per acres, and downed logs are relatively sparse and small (predominantly 8-16” diameter).

Environmental Effects

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

No change to the stands providing fisher denning and foraging habitats would be expected as no timber harvesting activities would occur under this alternative. Also, no changes in landscape connectivity would occur. Thus, 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, no direct or indirect effects would affect fisher habitat suitability in the project area.

Direct and Indirect Effects of the Action Alternative on Fishers

Approximately 156 acres of the 194 acres (81%) of suitable fisher habitats in the project area would be included in proposed harvest units. Of the existing 15 acres of suitable riparian fisher habitat, roughly 0.7 acres (5.7%) would be harvested. Suitable fisher habitats within harvest units would receive treatments would yield stands too open for appreciable fisher use. Approximately 14 acres of riparian fisher habitat would remain unharvested in the project area as well as an additional 37 acres of suitable upland fisher habitat. Unharvested fisher habitats within the project area would continue to provide connected habitat, specifically along the parcel's only class 1 stream. Harvest prescriptions call for retention of 2 snags and 2 snag recruits per acre (>21 in. dbh where they exist, otherwise the next largest size class), and 5-15 tons of coarse woody debris per acre would be planned for retention within the proposed units. Prescriptions call for retention of large snags and larger, dominant trees in the project area; further improving the development and sustainability of large snags. These large snags and trees could be a source for fisher denning and resting sites in the long-term future (80-100 years) when stands regenerate into suitable fisher habitat. Timber harvest activities within the project area could temporarily displace fishers, should they be present. At the conclusion of the proposed project, total roads within the project area would be reduced from 7.1 miles to 4.6 miles and roads receiving public motorized use would be reduced from 7.1 miles to 2.7 miles. Existing open roads adjacent to streams (1.3 miles) within the project area would be closed to public motorized use, which would reduce trapping risk in areas most likely to receive fisher use. Thus, since: 1) harvesting would remove 81 percent of fisher habitat within the project area, 2) minor reductions in upland habitat connectivity would occur and riparian fisher habitats would be largely maintained, 3) the overall likelihood of fisher use in the project area is currently low, 4) large snags and coarse woody debris would remain limited, and 5) motorized human access levels (e.g. trapping risk) would be reduced, minor adverse direct and indirect effects would be anticipated that would affect fisher habitat suitability in the project area.

Cumulative Effects of the No-Action Alternative on Fishers

No effects to riparian or upland fisher habitats on DNRC managed lands would be expected as no timber harvesting activities would occur under this alternative. Also, no changes to landscape connectivity within the cumulative effects analysis area would be expected. 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 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 fisher habitat suitability would be anticipated in the cumulative effects analysis area.

Cumulative Effects of the Action Alternative on Fishers

Approximately 156 acres (11%) of suitable fisher habitats on DNRC lands in the cumulative effects analysis area would be harvested. These reductions in habitat suitability would be additive to the losses associated with past and current timber harvesting in the cumulative effects analysis area. Future harvest operations or natural disturbance on non-DNRC ownerships could affect fisher habitat on the larger landscape. On DNRC administered lands within the cumulative effects analysis area, the proposed Smiley Face Timber Sale could affect up to 14 acres of suitable upland fisher habitat. Roughly 9,238 acres of the 34,308 acre cumulative effects area (27%) remains in mature forested

habitats, some of which may be suitable for fisher use. Negligible reductions in landscape connectivity within the cumulative effects analysis area would occur; close-canopy forest along the majority of riparian areas (440 acres) would persist. Harvest activities could temporarily displace fishers in the cumulative effects analysis area, but disturbance would be expected to return to pre-harvest levels following treatment. Following the proposed action, open roads within the cumulative effects analysis area would be reduced from 110 miles to 108 miles. Trapping risk would remain high along open roads, particularly those near streams. Thus, since: 1) harvesting would alter tree density and structure in stands of fisher habitat within the cumulative effects analysis area (156 acres, 0.5%), 2) negligible changes to preferred cover types or fisher habitats associated with the riparian areas in the cumulative effects analysis area would be anticipated, 3) negligible reductions in landscape connectivity for fishers would be anticipated, 4) overall habitat suitability for fishers would remain low due to widespread past harvesting and abundance of non-preferred forest cover types, and 5) minor reductions to motorized human access and trapping risk would occur, negligible adverse cumulative effects would be anticipated that would affect fisher habitat suitability within the cumulative effects analysis area.

FLAMMULATED OWL

Issue: Timber harvesting could reduce habitat quality for flammulated owls by modifying forest structure and removing nest snags.

Introduction

Flammulated owls are small, migratory, forest owls that inhabit old, open stands of warm-dry ponderosa pine and cool-dry Douglas-fir forests in the western United States. Flammulated owls are secondary cavity nesters, meaning they usually nest in cavities excavated by other birds, usually pileated woodpeckers or northern flickers. Nest snags are generally in 12-25" dbh aspen, ponderosa pine, or Douglas-fir. Flammulated owls forage for insects primarily via hawking or gleaning insects from vegetation, and thus require an open forest canopy for maneuvering. Without disturbance, Douglas-fir encroachment into ponderosa pine stands can increase stand density and result in decreased habitat quality for flammulated owls.

Analysis Area

Direct and indirect effects were analyzed on the project area. Cumulative effects were analyzed on the project area and surrounding sections directly adjacent to the proposed project area for a total cumulative analysis area of 5,772 acres (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. This scale includes enough area to support multiple 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. Snags were assessed during site visits using 9 systematically placed plots in the proposed project area and reviewing past DNRC harvesting information. Factors considered within the analysis include the level of harvesting, number of snags, relative amounts of coarse woody debris, and risk level of firewood harvesting.

Existing Environment

The stands in the project area are largely ponderosa pine, Douglas-fir, and western larch. Within the project area there are approximately 168 acres (35%) of potential flammulated owl habitats. The majority of these acres are no currently providing forest structural characteristics preferred by foraging flammulated owls due to high densities (>40 per acre) of mature (>8” dbh) trees. During field visits to the project area, an average of 5.9 (range 0-33) snags ≥8” dbh per acre were observed on vegetation plots. Snag abundance was highly variable; with the majority of plots containing no snags. The average diameter of all snags >8” dbh was relatively small (11.25” dbh, range 8-17”) and species varied. Vegetation plots within proposed harvest units did not locate any snags in the >21” dbh class and only

one snag >12" dbh. Although their abundance was not captured in vegetation plots, a few snags over 21" dbh were observed in the project area. Large snags suitable for flammulated owl nesting are limited in the project area by a variety of factors (see *Snags and Coarse Woody Debris*), including widespread firewood gathering along open and illegal roads.

In the cumulative effects analysis area, a portion of the area (3,439 acres, 60%) exists in relatively open forested conditions (<40% crown closure), which is preferred by flammulated owls. These open forest conditions are primarily the result of recent forest management and timber harvesting activities. Depending upon harvest Modern fire suppression has allowed conifer in-growth to create more dense stands of mixed ponderosa pine and Douglas-fir in portions of the cumulative effects analysis area, which has reduced overall habitat quality and abundance for flammulated owls. Additionally, open roads across the area (3.3 miles/sq. mile) facilitate loss of snags through firewood gathering.

Environmental Effects

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

Potential flammulated habitat within the project area would continue maturing. 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) there would be slight long-term, succession-related declines in habitat suitability, and 3) firewood gathering along illegal roads would continue to reduce potential nest snags, a minor degree of adverse indirect effects would be expected to affect flammulated owl habitat quality in the project area.

Direct and Indirect Effects of the Action Alternative on Flammulated Owls

The action alternative proposes harvesting on 124 acres (74%) of potential flammulated owl habitat within the project area. Current forest conditions on most of these potential acres are moderately to densely forested (>40% crown closure) stands not providing suitable habitat for flammulated owls. Proposed harvesting would open up forest structural conditions, (reducing to 8-10 mature trees per acre), on all of these acres, increasing their suitability for flammulated owl use. As a secondary cavity-nesting species, flammulated owls are dependent upon large-diameter snags for breeding. Harvesting would likely remove some snags, however measures contained in DNRC rules require retention of 1-2 snags and snag recruits >21 inches dbh (or next largest size) per acre. These larger-diameter snags could serve as potential nesting substrates for owls in the present and future. Large snags are currently limited in the project area and would likely remain limited at least 10 years post-harvest. Under the action alternative, the majority of unharvested mature trees would be shade-intolerant, fire-adapted species (i.e. ponderosa pine, western larch) that become high-quality snags. Flammulated owls are tolerant of human disturbance (McCallum 1994), however the elevated disturbance levels associated with harvesting could negatively impact flammulated owls should they be using existing habitat during the nesting period (June-August). The more open stand structure, the retention of fire adapted tree species, and the maintenance of snags and large recruitment trees would maintain the proposed project area in a condition similar to those observed under historical disturbance regimes, which would also provide suitable flammulated owl habitat. At project completion, roads open to public motorized use (and associated firewood gathering) would be reduced from 7.1 miles to 4.6 miles. Thus, since: 1) harvesting would open the forest canopy and increase maneuvering space for foraging owls, 2) elements of forest structure (snags and snag recruits) used for foraging and nesting by flammulated owl would be retained but the abundance of large snags (>21" dbh) would be limited for some time, 3) harvest prescriptions would lead to more open stands with mature ponderosa pine, western larch and Douglas-fir present, 4) harvest prescriptions would promote future development of preferred tree and snag species in the harvest units, and 5) snag loss due to firewood gathering along open roads would be reduced; minor improvements to flammulated owl habitat quality would be expected in the project area that would be realized over the next 20 to 30 years.

Cumulative Effects of the No-Action Alternative on Flammulated Owls

Portions of the cumulative effects analysis area have been harvested in the recent past, potentially improving flammulated owl habitats by creating foraging habitats and removing a portion of shade-tolerant conifer encroachment. No harvesting would occur on DNRC lands and areas exhibiting mature forested conditions would be expected to persist. Other portions of the cumulative effects analysis area that are not currently providing flammulated owl habitats, due to encroachment, 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 on the project area, 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, a low degree of adverse indirect effects would be expected to affect flammulated owl habitat quality in the cumulative effects analysis area.

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 could reduce nest snags across a small proportion (2.1%) of the cumulative effects analysis area. Although there would be reductions in mature forested stands, additional potential flammulated owl habitat within the cumulative effects analysis area would not be expected to change in the near future. In the broader landscape, past and ongoing timber harvesting and firewood collecting has likely decreased snag levels, especially along open roads. Open-canopy ponderosa pine, western larch and Douglas-fir stands on surrounding lands (3,439 acres, 60%) would provide potential habitat for flammulated owls. Portions of the cumulative effects analysis area that are not currently providing flammulated owl habitat (1,511 acres, 26%), due to meadow areas, housing development or dense canopies and shade-tolerant tree encroachment, would not be expected to change any time in the near future. Thus, since 1) harvesting would increase suitable flammulated owl nesting habitat (124 acres, 2.1%) and create more open foraging habitat, and 2) there would be an expected increase in the amount of the cumulative effects analysis area that would be more representative of historic conditions improving flammulated owl habitat suitability, minor beneficial cumulative effects would be expected to affect flammulated owl habitat in the cumulative effects analysis area.

GRAY WOLF

Issue: Timber harvesting and associated activities could displace gray wolves from the vicinity of the project area, particularly denning and rendezvous sites, and/or alter big game prey availability, which could adversely affect gray wolves.

Introduction

In April 2011, a Congressional measure associated with the federal government's primary budget bill removed gray wolves from the list of threatened and endangered species in Montana, Idaho and parts of Washington, Oregon, and Utah. DNRC currently considers them as a sensitive species for the purpose of analyzing impacts associated with forest management activities.

The Northern Rocky Mountain Wolf Recovery Plan (USFWS 1987) identified the key components of wolf habitat as: 1) a sufficient, year-round prey base of ungulates (big game) and alternate prey, 2) suitable and somewhat secluded denning and rendezvous sites, and 3) sufficient space with minimal exposure to humans.

Wolves are wide-ranging opportunistic carnivores that frequently take vulnerable prey (including young individuals, older individuals, and individuals in poor condition). In general, wolf densities are positively correlated to prey densities (Oakleaf et al. 2006, Fuller et al. 1992). Wolves prey primarily on white-tailed deer, and, to a lesser extent, elk and moose, in northwest Montana (Kunkel et al. 2004). However, some studies have shown that wolves may prey upon elk more frequently during certain portions of the year

(particularly winter) or in areas where elk numbers are higher (Arjo et al. 2002, Kunkel et al. 2004, Garrott et al. 2006). Thus, reductions in big game populations and/or winter range productivity could indirectly be detrimental to wolf populations.

Wolves typically den during late April in areas with gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. When the pups are 8 to 10 weeks old, wolves leave the den site and start leaving their pups at rendezvous sites while hunting. These sites are used throughout the summer and into the fall. Disturbance at den or rendezvous sites could result in avoidance of these areas by the adults or force the adults to move the pups to a less adequate site. In both situations, the risk of pup mortality increases.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on a 50,707 acre area around the project area; this area approximates an annual home range of a wolf pack (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. Ownership within the cumulative effects analysis area is 12% DNRC, 48% Plum Creek, 2% Stimson Lumber, 26% USDA Forest Service, and 12% small private owners.

Analysis Methods

Since changes in big game distribution could have a sizable effect on availability of prey for wolves, portions of this analysis tier to the big game analysis section below. Disturbance at den and rendezvous sites is important during certain portions of the year, and timing of proposed activities in relation to these sites is also important. Direct and indirect, and cumulative effects were analyzed using field evaluations, aerial photograph interpretation, and a GIS analysis of habitat components. Factors considered in the analysis include the amount of big game winter range modified, level of human disturbance in relation to any known wolf dens or rendezvous sites, and risk of hunting mortality to wolves or big game prey species.

Existing Conditions

The annual home range of the Corona and Cottonwood wolf packs could include the proposed project area (MTFWP, 2010). While the current locations and status of individuals in these two separate wolf packs is unknown, current or future wolf presence in the area is likely. Wolves are believed to be most sensitive to human disturbance at denning and rendezvous sites. No known denning or rendezvous sites are present in the project area. No denning or rendezvous sites are known to occur in the proposed project area.

In northwest Montana, wolf population levels and habitat use generally track those of their ungulate prey; primarily white-tailed deer, moose, and elk. Montana Fish, Wildlife, and Parks has identified all 480 acres of the proposed project area as white-tailed deer and elk winter range (see *Big Game* section). Signs of summer use by white-tailed deer, elk, and moose were observed during field visits. The proposed project area contains numerous roads that could serve as a source of disturbance and mortality for both wolves and big game. Currently, 4.1 miles of open road are present within the proposed project area. An additional 2.8 miles of illegal 2-track roads and trails traverse through the project area. This road system facilitates human use of the project area and likely discourages extended periods of wolf use.

Within the larger, cumulative effects analysis area, white-tailed deer and elk winter range are abundant (see *Big Game* section). Small amounts of mule deer and moose winter range also exist (see *Big Game* section). Grassland habitat to the south (towards the town of Plains) likely provides foraging opportunities while dense forest cover within the cumulative effects analysis area offers snow intercept and thermal cover. Landscape features commonly associated with denning and rendezvous sites, including meadows and other openings near water and in gentle terrain, occur in the cumulative effects analysis area. Past harvesting on all ownerships in the cumulative effects analysis area has altered big game and wolf habitats (32,176 acres of low quality cover or non cover, 62%), in turn reducing the amount of thermal cover and snow intercept available to big game. Roughly 13,799 acres (27%) of the cumulative effects analysis area is in mature forest and likely providing cover for both wolves and big game. The cumulative effects area contains an extensive network of restricted and open roads (4.5 miles per square mile),

which, in turn, has increased human access and the potential for wolf-human interactions. Increasing the access to these areas can create increasing pressure on wolves and their ungulate prey, especially during hunting seasons. Roadways and human dwellings in the southern half of the cumulative effects analysis area pose additional risk for wolves. Grazing leases are present within the cumulative effects analysis area. Active grazing, as well as pets and livestock associated with homes, likely pose the greatest risk to wolves using the area due to the heightened potential for associated conflicts. Indeed, the wolf packs occupying this area in the past (i.e. Fishtrap Pack) were removed due to livestock depredations.

Environmental Effects

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

Disturbance to wolves would not increase. No changes in big game habitat, including no changes to forested cover on big game winter range would be expected during the short-term; therefore, no changes in wolf prey availability would be anticipated. No changes in the ability for wolves to use the project area would be expected. Thus, since: 1) no changes in human disturbance levels would occur, and 2) no changes to big game winter range would occur, no direct and indirect effects would be expected to affect gray wolf displacement risk or big game prey availability that could subsequently affect wolves.

Direct and Indirect Effects of the Action Alternative on Gray Wolves

Wolves using the area could be temporarily disturbed by harvesting activities; however they are most sensitive at den and rendezvous sites, which are not known to occur within the project area. Harvest would result in the reduction of 398 acres (83%) of thermal cover on big game winter range within the project area. These reductions in cover on big game winter range could temporarily displace wolves' ungulate prey. Approximately 82 acres of mature forest with >40% canopy closure would remain unharvested and continue to provide snow intercept and some thermal cover. Additional impacts to big game winter range are discussed in more detail in a subsequent section of this analysis. Open stand conditions resulting from timber harvest could increase the probability of a wolf or big game species being observed and harvested during future hunting seasons. Due to open canopy conditions, potential for wolf use of the project area for denning and rendezvous sites could be reduced for 10-15 years. In the short term (approximately 2-4 years), activities associated with the proposed harvest could displace wolves and/or big game, should they be present in the area. After timber harvesting, human disturbance levels would likely revert to pre-harvest levels. All current and newly constructed roads would be opened for harvest activities only for no more than four consecutive seasons. Under this alternative, project area roads receiving public motorized use would be reduced from 7.1 miles to 4.6 miles at project completion. There would be no open roads in 82 acres of unharvested mature forest in the northwest corner of the project area, which could provide some cover for wolves and big game prey. Thus, since: 1) no known wolf den and/or rendezvous sites are within the project area; 2) there would be moderate reductions in habitat quality of big game winter range that could alter prey availability in the project area for 10-15 years, 3) minor, short-term increases and minor, long-term decreases in human disturbance levels would occur; and 4) there would be a minor beneficial long-term change in motorized access that could lower hunting mortality risk, and; minor adverse direct and indirect effects would be expected to affect gray wolf displacement risk and big game prey availability.

Cumulative Effects of the No-Action Alternative on Gray Wolves

No disturbance of gray wolves, their prey, or their habitat would occur under this alternative as no timber harvesting activities would occur. Thus, no adverse cumulative effects to gray wolf denning/rendezvous sites or big game prey in the cumulative effects analysis area would be expected that could result in adverse effects on wolves.

Cumulative Effects of the Action Alternative on Gray Wolves

In the cumulative effects analysis area, temporary displacement of big game and possibly wolves (should they inhabit the area) could occur in the portions of the cumulative effects analysis area within

close proximity to proposed timber harvest and hauling activities. Reductions in cover may cause slight decreases in use by deer and elk; however, no appreciable changes in deer and elk distribution or abundance would be expected at the scale of the cumulative effects analysis area (see *Big Game* section). Minor reductions in cover on big game winter range would be expected. Reductions in cover would be additive to losses from past timber-harvesting activities in the cumulative effects analysis area. The reductions that would occur under this alternative to big game winter range would not be expected to affect the overall use of the cumulative effects analysis area by wolves. Under this alternative, roads receiving public motorized would be slightly reduced from 179 miles to 176 miles. Other risks, such as pets and livestock on surrounding private lands would continue to pose a threat to wolves in this area because of the potential for conflicts and resulting management actions. No substantive change in potential wolf use of the cumulative effects analysis area would be expected. Thus, since: 1) localized disturbance would occur due to logging activities in the area; 2) winter range habitat quality would be reduced on 0.7% of the cumulative effects analysis area, which is unlikely to lower big game winter carrying capacity in the area; and 3) there would be no long-term increase in motorized access; minor adverse cumulative effects to gray wolf displacement risk and minimal changes to big game prey availability would be expected under the Action Alternative.

PILEATED WOODPECKER

Issue: Timber harvesting and associated activities could negatively affect pileated woodpecker habitat suitability by removing canopy cover and snags used for foraging and nesting and by creating disturbance.

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." Necessary feeding and nesting habitat attributes include large snags or decayed trees for nesting and downed wood for feeding, which closely tie these woodpeckers to mature forests with late-successional characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979).

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on the project area and surrounding sections directly adjacent to the proposed project area for a total cumulative analysis area of 5,772 acres (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. This scale includes enough area to support multiple pairs of pileated woodpeckers if enough suitable habitat is present (Bull and Jackson 1995).

Analysis Methods

To assess potential pileated woodpecker nesting habitat, forested areas with mature conifer cover ≥40% were quantified. Direct and indirect effects as well as cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and maps of potential nesting habitat. Factors considered included the amount of potential habitat, degree of harvesting, and the amount of continuous forested habitat.

Existing Conditions

In the project area, there are approximately 431 acres (90%) of potential pileated woodpecker habitat. Potential pileated habitat consists of mature ponderosa pine, Douglas-fir and western larch stands. All of these acres currently exhibit the forest structural attributes found in suitable pileated woodpecker habitat.

Abundance of large snags (>21" dbh) and coarse woody debris (>8" diameter) is limited in the project area (see *Snags and Coarse Woody Debris*), which likely lowers pileated woodpecker habitat quality. However, evidence of pileated woodpecker foraging was observed during field visits. Open roads and unauthorized motorized access serve as a source of disturbance for pileated woodpeckers that may be using the area. Additionally, these roads facilitate firewood gathering; resulting in a reduction of woodpecker nesting and foraging substrates within the project area.

Presently, roughly 66 percent (3,800 acres) of the cumulative effects analysis area is not in mature, forest conditions suitable for use by pileated woodpeckers due to road building, land clearing, firewood gathering and past harvesting. Any harvesting that may be occurring on other ownerships in the cumulative effects analysis area could continue altering pileated woodpecker habitats. Around 32 percent (1,836 acres, average patch size 61 acres) of the cumulative effects analysis area is mature, closed canopy forest and likely provides habitat conditions suitable for foraging pileated woodpeckers.

Environmental Effects

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

No timber harvesting activities would occur under this alternative. Thus, no adverse direct and indirect effects to pileated woodpeckers disturbance levels or habitat suitability in the project area would be expected since: 1) no changes in the amount of continuously forested habitat would be anticipated, 2) no changes to existing pileated woodpecker habitat would be anticipated, and 3) no additional disturbance would take place.

Direct and Indirect Effects of the Action Alternative on Pileated Woodpeckers

Harvesting would reduce mature forested habitat for pileated woodpeckers and create younger-aged stands with widely scattered mature trees. Roughly 353 acres (82%) of current potential pileated woodpecker habitat would be altered with harvest treatments and would be too open to be considered habitat following proposed treatments. In the stands proposed for treatment, potential pileated habitat would be removed for 50 to 100 years. Elements of the forest structure important for nesting pileated woodpeckers would be retained in the proposed harvest areas (see *Snags and Coarse Woody Debris*), however snag and snag recruit abundance would be reduced. Since pileated woodpecker density is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979), pileated woodpecker habitat quality in the project area would be expected to be reduced on 353 acres. 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. Low-quality habitat associated shade-tolerant tree species would likely be converted to a more desirable forest type, although it would take many years (~50-100) to mature into pileated habitat. Approximately 78 acres of suitable pileated woodpecker habitat would remain unharvested, which could continue to provide enough habitat for a nesting pair when combined with adjacent mature forest on private land. Pileated woodpeckers tend to be tolerant of human activities (Bull and Jackson 1995), but might be temporarily displaced by the proposed harvesting for 1-4 years. After project completion, roads receiving motorized use would be reduced by 2.5 miles, reducing risk of woodpecker disturbance and firewood gathering once forest stands regenerate back into pileated habitat. Thus, minor adverse direct and indirect effects would be anticipated that would affect pileated woodpecker habitat suitability and would be associated with disturbance of pileated woodpeckers in the project area since: 1) baseline habitat suitability is fair for pileated woodpeckers due to abundant mature forest cover but low levels of large snags/coarse woody debris, 2) 82% (353 acres) of suitable habitat in the project area would be removed for 50-100 years; 3) some snags and snag recruits would be removed; however, mitigation measures to retain a minimum of 2 snags per acre and 2 snag recruits per acre would be included, 4) some suitable pileated habitat would be retained adjacent to mature forest outside of the project area, and 5) temporary levels of potential disturbance would increase, but long-term disturbance would decrease with proposed road closures.

Cumulative Effects of the No-Action Alternative on Pileated Woodpeckers

No disturbance of pileated woodpeckers or their habitat would occur under this alternative as no timber harvesting activities would occur. Thus, no adverse cumulative effects to pileated woodpecker disturbance levels or habitat suitability in the cumulative effects analysis area would be expected since: 1) no changes in the amount of continuously forested habitat would be anticipated, 2) no changes to existing pileated woodpecker habitat would be anticipated, and 3) no additional disturbance would take place.

Cumulative Effects of the Action Alternative on Pileated Woodpeckers

Under this alternative, further reductions (353 acres, 6.1%) pileated woodpecker habitat would be expected in the cumulative effects analysis area, which contains approximately 1,836 (32%) acres of mature forest habitat. Snags, coarse woody debris, and potential nesting trees would be retained in the project area according to forest management *ARM 36.11.41*; however, future recruitment potential for these attributes would be reduced in the area affected by proposed activities. In the project area, the canopy on 353 acres proposed for regeneration-type treatments would likely be too open for appreciable pileated woodpecker use and would be more similar to existing recently harvested stands on adjacent ownerships. Proposed harvesting would reduce the quality of the cumulative effects analysis area for pileated woodpeckers by reducing the amount of the cumulative effects analysis area in mature forest from 1,836 to 1,483 acres (19%). A number of remaining mature forest patches within the cumulative effects analysis are large enough (>100 acres) to provided habitat for 2-3 breeding pairs of pileated woodpeckers, should they be present. Recent and ongoing harvesting in the cumulative effects analysis area has reduced the quality and amount of pileated woodpecker habitat by 3,726 acres (65%) in the cumulative effects analysis area. Reductions associated with this action alternative would be additive to those losses. In the long term, maturation of stands across the cumulative effects analysis area would increase suitable pileated woodpecker habitat through time. Firewood gathering along open roads would continue to serve as a source of disturbance and limit snags/woody debris within the cumulative effects analysis area. Thus, minor cumulative effects would be anticipated that would affect pileated woodpecker habitat suitability and displacement in the cumulative-effects analysis area since: 1) a moderate amount (353 acres) of suitable, closed canopy forest would be altered; 2) potential nesting and foraging habitats would be reduced on 353 acres; 3) several snags and snag recruits per acre would be removed in the proposed harvest areas for operational and human safety purposes; however, mitigation measures would retain some of these attributes in the harvested area, and 4) disturbance and firewood gathering would not appreciably change in the long-term.

BIG GAME HABITAT

Issue: Timber harvesting and associated activities could reduce security and habitat quality for big game species, especially during the winter season.

Introduction

Timber harvesting can increase big game (e.g. elk) vulnerability by changing the size, structure, juxtaposition, and accessibility of areas that provide security during times of hunting pressure (Hillis et al. 1991). As visibility and accessibility increase within forested landscapes, elk and deer have a greater probability of being observed and, subsequently, harvested by hunters. Because the female segments of the elk and deer populations are normally regulated carefully during hunting seasons, primary concerns are related to a substantial reduction of the male segment and resulting decrease in hunter opportunity. Dense (>60% crown closure), large (≥ 250 acres) forest patches at least ½ mile from an open road that would limit elk (and subsequently deer) visibility and hunter accessibility (Hillis et al. 1991) are considered security cover. It is expected that when elk security is substantially compromised, effects to deer can also be expected (albeit to a lesser degree than for elk).

Timber harvesting can affect big game and habitat quality through disturbance during harvest activities, removal of forest crown closure, and by creating openings in the forest used for foraging. Forested habitat on winter ranges enables big game survival by minimizing the effects of severe winter weather conditions. Winter ranges tend to be relatively small areas that support concentrations of big game,

which are widely distributed during the remainder of the year. Suitable winter ranges have adequate midstory and overstory cover that reduces wind velocity and intercepts snow, while moderating ambient temperatures. Besides providing a moderated climate, the snow-intercept capacity effectively lowers snow depths, which enables big game movement and access to forage. Snow depths differentially affect big game; deer are most affected, followed by elk, then moose.

Analysis Area

Direct and indirect effects were analyzed for activities conducted within the project area. Direct and indirect effects were analyzed for activities conducted within the project area. Cumulative effects were analyzed on a 50,707 acre area around the project area (see *FIGURE W-1 – WILDLIFE ANALYSIS AREAS)*. This scale of analysis approximates an elk herd home range in winter.

Analysis Methods

To assess big game habitats on the project area, SLI data were used to identify stands with habitat types and forest structure that could provide thermal and/or hiding cover for big game species. Estimated winter range areas for big game species were obtained from Montana Fish, Wildlife, and Parks. Direct, indirect, and cumulative effects were analyzed using a combination of field evaluation, aerial photograph interpretation, and a GIS analysis of available habitats.

Existing open roads were buffered 0.5 mile and identified as areas not meeting elk security habitat criteria (*Hillis et al. 1991*). Within the cumulative effects analysis area recent timber harvest activities were taken into account as they likely reduce the amount of secure habitat for elk. Additionally, elk security habitat patches need to be large forested blocks (>250 acres) with adequate cover to afford elk security during the general big game hunting season, so areas failing to meet this criteria were also removed, leaving patches that were distant enough from open roads, were large enough to meet the minimum criteria, and had adequate forest cover density to provide elk security habitat (*Hillis et al. 1991*). Factors considered in the analysis include the amount of security habitat available and level of human access for recreational hunting.

Existing Environment

Elk security habitat as defined by Hillis et al. (1991) is not present in the project area. Therefore, it will not be discussed further in this analysis. The proposed project area contains white-tailed deer and elk winter range (see *TABLE W-4 –BIG GAME WINTER RANGE)*. Evidence of summer white-tailed deer, moose, and elk use was observed during field visits. The project area contains approximately 442 acres (92%) of habitat that are currently providing year-round cover and visual screening for big game. These 442 acres also provide suitable amounts of thermal cover and snow intercept for wintering big game. Winter snow depths and suitable microclimates influence big game distribution and use within the vicinity. Small patches of dense regenerating conifers exist in limited amounts throughout the project area. Roughly 7.1 miles (9.5 miles/sq. mile) of roads allow motorized vehicles (including snow machines) to access most of the project area and increase overall potential disturbance to big game throughout the year.

The cumulative effects analysis area contains white-tailed deer, mule deer, moose and elk winter range (see *TABLE W-4 –BIG GAME WINTER RANGE)*. Within the cumulative effects analysis area, there are approximately 13,799 acres (27%) of mature, forest (>40% crown closure), which provides cover usable by big game. These forest patches are currently well-distributed throughout the big game winter range occurring within the cumulative effects analysis area. In the recent past, harvesting has reduced thermal cover and snow intercept on big game winter range within the cumulative effects analysis area (32,176 acres, 63%). These recent harvests have reduced the quality and quantity of winter range within the area, but may have increased forage quality by opening up the canopy. Encroachment into recently opened areas by noxious weeds has likely offset much of the potential gain in foraging habitat. Roughly 2,051 acres (4%) of the cumulative effects analysis area consists of permanent non-forest, which may function as winter foraging areas, but do not provide thermal cover or snow intercept. A network of open roads 179 miles (2.3 miles/sq. mile) serves as a source of disturbance during the winter season.

TABLE W-4 – BIG GAME WINTER RANGE. Estimates and proportions of existing big game winter range in the project and cumulative effects analysis area. Percent refers to the percentage of big game winter range in the analysis area.

Big Game Species	Acres of big game winter range (percent of area)			
	Project Area		Cumulative Effects Analysis Area	
	Existing	Affected by Harvest	Existing	Affected by Harvest
White-tailed Deer Winter Range	480 (100.0%)	398 (83.0%)	34,975 (69.0%)	398 (0.8%)
Mule Deer Winter Range	0 (0%)	0.0 (0%)	595 (1.2%)	0 (0%)
Moose Winter Range	0 (0%)	0 (0%)	1,088 (2.1%)	0 (0%)
Elk Winter Range	480 (100.0%)	398 (83.0%)	31,075 (61.3%)	398 (0.8%)

Environmental Effects

Direct and Indirect Effects of the No-Action Alternative on Big Game Habitat
No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing cover would continue to contribute to winter range quality. Thus, since: 1) no changes to existing thermal cover would be anticipated and continued maturation of forest cover would improve thermal cover and snow intercept, 2) the level of human access would remain unchanged, no direct or indirect effects to big game habitat in the project area would be anticipated.

Direct and Indirect Effects of the Action Alternative on Big Game Habitat
Under the action alternative, approximately 398 acres of white-tailed deer and elk winter range habitat would be harvested (see *TABLE W-4 –BIG GAME WINTER RANGE)*. Dense crown closure that would enable concentrated winter use by deer and elk would be reduced on all of the affected acres. These losses of thermal cover and snow intercept would require 40-60 years for suitable sized trees (>40 ft. tall) to develop in the stand. However, retained existing patches of scattered dense conifer regeneration could supply limited (<5% of area) amounts of thermal cover and snow intercept in less than 40 years. Additionally, 82 acres of mature forest in the northwest corner of the project area would remain unharvested and available as suitable winter range. Proposed vegetation removal would increase sight distances in harvest units and could increase risk of hunting mortality. Some short-term (1-4 years) displacement of big game would be expected as a result of the proposed motorized logging disturbance. At project completion, open roads would be reduced by 2.5 miles to a density of 3.6 miles/sq. mile. Collectively, since: 1) a large percentage (83%) of effective thermal cover and snow intercept in the project area would be altered, but some effective cover would remain (17%), 2) sight distances would increase on 398 acres, which could increase hunting mortality risk, 3) relatively short-term logging activities would create disturbance in this area, possibly during winter months, and 4) there would a long-term reduction in open road density, moderate adverse direct and indirect effects to big game habitat quality and winter range within the project area would be expected for the next 40 to 60 years.

Cumulative Effects of the No-Action Alternative on Big Game Habitat

No changes in big game habitat would be expected as no timber harvesting activities would occur. Existing levels of cover would persist. Thus, since: 1) no big game habitat would be altered and continued maturation of forest cover would improve thermal cover and snow intercept, and 2) the level of human access would remain unchanged, no cumulative effects to big game habitat quality in the project area would be anticipated.

Cumulative Effects of the Action Alternative on Big Game Habitat

Forest stands providing suitable thermal cover and snow intercept could be removed from approximately 398 acres (<1%) of winter range within the cumulative effects analysis area (50,707 acres, see *TABLE W-4 –BIG GAME WINTER RANGE)*. This reduction in thermal cover and snow intercept would be additive to past reductions on private, USFS, and DNRC ownerships from forest management. Harvesting on surrounding lands 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. Continued maturation of previously harvested stands within the cumulative effects analysis area would improve hiding cover within recent harvest units and partially offset these current losses within 10 to 30 years. Roads temporarily opened for harvesting activities would result in a very slight increase in open road density (<0.1 miles/sq. miles to 2.3 miles/sq. mile) under the action alternative. After harvesting, open road density would remain relatively high in the cumulative area (2.2 miles/sq. mile) and continue to facilitate human-caused disturbance. Thus, since 1) a small amount (0.8%) of existing thermal cover and snow intercept on winter range in the cumulative effects analysis area would be altered, 2) more thermal cover and snow intercept would become available within the cumulative effects analysis area as harvested areas regenerate in 10-30 years, 3) logging activities would create disturbance in a small portion of the cumulative effects analysis area (0.9%), and 4) long-term open road densities would not appreciably change, minor adverse cumulative effects to big game winter range would be expected.

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.
- Retain patches of young, regenerating conifers within harvest units where feasible.
- Manage for snags, snag recruits, and coarse woody debris, particularly favoring ponderosa pine, western larch and Douglas-fir (ARM 36.11.439(1) (b)). Clumps of existing snags could be maintained where they exist to offset areas without sufficient snags. Emphasize retention of logs >15" diameter.
- Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1)(m)).

Literature Cited:

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

Arjo,W. M., D. H. Pletscher, and R. R. Ream. 2002. Dietary Overlap between Wolves and Coyotes in Northwestern Montana. Journal of Mammalogy 83:754-766.

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

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

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

Fischer, W.C., and A.F. Bradley. 1987. Fire ecology of western Montana forest habitat types. USDA Forest Service, General Technical Report INT-223. 95pp.

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

Fuller, T. K.,W. E. Berg, G. L. Radde, M. S. Lenarz, and G. B. Joselyn. 1992. A History and Current Estimate of Wolf Distribution and Numbers in Minnesota. Wildlife Society Bulletin 20:42-55.

Garrott, R., S. Creel, and K. Hamlin. 2006. Monitoring and Assessment of Wolf-Ungulate Interactions and Population Trends within the Greater Yellowstone Area, SW Montana and Montana Statewide. Unpublished report at: *http://www.homepage.montana.edu/~rgarrott/wolfungulate/index.htm*

Green, P., J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old Growth Forest Types of the Northern Region. R-1 SES. USDA Forest Service, Northern Region, Missoula MT 60pp.

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

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

Hillis, J.M., and M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-43 in A.G. Christensen, L.J. Lyon, and T.N. Lonner, comps., Proc. Elk Vulnerability Symp., Mont. State Univ., Bozeman, Montana. 330pp.

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

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

Kunkel, K.E., D.H. Pletscher, D.K. Boyd, R.R. Ream, and M.W. Fairchild. 2004. Factors Correlated with Foraging Behavior of Wolves in and near Glacier National Park, Montana. Journal of Wildlife Management 68(1): 167-178.

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

Maxell, B. A., J.K Werner, P. Hendricks, D.L. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species,

and indexed bibliography. Northwest Fauna Number 5. Society for Northwestern Vertebrate Biology. Olympia, Washington. 138pp.

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

MNHP. 2011. Tracker data. Montana Natural Heritage Program online database query for the Lower Corona timber sale project area. http://mtnhp.org/Tracker/NHTMap.aspx

Oakleaf, J.K., D. L. Murray, J. R. Oakleaf, E. E. Bangs, C. M. Mack, D. W. Smith, J. A. Fontaine, M. D. Jimenez, T. J. Meier, and C. C. Niemeyer. 2006. Habitat Selection by Recolonizing Wolves in the Northern Rocky Mountains of the United States. Journal of Wildlife Management 70:554-563.

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

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

Sime, Carolyn A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, A. Nelson, and J. Steuber. 2011. Montana gray wolf conservation and management 2010 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 168 pp.

Sime, Carolyn A., V. Asher, L. Bradley, N. Lance, K. Laudon, M. Ross, and J. Steuber. 2009. Montana gray wolf conservation and management 2008 annual report. Montana Fish, Wildlife & Parks. Helena, Montana. 154 pp.

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

Attachment III
Harvest Prescriptions

Footnote: All proposed road miles, harvest boundaries and acreages are close approximations as this proposal has not yet been implemented on the ground.

Harvest Unit Prescriptions Lower Corona Timber Sale; T21N R26W S12

Harvest Unit: 12-1	**Elevation:** 3400' – 3600'	**Slope:** 6 -35%	
Acres: 42	**Location:** SW1/4	**Aspect(s):** South, West, East	
Habitat type(s):	ABGR/LIBO - LIBO	16 acres	
	PSME/CAGE	15 acres	
	PSME/CARU - AGSP	6 acres	
	PSME/SYAL - CARU	5 acres	
Current Cover Type(s):	Mixed Conifer	15 acres	
	Douglas Fir	15 acres	
	Ponderosa Pine	12 acres	
Desired Future Condition(s):	Ponderosa Pine	27 acres	
	Western Larch/Douglas Fir	15 acres	
Soil Type(s):	Winkler gravelly sandy loam, 15 to 35% slopes		83%
	Combest gravelly ashy silt loam, 15 to 35% slopes		15%
	Yourame gravelly loam, 4 to 15% slopes		2%

Current Stand Conditions:		**Saw timber; Well stocked**	
	Multi-storied (three or more canopy levels)		
	Upper Canopy %	**Middle Canopy %**	**Lower Canopy %**
1st spp	DF – 50	GF – 40	GF – 50
2nd spp	PP – 25	DF – 35	DF – 45
3rd spp	GF – 20	PP – 15	PP - 5
4th spp	WL - 5	WL - 10	
Ave DBH	16.5"	12.0"	1"
Height	95'	75'	6'
Age	100	65	30
Vigor	Average to below ave	Good to Average	Good to Average

Treatment Objectives: **Lower Corona; 12-1**

- Remove unhealthy trees, as well as those with poor vigor to promote long term forest health, growth and vitality.
- Promote a healthy stand of timber by significantly reducing the dwarf mistletoes *(Arceuthobium spp)* affecting this stand of timber.
- Move this unit toward the desired future condition classifications of ponderosa pine and western larch/Douglas-fir.
- Scarify the site sufficiently to make an available seedbed to promote natural regeneration, particularly ponderosa pine and western larch.

Prescribed Treatment:

- Modified, Seed tree harvest. Leave tree marking healthy vigorous trees with good crown and bark characteristics, with a variable spacing of 50 - 55 feet, leaving 10 - 20 trees per acre.
- Favor leaving dominant and co-dominant ponderosa pine and western larch that are wind firm and that have the bark characteristics that would withstand a low intensity burn.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method: **Lower Corona; 12-1**

- Ground based harvesting with conventional, mechanical, or cut-to-length operations on dry, frozen or snow covered ground are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Landing piles to be burned and/or ground at landings following harvest.
- Residual damaged submerchantable material would be slashed then piled and burned.

Site Preparation and Regeneration:

- Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.
- Leave trees to provide seed source for natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of site preparation, and the need for supplemental planting determined.
- This stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 20 years from time of harvest.
- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

Harvest Unit: 12-2	**Elevation:** 3600' – 3720'	**Slope:** 6 -35%	
Acres: 113	**Location:** SW1/4	**Aspect(s):** South, West, East	
Habitat type(s):	ABGR/LIBO - LIBO	44 acres	
	PSME/VAGL - ARUV	36 acres	
	PSME/CARU - AGSP	13 acres	
	PSME/SYAL - CARU	13 acres	
	PSME/VACA	7 acres	
Current Cover Type(s):	Ponderosa Pine	69 acres	
	Western Larch/Douglas Fir	44 acres	
Desired Future Condition(s):	Ponderosa Pine	69 acres	
	Western Larch/Douglas Fir	44 acres	
Soil Type(s):	Winkler gravelly sandy loam, 15 to 35% slopes		59%
	Courville gravelly ashy silt loam, 8 to 30% slopes		41%

Current Stand Conditions:		**Saw timber; Well stocked**	
	Multi-storied (three or more canopy levels)		
	Upper Canopy %	**Middle Canopy %**	**Lower Canopy %**
1st spp	DF – 60	DF – 60	DF – 60
2nd spp	PP – 25	GF – 20	GF – 30
3rd spp	WL - 10	PP – 10	PP - 10
4th spp	LP - 5	WL & LP - 10	
Ave DBH	15.0"	7.0"	1.5"
Height	85'	55'	7'
Age	100	65	15
Vigor	Average to below ave	Below average	Good to Average

Treatment Objectives: **Lower Corona; 12-2**

- Remove unhealthy trees, as well as those with poor vigor to promote long term forest health, growth and vitality.
- Promote a healthy stand of timber by significantly reducing the dwarf mistletoes *(Arceuthobium spp)* affecting this stand of timber.
- Move this unit toward the desired future condition classifications of ponderosa pine and western larch/Douglas-fir.
- Scarify the site sufficiently to make an available seedbed to promote natural regeneration, particularly ponderosa pine and western larch.

Prescribed Treatment:

- Modified, Shelterwood harvest. Leave tree marking healthy vigorous trees with good crown and bark characteristics, with a variable spacing of 40 - 45 feet, leaving 20 - 30 trees per acre.
- Favor leaving dominant and co-dominant ponderosa pine and western larch that are wind firm and that have the bark characteristics that would withstand a low intensity burn.
- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Ground based harvesting with conventional, mechanical, or cut-to-length operations on dry, frozen or snow covered ground are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Landing piles to be burned and/or ground at landings following harvest.
- Residual damaged submerchantable material would be slashed then piled and burned.

Site Preparation and Regeneration:

- Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.
- Leave trees to provide seed source for natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of site preparation, and the need for supplemental planting determined.
- This stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 20 years from time of harvest.
- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

Harvest Unit: 12-3	**Elevation:** 3600' – 3960'	**Slope:** 6 -35%	
Acres: 105	**Location:** NW1/4	**Aspect(s):** South, West	
Habitat type(s):	ABGR/LIBO - LIBO	53 acres	
	PSME/VACA	20 acres	
	PSME/LIBO - SYAL	22 acres	
	PSME/SYAL - CARU	10 acres	
Current Cover Type(s):	Ponderosa Pine	104 acres	
	Western Larch/Douglas Fir	1 acres	
Desired Future Condition(s):	Ponderosa Pine	104 acres	
	Western Larch/Douglas Fir	1 acres	
Soil Type(s):	Courville gravelly ashy silt loam, 8 to 30% slopes		44%
	Wildgen gravelly loam, 15 to 30% slopes		35%
	Loneman ashy silt loam, 15 to 35% slopes		12%
	Combest gravelly ashy silt loam, 15 to 35% slopes		6%
	Winkler gravelly sandy loam, 15 to 35% slopes		3%

Current Stand Conditions:		**Saw timber; Well stocked**	
	Multi-storied (three or more canopy levels)		
	Upper Canopy %	**Middle Canopy %**	**Lower Canopy %**
1st spp	DF – 45	DF – 50	DF – 60
2nd spp	PP – 40	PP – 25	GF – 20
3rd spp	WL - 15	WL - 15	LP - 10
4th spp		GF –10	PP & WL - 10
Ave DBH	17.0"	10.5"	3"
Height	90'	70'	20'
Age	120	80	30
Vigor	Below average	Average	Average

Treatment Objectives: **Lower Corona; 12-3**

- Remove unhealthy trees, as well as those with poor vigor to promote long term forest health, growth and vitality.
- Promote a healthy stand of timber by significantly reducing the dwarf mistletoes *(Arceuthobium spp)* affecting this stand of timber.
- Move this unit toward the desired future condition classification of ponderosa pine.
- Scarify the site sufficiently to make an available seedbed to promote natural regeneration, particularly ponderosa pine.

Prescribed Treatment:

- Modified, Shelterwood harvest. Leave tree marking healthy vigorous trees with good crown and bark characteristics, with a variable spacing of 40 - 45 feet, leaving 20 - 30 trees per acre.
- Favor leaving dominant and co-dominant ponderosa pine and western larch that are wind firm and that have the bark characteristics that would withstand a low intensity burn.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method: **Lower Corona; 12-3**

- Ground based harvesting with conventional, mechanical, or cut-to-length operations on dry, frozen or snow covered ground are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Landing piles to be burned and/or ground at landings following harvest.
- Residual damaged submerchantable material would be slashed then piled and burned.

Site Preparation and Regeneration:

- Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.
- Leave trees to provide seed source for natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of site preparation, and the need for supplemental planting determined.
- This stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 20 years from time of harvest.
- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

Harvest Unit: 12-4	**Elevation:** 3680' – 3960'	**Slope:** 6 -35%	
Acres: 80	**Location:** NE1/4	**Aspect(s):** East, South, West	
Habitat type(s):	ABGR/LIBO - LIBO	29 acres	
	PSME/VAGL - ARUV	14 acres	
	PSME/LIBO - SYAL	12 acres	
	PSME/SYAL - CARU	11 acres	
	PSME/VACA	7 acres	
	PSME/SYA	7 acres	
Current Cover Type(s):	Ponderosa Pine	55 acres	
	Mixed Conifer	25 acres	
Desired Future Condition(s):	Ponderosa Pine	55 acres	
	Western Larch/Douglas Fir	15 acres	
	Douglas Fir	10 acres	
Soil Type(s):	Courville gravelly ashy silt loam, 8 to 30% slopes		62%
	Winkler gravelly sandy loam, 15 to 35% slopes		30%
	Wildgen gravelly loam, 15 to 30% slopes		8%

Current Stand Conditions:	Saw timber; Well stocked		
	Multi-storied (three or more canopy levels)		
	Upper Canopy %	Middle Canopy %	Lower Canopy %
1st spp	DF – 50	DF – 50	DF – 55
2nd spp	PP – 30	GF – 25	GF – 35
3rd spp	WL - 10	PP – 15	WL - 5
4th spp	GF –10	WL - 10	PP - 5
Ave DBH	15.5”	10.0”	2”
Height	85’	65’	12’
Age	105	70	35
Vigor	Average to below ave	Average to below ave	Average to below ave

Treatment Objectives: **Lower Corona; 12-4**

- Remove unhealthy trees, as well as those with poor vigor to promote long term forest health, growth and vitality.
- Promote a healthy stand of timber by significantly reducing the dwarf mistletoes *(Arceuthobium spp)* affecting this stand of timber.
- Move this unit toward the desired future condition classifications of ponderosa pine, western larch/Douglas-fir and Douglas-fir.
- Scarify the site sufficiently to make an available seedbed to promote natural regeneration, particularly ponderosa pine, western larch and Douglas-fir.

Prescribed Treatment:

- Modified, Shelterwood harvest. Leave tree marking healthy vigorous trees with good crown and bark characteristics, with a variable spacing of 35 - 40 feet, leaving 25 -35 trees per acre.
- Favor leaving dominant and co-dominant ponderosa pine and western larch that are wind firm and that have the bark characteristics that would withstand a low intensity burn.

- Retain a minimum of two snags per acre, 14” DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method:

- Ground based harvesting with conventional, mechanical, or cut-to-length operations on dry, frozen or snow covered ground are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Landing piles to be burned and/or ground at landings following harvest.
- Residual damaged submerchantable material would be slashed then piled and burned.

Site Preparation and Regeneration:

- Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.
- Leave trees to provide seed source for natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of site preparation, and the need for supplemental planting determined.
- This stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 20 years from time of harvest.
- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

Harvest Unit: 12-5	**Elevation:** 3600' – 3960'	**Slope:** 16 -35%	
Acres: 57	**Location:** NE1/4	**Aspect(s):** South	
Habitat type(s):	ABGR/LIBO - LIBO	28 acres	
	PSME/SYAL - CARU	12 acres	
	PSME/CAGE	9 acres	
	PSME/CARU - PIPO	8 acres	
Current Cover Type(s):	Ponderosa Pine	29 acres	
	Mixed Conifer	28 acres	
Desired Future Condition(s):	Ponderosa Pine	40 acres	
	Western Larch/Douglas Fir	17 acres	
Soil Type(s):	Winkler gravelly sandy loam, 15 to 35% slopes		37%
	Combest gravelly ashy silt loam, 15 to 35% slopes		34%
	Winkler gravelly sandy loam, 35 to 60% slopes		21%
	Courville gravelly ashy silt loam, 8 to 30% slopes		8%

Current Stand Conditions:		**Saw timber; Well stocked**	
	Multi-storied (three or more canopy levels)		
	Upper Canopy %	**Middle Canopy %**	**Lower Canopy %**
1st spp	DF – 25	DF – 50	GF – 50
2nd spp	PP – 45	GF – 25	DF – 45
3rd spp	WL – 15	WL - 15	WL - 5
4th spp	GF – 15	PP – 10	
Ave DBH	15.0"	9.5"	2"
Height	90'	60'	16'
Age	120	80	45
Vigor	Below average	Average	Below average

Treatment Objectives: **Lower Corona; 12-5**

- Remove unhealthy trees, as well as those with poor vigor to promote long term forest health, growth and vitality.
- Promote a healthy stand of timber by significantly reducing the dwarf mistletoes *(Arceuthobium spp)* affecting this stand of timber.
- Move this unit toward the desired future condition classifications of ponderosa pine and western larch/Douglas-fir.
- Scarify the site sufficiently to make an available seedbed to promote natural regeneration, particularly ponderosa pine and western larch.

Prescribed Treatment:

- Modified, Shelterwood harvest. Leave tree marking healthy vigorous trees with good crown and bark characteristics, with a variable spacing of 35 - 40 feet, leaving 25 -35 trees per acre.
- Favor leaving dominant and co-dominant ponderosa pine and western larch that are wind firm and that have the bark characteristics that would withstand a low intensity burn.
- Retain a minimum of two snags per acre, 14" DBH & greater, and two snag recruits per acre, where present, if they are not a safety hazard.

Harvest Method: **Lower Corona; 12-5**

- Ground based harvesting with conventional, mechanical, or cut-to-length operations on dry, frozen or snow covered ground are applicable to this unit.
- Trees marked to leave.

Hazard Reduction:

- Landing piles to be burned and/or ground at landings following harvest.
- Residual damaged submerchantable material would be slashed then piled and burned.

Site Preparation and Regeneration:

- Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.
- Leave trees to provide seed source for natural regeneration.

Anticipated Future Treatments:

- Natural regeneration should be evaluated approximately five years from time of site preparation, and the need for supplemental planting determined.
- This stand should be evaluated for pre-commercial thinning and overstory removal treatments approximately 20 years from time of harvest.
- Stand conditions would be monitored for future salvage opportunities related to insect and disease outbreaks, severe weather events, fire or other unanticipated circumstances on a case-by-case basis.

Attachment IV
Mitigations

MITIGATION MEASURES

Roads: A transportation system minimizing road miles meeting Best Management Practices (BMP's) has been designed by the DNRC. This system proposes the construction of approximately 2.45 miles of new road and 1.75 miles of reconstructed road which would remain in place following project activity. After harvest activities have been completed the roads would be grass seeded and fertilized. Upon completion of roadwork, all haul roads would meet BMP's standards. Approximately 1.00 miles of old roads would also be obliterated.

Wildlife: the following issues have been identified, with mitigation measures incorporated into the proposed project.

Cease all operations if a threatened or endangered species is encountered. Consult a DNRC biologist and develop additional mitigations that are consistent with the administrative rules for managing threatened and endangered species (ARM 36.11.428 through 36.11.435).

Favor western larch and ponderosa pine in retention and regeneration decisions for pileated woodpecker and flammulated owl nesting and foraging habitats.

Manage for snags (minimum of 2 snags/acre > 14 in. dbh; > 21 in. dbh where they exist), snag recruits (minimum of 2 recruits/acre > 14 in. dbh; > 21 in. dbh where they exist), and coarse woody debris (5-10 tons/acre), particularly favoring western larch and ponderosa pine (ARM 36.11.439(1) (b)).

Effectively close roads after the proposed activities to reduce the potential for unauthorized motor vehicle use and/or loss of snags to firewood gathering.

Reduce views into harvest units along the open road where feasible using a combination of topography, group retention, roadside vegetation buffers, and retention of pockets of advanced regeneration.

Prohibit contractors and purchasers conducting contract operations from carrying firearms while operating on restricted roads (ARM 36.11.432(1) (m)).

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

On ground skidding units, the contractor and sale administrator would agree to a general skidding plan prior to equipment operations. Skid trail planning would identify which main trails to use, and what additional trails are needed. Trails that do not comply with BMPs (i.e. draw bottom trails) would not be used and may be closed with additional drainage installed where needed or grass seeded to stabilize the site and control erosion.

Tractor skidding should be limited to slopes less than 45% unless the operation can be completed without causing excessive erosion. Short steep slopes above incised draws may require a combination of mitigation measures based on site review, such as adverse skidding to ridge or winch line skidding from more moderate slopes less than 45%.

Keep skid trails to 20% or less of the harvest unit acreage. Provide for drainage in skid trails and roads concurrent with operations.

Limit soil displacement during harvest operations. Mechanical scarification of those areas void of established regeneration, to a minimum of 35% exposed mineral seedbed for natural regeneration.

Slash Disposal: No dozer piling on slopes over 35%; no excavator piling on slopes over 45% unless the operation can be completed without causing excessive erosion. Consider lop and scatter or jackpot burning on steeper slopes. Accept disturbance incurred during skidding operations to provide adequate scarification for regeneration.

Retain 10 to 15 tons large woody debris and a majority of all fine litter feasible following harvest. On commercial thin units where whole tree harvesting is used implement one of the following mitigations for nutrient cycling; 1) use in woods processing equipment that leaves slash on site, 2) for whole tree harvest, return skid slash and evenly distribute within the harvest area, or 3) cut off tops from every third bundle of logs so that tops are dispersed as skidding progresses. These measures would be specified in the Timber Sale Contract and would be monitored by the Forest Officer.

Hydrology: All timber harvest would be regulated by the SMZ law and prohibit equipment operation within any SMZ. In addition to the resource protection provided by the SMZ law, forestry BMP's would be implemented in all aspects of the proposed timber harvest.

Weed Management: Measures to control the introduction or increases to infestations of noxious weeds would be implemented through the Timber Sale Contract. Control measures include the washing of all equipment prior to entering the project area and seeding all areas of disturbed soil associated with road construction or upgrades. Roads and skid trail approaches would again be seeded at the close of project activity. Measures to control any unforeseen outbreak would be implemented as needed through and beyond the project operational period.

Insects and Diseases: Promotion of open healthy timber stands would assist in controlling insect and disease activity in the project area.

Visual Impacts/Aesthetic Values: Prescriptions are designed to mimic historical stand conditions. Harvest unit shapes and residual tree retention patches would follow topographical features such as natural contour breaks and riparian retention zones. The cumulative visual effects of this proposed action in conjunction with current adjacent land management practices would blend into the landscape and soften any hard ownership boundaries.

Fuel Hazards: Harvest treatments would reduce ladder fuels and trees susceptible to fire. Slash would be treated either through logging system design, excavator piling and the burning of these piles, as designated by prescription per each individual harvest unit.

Stand Growth and Vigor: Silvicultural prescriptions are designed to maintain and improve stand growth and vigor, while maintaining DNRC's commitments to managing for a biologically diverse landscape.

Attachment V

Consultants & References

INDIVIDUALS CONSULTED

Larry Ballantyne; MT DNRC, Unit Manager, Plains Unit

Christopher Forristal; MT DNRC, Wildlife Biologist, Northwestern Land Office

Kyle Johnson; MT DNRC, Management Forester, Plains Unit

Norman Kuennen; ROW Grants Specialist NWLO

Calvin Minemyer; MT DNRC, Unit Fire Supervisor, Plains Unit

Tony Nelson; MT DNRC, Hydrologist/Resource Analyst, Northwestern Land Office

Dave Olsen; MT DNRC, Forest Management Supervisor, Plains Unit

Patrick Rennie; MT DNRC, Archaeologist, Trust Land Mgt. Division, Helena, Montana

Doug Shaner; retired USFS Forester, Express Services, Plains, Montana

Tim Spoelma; MT Forest Management Bureau; Silviculturalist

Marc Vessar; MT DNRC, Hydrologist, Northwestern Land Office

Everett Young; MT DNRC, Service Forester, Plains Unit

Document Preparation

Christopher Forristal; MT DNRC, Wildlife Biologist, Northwestern Land Office

Tony Nelson; MT DNRC, Hydrologist/Resource Analyst, Northwestern Land Office

Dale Peters; MT DNRC, Management Forester, Plains Unit

REFERENCES

- Forestry Best Management Practices
- DNRC, 1996, State Forest Land Management Plan. Montana DNRC Forest Management Bureau. Missoula, Montana.
- Green, P. J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. 1992. Old-Growth forest types of the Northern Region. USDA Forest Service, Northern Region. Missoula, Montana.
- Losensky, J. 1997. Historical Vegetation of Montana. Contact #970900. Montana DNRC. Missoula, MT. 109pp.