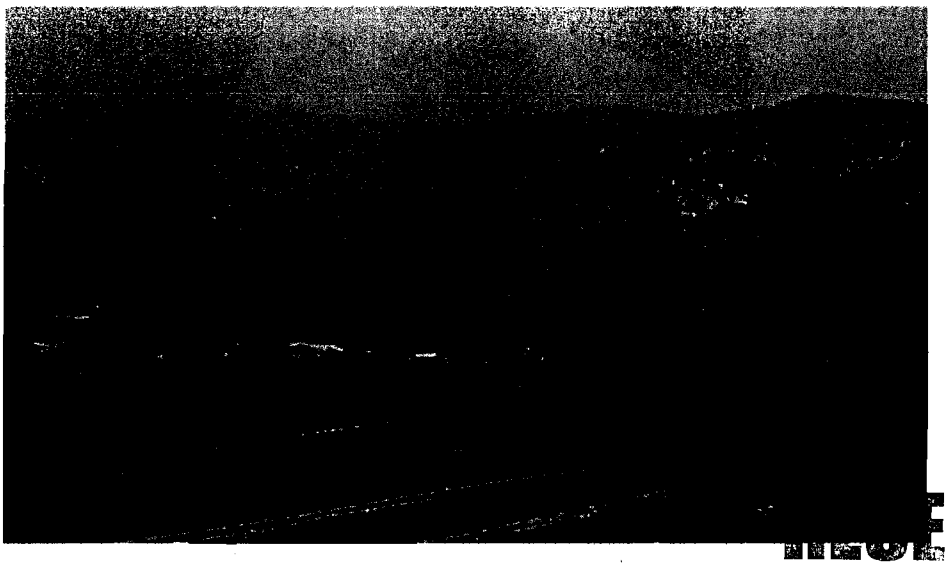
DNRC - Trust Land Management Division



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POLICY OFFICE

Environmental Analysis for the Swamp Ridge Timber Sale

Prepared By

Jim Kibler, Management Forester

Plains Unit

Northwestern Lands Office

Montana Department of Natural Resources and Conservation

November 2003

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MEMO

KALISPELL-PLAINS UNIT

TO: Jon Hayes, Forest Management Supervisor, Plains Office, KalPlns Unit

FROM: William F. Wright, Kalispell-Plains Unit Manager

DATE: May 23, 2000

Primary Objective

The primary objective of the Swamp Ridge Timber Sale is to generate income for the Common School (CS) trust. This sale should provide approximately 1.5MMBF of merchantable timber toward the Northwestern Land Office's FY02 goal of 23MMBF.

Secondary Objectives

The secondary objectives for this sale are as follows:

1. Improve overall forest health by identifying and treating insect and disease problems that occur within the sale area, with the purpose of minimizing timber volume and income loss caused by insect and disease activity in the area.

2. Convert the identified stands from their present multiple species mix, back to stands dominated by seral species and provide for biodiversity.

In planning and preparing this sale, management direction of the State Forest Land Management Plan and other guidelines shall be closely followed. All applicable Streamside Management Zone rules and regulations and all Best Management Practices guidelines shall be applied.

CHECKLIST ENVIRONMENTAL ASSESSMENT

Project Name:	Swamp Ridge Timber Sale
Proposed Implementation Date:	February, 2004
Proponent:	Department of Natural Resources and Conservation, Northwestern Land Office, Plains Unit
Location:	Section 36, Township 20N, Range 27W
County:	Sanders

I. TYPE AND PURPOSE OF ACTION

The Department of Natural Resources and Conservation Proposes to sell 15,000 tons of timber in the East Fork Swamp Creek Drainage. This action would produce revenue for the Common School (C.S.) Trust Grant. Activities proposed would maintain and improve forest health, reduce fuel loadings, and increase forest productivity beneficial to future Trust actions. No reasonable alternatives were identified or proposed during project scoping, therefore only forest product removal and sale are analyzed in this EA checklist.

This proposal contains two alternatives for consideration: an Action and a No Action alternative. The Action Alternative proposes ten harvest units totaling 435 acres. An estimated 15,000 tons (2.3 MMBF) of timber would be harvested. The Action Alternative would require the construction of approximately 3.5 miles of new road, reconstruction of 3.2 miles of existing road, and upgrade of 2.1 miles of cost share road. Income to the Trust from this project is estimated at $300,000.00. Under the No Action alternative no activity would be undertaken. Vegetative conditions that now exist would progressively move to latter successional characteristics. Dominant shade intolerant tree species would be replaced by shade tolerant species. Insect and disease infestations would be expected to increase as well as an increase in fire hazard. No revenue would be gained from the sale of timber under the No Action Alternative.

Lands involved in this proposed project are held by the State of Montana in trust for the support of the specific beneficiary institutions such as the public buildings trust, public schools, state colleges, universities, and other specific State institutions such as the School for the Deaf and Blind (Enabling Act of February 22, 1889; 1972 Montana Constitution, Article 1 Section 11). 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). On May 30, 1996, The Department of Natural Resources and Conservation (DNRC) released the Record of Decision for the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17, 1996. The SFLMP outlines the management philosophy of the DNRC in the management of state forested lands, as well as sets out the specific Resource Management Standards for ten resource categories.

The DNRC will manage the lands involved in this project according to the approved philosophy and standards in the SFLMP, which states: "Our premise is that the best way to produce long-term income for the trust is to manage intensively for the health and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream. In the foreseeable future, timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives."

II. PROJECT DEVELOPMENT

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

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

Public involvement has been solicited through newspaper advertisements plus letters sent to adjacent landowners and other known interested parties and organizations. Public response was received and used to assist in defining issues surrounding the proposed project. Hydrological, soils, wildlife and vegetative concerns were identified by DNRC specialist and field foresters for the Action Alternative as well as the effects of the No Action Alternative. Issues and concerns have been resolved or mitigated through project design 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 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 3, Prescriptions; Attachment 4, Mitigation; Attachment 6, Consultants and References).

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

Approval is required by Montana Fish, Wildlife, and Parks for a Stream Preservation Act Permit 124, and a 318 permit. Application has been made and final permit would be in hand prior to submitting this project to the Land Board for approval. The existing Reciprocal Access Agreement with Plum Creek Marketing Inc. would be modified, and an access agreement with USFS would be finalized prior to beginning this project.

3. ALTERNATIVES CONSIDERED:

Action: The Action Alternative would harvest 15,000 tons (2.3 MMBF) from 435 acres, generating approximately $300,000 of income to the Common School Trust Grant. Additionally, the Action Alternative proposes to construct 3.5 miles of new road, reconstruct 3.2 miles of road and upgrade 2.1 miles of road. (See Attachment 1, Area Maps and Project Plan).

No Action: This alternative would not produce revenue for the Common School (C.S.) Trust Grant. Increased losses due to insect and disease activities could be expected. Fuel loadings available for wildland fires would be expected to increase putting at risk the existing timber stands in these sections and adjacent properties.

III. IMPACTS ON THE PHYSICAL ENVIRONMENT

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

4. GEOLOGY AND SOIL QUALITY, STABILITY AND MOISTURE:

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

Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 3, Prescriptions; Attachment 4, Mitigation).

5. WATER QUALITY, QUANTITY AND DISTRIBUTION:

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

The project area, transportation system, and harvest plan have been reviewed by a DNRC hydrologist. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 4, Mitigation).

6. AIR QUALITY:

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

The project area is located in Montana State Airshed 2; it is not within a Class 1 Airshed. Some particulate matter would be introduced into the Airshed from the burning of logging slash. All burning would be conducted during times of adequate ventilation within the existing rules and regulations.

7. VEGETATION COVER, QUANTITY AND QUALITY:

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

Silvicultural prescriptions have been developed to convert exiting conditions to reflect historic appropriate cover types through the removal of diseased, insect infested, and non-preferred timber species. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 3, Prescriptions; Attachment 4, Mitigation). Tree removal would change some current cover types, age classes, size classes, and remove approximately 14 acres from timber production to create road access into the section. The Action Alternative affects no old growth stands as defined by "Green et al". 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 4, Mitigation).

8. TERRESTRIAL, AVIAN AND AQUATIC LIFE AND HABITATS:

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

The Swamp Ridge sale area is in big game habitat. The proposed activities are designed to limit impacts to wildlife habitat with special emphasis directed toward big game. Unit marking and treatments would retain some visual screening in the project area. Wildlife security would be maintained through active road management. Treatments would also help improve available forage for big game. The East Fork Swamp Creek has been identified as having a possible population of westslope cutthroat trout. The cumulative watershed effects boundary incorporates the East Fork Swamp Creek drainage. Due to unit prescription design and location it is unlikely that any effects for the proposed activities would be detectable down stream of section 36. Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 4, Mitigation).

9. UNIQUE, ENDANGERED, FRAGILE OR LIMITED ENVIRONMENTAL RESOURCES:

Consider any federally listed threatened or endangered species or habitat identified in the project area. Determine effects to wetlands. Consider Sensitive Species or Species of special concern. Identify cumulative effects to these species and their habitat.

Direct use by Threatened and Endangered species has not been indicated in the wildlife biologist reports (see Attachment 2, Resource Analysis, Wildlife). Recommendations to minimize direct, indirect and cumulative impacts have been incorporated in the project design (see Attachment 1, Area Maps and Project Plan; Attachment 2, Resource Analysis; Attachment 4, Mitigation).

10. HISTORICAL AND ARCHAEOLOGICAL SITES:

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

This project has been reviewed by DRNC archeologist. Significant sites or artifacts were not identified during these reviews.

11. AESTHETICS:

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

The project is located on the state owned section of Swamp Ridge. Portions of the project area would be visible from the Town of Plains, portions of Hwy 200, as well as various properties and locations along River Road West and the Blackjack road. Visible impacts would be noticeable in the short term, but are not expected to remain in the long term. Openings from a new road, skid trails, skyline corridors and changes in tree cover density would be seen from these locations until regeneration has reached the point of canopy closure again.

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

None

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

Swamp Buggy EA (1996, USFS), East Fork Swamp Creek Timber Sale EA (1993 DNRC). These documents were used to evaluate and minimize direct, indirect and cumulative impacts in the projects design (see Attachment 2, Resource Analysis; Attachment 4, Mitigation).

IV. IMPACTS ON THE HUMAN POPULATION

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

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

None

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

Timber harvest would provide continuing industrial production in the Plains area.

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

People are currently employed in the wood products industry in the region. Due to the relatively small size of the timber sale program, there would be no measurable cumulative impact from this proposed action on employment

17. LOCAL AND STATE TAX BASE AND TAX REVENUES:
Estimate tax revenue the project would create or eliminate. Identify cumulative effects to taxes and revenue.

None

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

Log trucks hauling to the purchasing mill would result in temporary increases in traffic on the River Road West, and Montana Highway 200. 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.

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 June 1996, DNRC began a phased-in implementation of the State Forest Land Management Plan (The Plan). In 2003, rules were added to the plan under Forest Management, Sub-Chapter 4. This project was scoped before the adoption of the rules and follows direction pertaining "Old Growth" at the time of scoping. The management direction provided in the Plan comprises the framework within which specific project planning and activities take place. The Plan philosophy and appropriate Resource Management Standards have been incorporated into the design of the proposed action.

20. ACCESS TO AND QUALITY OF RECREATIONAL AND WILDERNESS ACTIVITIES:
Identify any wilderness or recreational areas nearby or access routes through this tract. Determine the effects of the project on recreational potential within the tract. Identify cumulative effects to recreational and wilderness activities.

Some increase in non-motorized recreational use is expected following the project. Recreational areas and wilderness are not accessed through this tract.

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

None

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

None

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

None

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

Costs, revenues and estimates of return are estimates intended for relative comparison of alternatives. They are not intended to be used as absolute estimates of return. The estimated stumpage is based on comparable sales analysis. This method compares recent sales to find a market value for stumpage. These sales have similar species, quality, average diameter, product mix, terrain, date of sale, distance from mills, road building and logging systems, terms of sale, or anything that could affect a buyer's willingness to pay for. The effect of the proposed project would generate an estimated return to the trust of $300,000 in the Action Alternative. The No Action alternative does not generate any return to the trust at this time.

EA Checklist Prepared By:	**Name:**	James B Kibler	**Date:**	October,30, 2003
	Title:	Management Forester, Northwest Land Office, Plains Unit, DNRC,		

V. FINDING

25. ALTERNATIVE SELECTED:

The Action Alternative as proposed meets the stated project objectives. It complies with all applicable environmental laws and the DNRC State Forest Land Management Plan and the associated administrative rules. A consensus of professional opinion finds this alternative within the limits of acceptable environmental impact. The No Action alternative meets none of the project objectives and does not provide fiscal income to the Trust. For these reasons I have selected the Action Alternative for implementation on this project.

26. SIGNIFICANCE OF POTENTIAL IMPACTS:

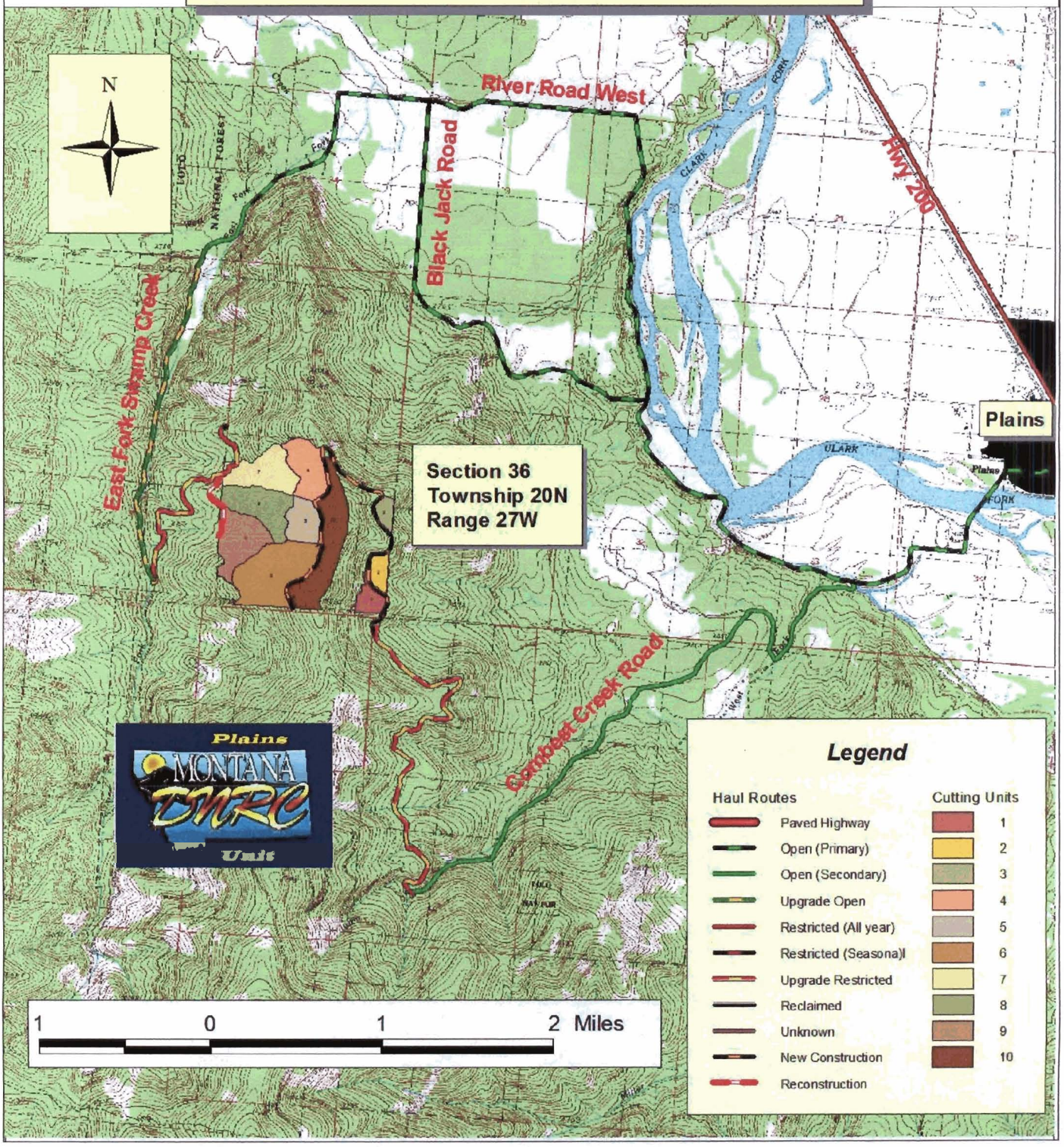
After thorough review of the Project File and all scoping documents, I find all identified resource management concerns have been fully addressed in this environmental assessment. Specific mitigation measures surrounding resource concerns are listed in Attachment 4. The Action Alternative provides for Trust income in the present while assuring the long-term productivity of the site. It does not eliminate other as yet unidentified revenue generating opportunities. Specific project design features and resource management specialist recommendations have been included to ensure this project will fall within the limits of acceptable environmental change. Considering the content of this analysis I find there would be no significant impact to the physical or human environment as a result of implementing the Action Alternative.

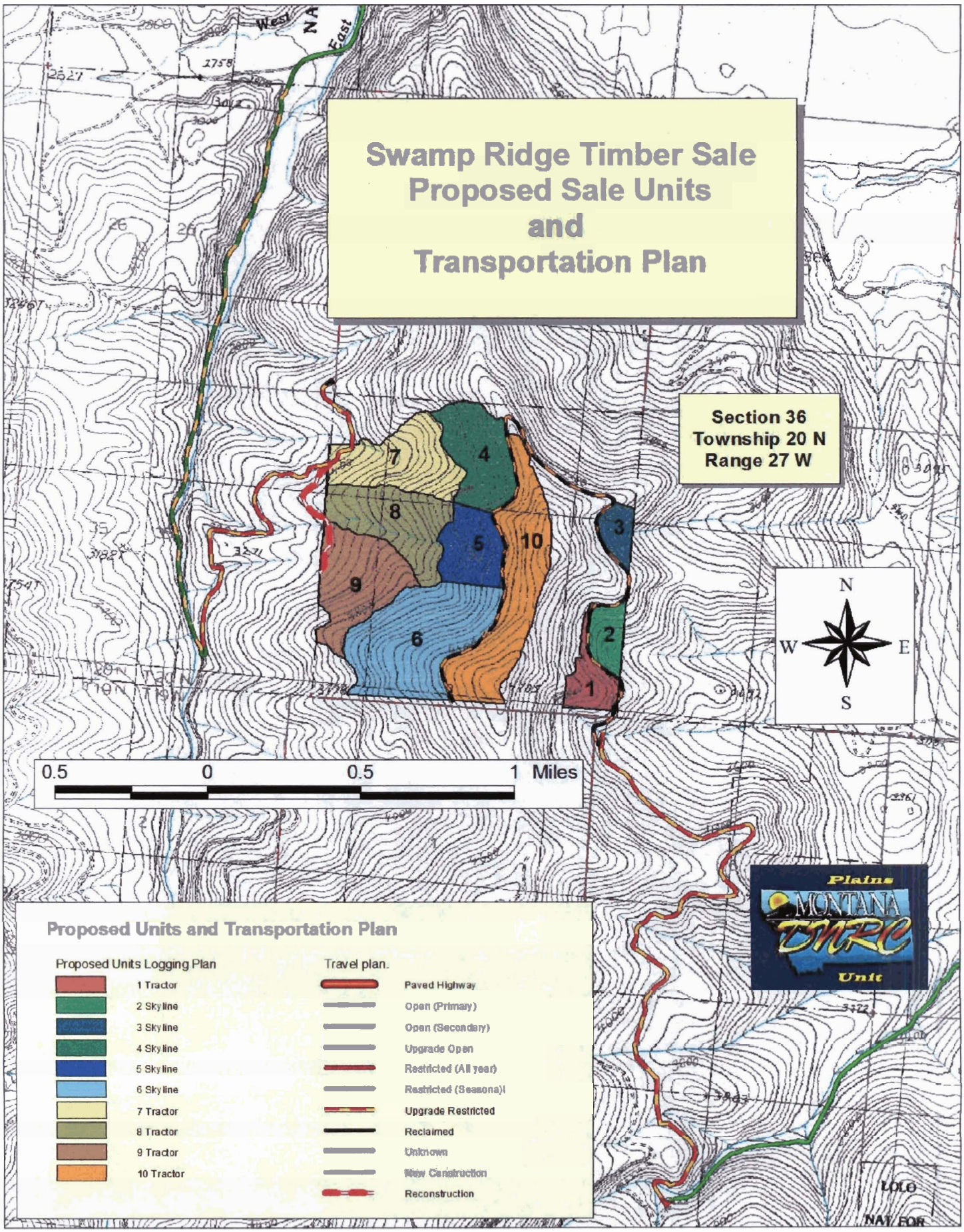
27. NEED FOR FURTHER ENVIRONMENTAL ANALYSIS:

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

EA Checklist Approved By:	**Name:** Larry Ballantyne **Title:** Resource Program Manager	
Signature:		**Date:** 11-17-03

Swamp Ridge Timber Sale
Travel Plan
Vicinity Map




Swamp Ridge Timber Sale
Proposed Sale Units
and
Transportation Plan
Section 36
Township 20 N
Range 27 W
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0.5
1 Miles
Plains
MONTANA
DNRC
Unit
Proposed Units and Transportation Plan
Proposed Units Logging Plan
1 Tractor
2 Skyline
3 Skyline
4 Skyline
5 Skyline
6 Skyline
7 Tractor
8 Tractor
9 Tractor
10 Tractor
Travel plan.
Paved Highway
Open (Primary)
Open (Secondary)
Upgrade Open
Restricted (All year)
Restricted (Seasona)l
Upgrade Restricted
Reclaimed
Unknown
New Construction
Reconstruction
LOLO
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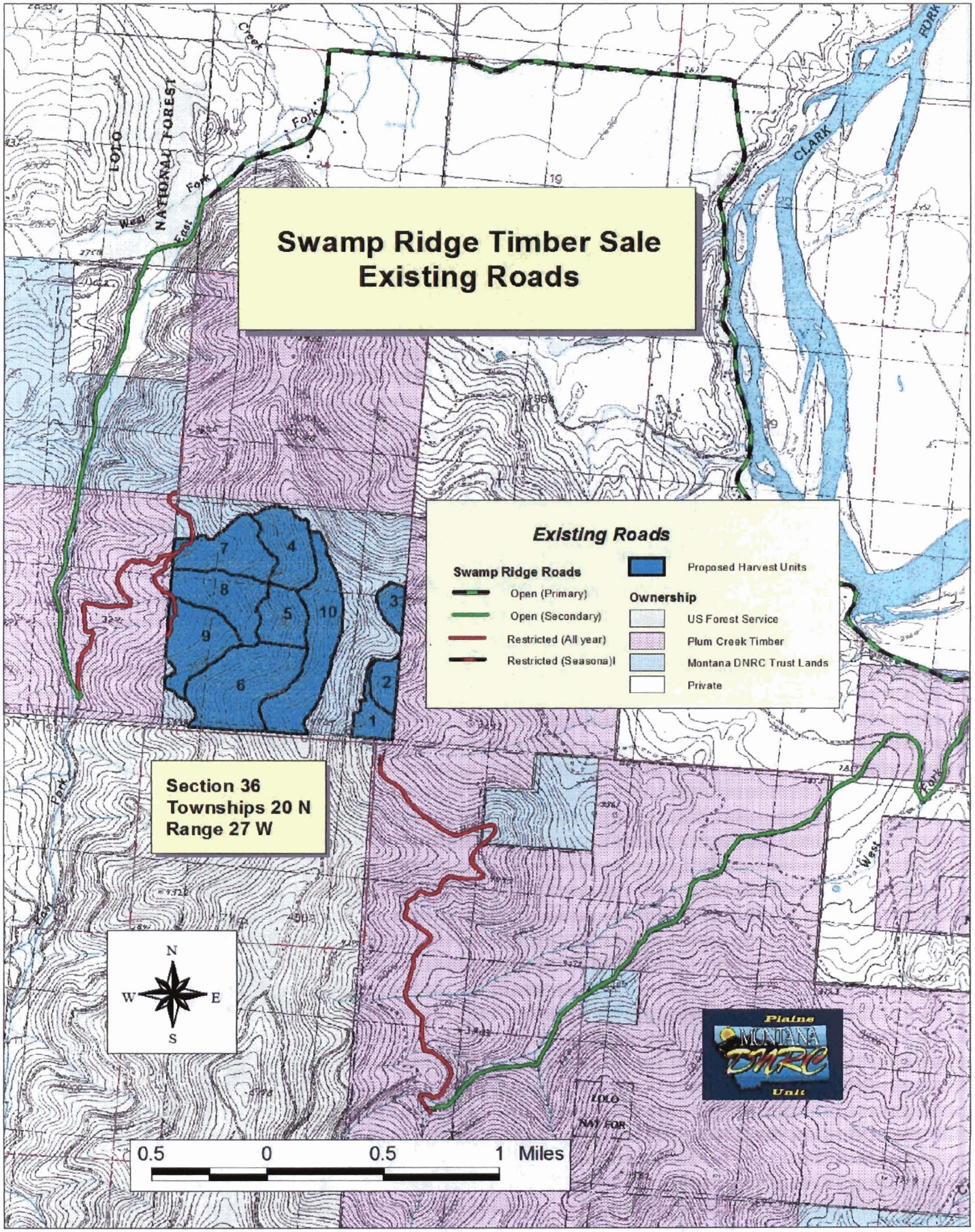
Table 1
Harvest Plan

Unit Number	Acres	Volume	Tons	Treatment	Harvest Method
1	18	40 mbf	260 Tons	Commercial Thinning	Tractor
2	16	32 mbf	204 Tons	Commercial Thinning	Skyline
3	12	66 mbf	429 Tons	Commercial Thinning	Skyline
4	42	109 mbf	710 Tons	Shelterwood Cut	Skyline
5	31	141 mbf	916 Tons	Shelterwood Cut	Skyline
6	87	348 mbf	2262 Tons	Shelterwood Cut	Skyline
7	50	417 mbf	2708 Tons	Shelterwood Cut	Tractor
8	50	278 mbf	1806 Tons	Shelterwood Cut	Tractor
9	52	281 mbf	1825 Tons	Shelterwood Cut	Tractor
10	77	539 mbf	3503 Tons	Shelterwood Cut	Tractor
R/W	14	58 mbf	377 Tons	Right – of – Way timber	Tractor
Total	449	2.3 MMBF	15,000 Tons		


Swamp Ridge Timber Sale
Existing Roads
Existing Roads
Swamp Ridge Roads
Open (Primary)
Open (Secondary)
Restricted (All year)
Restricted (Seasona)l
Proposed Harvest Units
Ownership
US Forest Service
Plum Creek Timber
Montana DNRC Trust Lands
Private
Section 36
Townships 20 N
Range 27 W
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CLARK
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MONTANA
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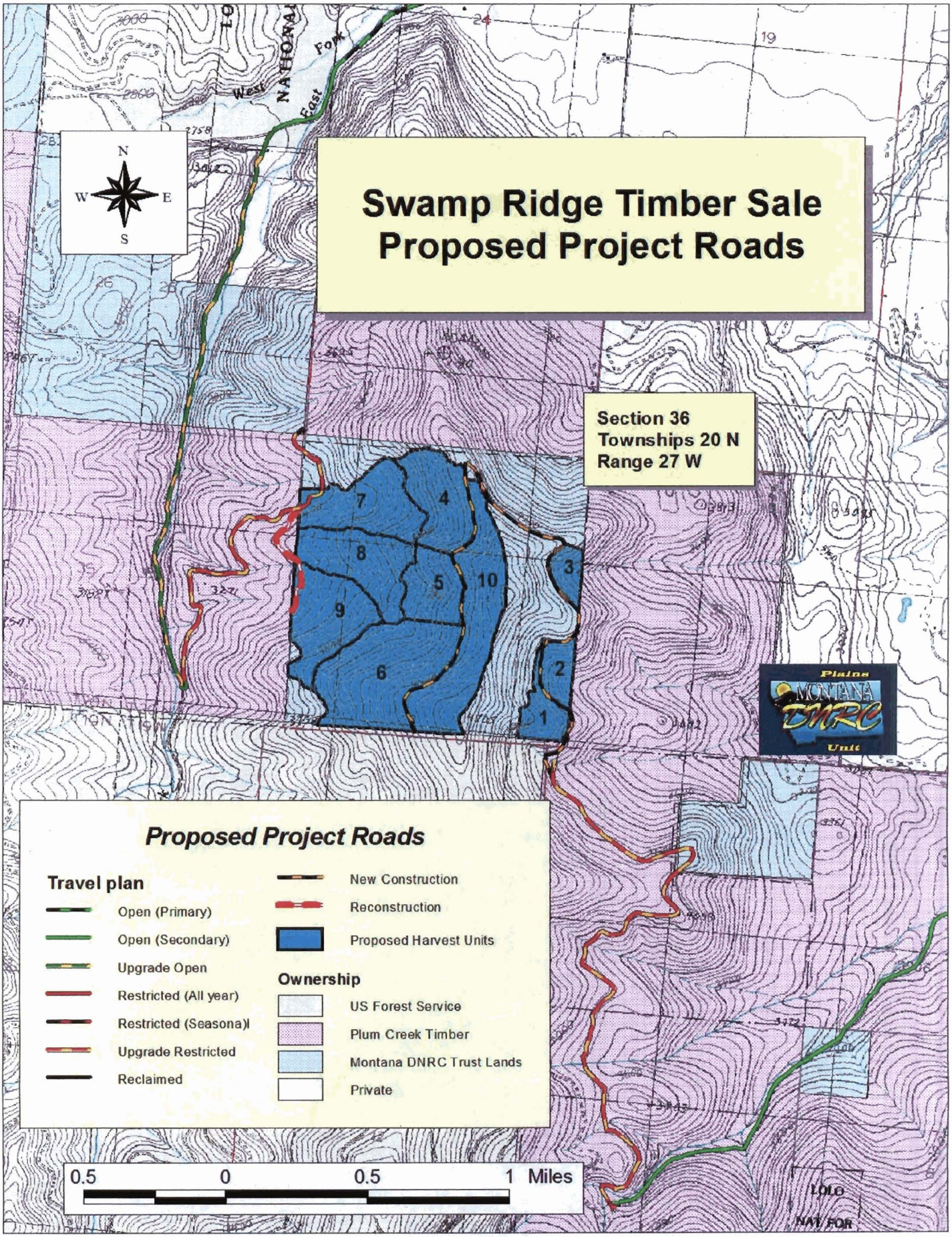
Unit


Swamp Ridge Timber Sale
Proposed Project Roads
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East Fork
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7
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Plains
MONTANA
DNRC
Unit
Proposed Project Roads
Travel plan
Open (Primary)
Open (Secondary)
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Restricted (All year)
Restricted (Seasona)l
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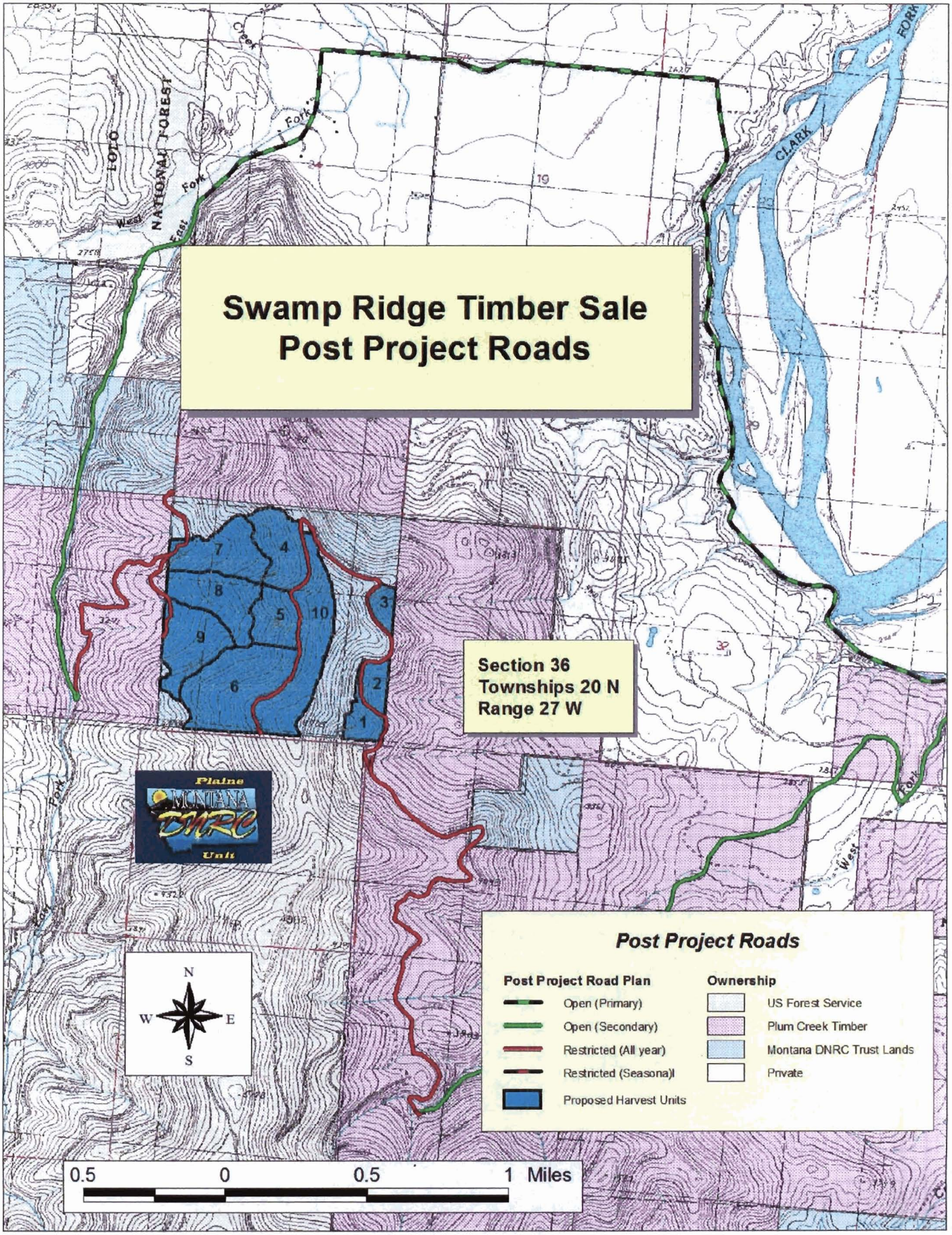
Swamp Ridge Timber Sale
Post Project Roads
Section 36
Townships 20 N
Range 27 W
Plains
MONTANA
DNRC
Unit
Post Project Roads
Post Project Road Plan
Open (Primary)
Open (Secondary)
Restricted (All year)
Restricted (Seasonal)
Proposed Harvest Units
Ownership
US Forest Service
Plum Creek Timber
Montana DNRC Trust Lands
Private
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0.5
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0.5
1 Miles
LOLO NATIONAL FOREST
CLARK FORK
West Fork
Fork
Creek

VEGETATION ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the vegetative resources and display the anticipated effects that may result from each alternative of this proposal. During and following the initial scoping, the public and DNRC specialists identified the following issues regarding the effects of proposed alternatives on vegetation:

- Growth and Vigor: There are concerns that not treating overstocked existing stands will perpetuate and/or contribute to decreased growth, vigor and change the appropriate species characteristics identified for the area.
- Fire Ecology: There is concern that the exclusion of fire from the site has changed stand compositions, and age classes from what would have historically occurred in the area. There is also concern that forest fuels have accumulated to a point that would leave this area predisposed to a catastrophic fire event.
- Forest Health: There are concerns that endemic populations of diseases and insects are increasing on the site and have the potential reach epidemic proportions or reduce productivity.
- Aesthetics: There are concerns that harvesting activities would reduce the visual quality of the Plains area.
- Economic Benefits and Project Revenue: Concern has been raised that the proposed project might not be economically viable.

History and surrounding conditions

Past and current events have changed the forest conditions on the land parcel involved in the proposed project area. The area has had stand replacing fire events in the late 1800's and early 1900's. Normally the area would be characterized as having periodic low intensity under burns. Since the late 1800's, fire has virtually been excluded from the area. Past logging activity has occurred primarily on the west side and the lower southeast portion of the section. Section records indicate that this section had timber sales in the 1940's and as late as 1958. Evidence from these past logging activities can be found on the section. A minor amount of volume was removed in 1982 in the Northwest corner of the section for road right-of-way.

The properties adjacent to these sections are federal, industrial private, or owned by the state. Sections 25 and 35 of Township 20N Range 27W are owned by Plum Creek Timber and managed for commercial timber uses. Part of section 26 in this Township adjacent to section 36 is land managed by the DNRC. Plum Creek Timber has two other sections adjacent to section 36; Section 31, Township 20N Range 26W, and Section 6, Township 19N Range 26W. Sections to the south and southwest of the project area are lands in Federal ownership managed by the United States Forest Service. Adjacent to the northwest corner of the project area in section 30 of Township 20N Range 26W is sub-divided land held in private ownership. Fuel loadings on private lands surrounding the project area are lower than on the land managed by the State.

Analysis Methods

The Plains Office typically prepares two to four timber sales per year. Each proposed project is evaluated for its potential direct, indirect and cumulative effects on lands managed by the DNRC. 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. In this analysis, past and existing conditions are compared to determine what future conditions might be expected.

Analysis Levels and Associated Areas

In developing the proposed project, analysis was done on two levels. The first level comprises lands managed on the Plains Unit by the State of Montana, Department of Natural Resources and Conservation. This level is shown in Tables 1 and 2 in this analysis. The second level comprises lands adjacent to Section36 in Township 20 North, Range 27 West in Sanders County, Montana. This area is shown on the Swamp Ridge Timber Sale Vicinity map.

Existing Condition

Vegetation conditions that currently exist at the Plains Unit level are evaluated by cover types described in Losensky's "Historical Vegetation of Montana" (1997). Stand level inventories are compared to the cover types that historically would be expected on areas managed by the DNRC (see Table 1, Table 2, Table 3, and the Swamp Ridge Stand Map). Section 36 is approximately five miles west of Plains, Montana. Current cover types on this section and the Plains Unit in general, are the result of stand replacing fires in the late 1800's and early 1900's. The literature indicates that, prior to this time, many of these cover types were influenced by periodic low intensity under burns. This would suggest that the stands were historically open and dominated by seral shade intolerant tree species. The average cycle of these under burns was 20 to 30 years. It is believed that conditions from at least the 1500's till about 1850 were considerably cooler and wetter than subsequent times helping to create conditions similar to the effects from fire suppression and predisposing these and other stands to stand replacement severity burns. In the period around 1900 weather conditions and the influence of expanding settlement contributed to the events that helped create the large fires that occurred during this period. Since that time an aggressive attempt to exclude fire from the area has greatly influenced the current vegetation.

Past logging events have also influenced the area. Large seral overstory trees were typically removed leaving subdominant, shade tolerant species and smaller seral species on the area. The selection of primarily large Ponderosa Pine for removal in the past was driven by availability, accessibility, economic forces and market preferences. The pine removed in the Plains area in the early 1900s was used to supply mining timbers in the Superior area. After the railroads moved into the area, timbers were also supplied to the mines in Butte. Later, Ponderosa pine became a preferred species in construction. Section 36 stand records indicate that some logging had occurred in the 1940s.

The result is that many of the cover types on the Plains Unit comprise two- and three-storied stands that are less than 150 years old with older overstory remnants. Cover-types have progressively changed from what would historically be expected to exist, to the present condition (see Table 3, Plains Unit Cumulative effects on Cover Types). Three-storied stands are typically overcrowded and stagnated with the 150-year-old overstory component the same age as the mid-level. Regeneration is occurring in small openings created by the death of individual or groups of overstory trees. Regeneration is usually shade tolerant Douglas-fir or true firs, and on many areas the overstory is infected with dwarf mistletoe. These stands are converting from shade intolerant seral forest to shade tolerant climax forest. Stands are also showing increased available fuels due to fire exclusion.

The second level of analysis looks at the vegetative conditions of timber stands in section 36 (see the Swamp Ridge Timber Sale Vicinity and Swamp Ridge Stand maps). The stands in the proposed project are characterized as multistoried stands. The overstory is remnant seral ponderosa pine and larch. The understory is comprised of Douglas-fir, grand fir and some lodgepole pine (see Table 2). The stands range from 90 to 190 years old. Two stands were identified as old growth as described by Green et al. (1996). These stands were not included in the proposed project design, and will not be affected by the proposed

action. The stands have variable basal areas and stand structures that reflect a change from shade intolerant seral structures to shade tolerant species. Currently the stands are showing increased mortality from insects and diseases and competition from shade tolerant species. The stands are also showing increases in forest fuel loadings and increases in ladder fuels from tolerant species regeneration in the understory. Many snags are present on the section due to infestations of Mountain Pine Beetle (Dendroctonus ponderosae), and competition from the under-story. There are noxious weed populations scattered throughout the proposed project area in small openings and along roads rights-of way.

Direct and Indirect Effects

No Action Alternative

Conditions that now exist will remain the same in a No Action Alternative. Insect and disease related mortality is expected to increase. Noxious weed populations are not expected to increase.

Action Alternative

The proposed action alternative would harvest timber from approximately 435 acres. Proposed harvest would convert 150 acres from mixed conifer cover type to a western larch / Douglas-fir cover type. Harvest would also convert 286 acres from a mixed conifer cover type to a ponderosa pine cover type. Trees affected or susceptible to insects and disease would be removed. All snags greater than 14 inches DBH and not creating a safety hazard would be retained. Unauthorized removal of snags would be reduced by the road management measures shown in the project plan. Because forest fuel loadings would be reduced by logging system design, post harvest thinning, spot excavator piling and prescribed burning, the fuel loading across the harvest area would be 5 -10 tons per acre of material larger than 3 inches diameter; and small groupings of regeneration greater than 15 feet in height and free of insects and disease. Available fire fuels would be reduced by site treatment, crown spacing and the removal of understory ladder fuels. Adverse visual effects would be reduced by logging systems design. This would include road screening, skid trail and corridor design with the appropriate logging systems. Noxious weeds may increase in canopy openings. Spot treatment with chemicals would be used to manage small weed outbreaks. Closed roads and skid trails would be fertilized and seeded to help reduce invasion from noxious weeds.

Cumulative Effects

No Action Alternative

In the No Action Alternative stand structure and species composition on State lands across the Plains Unit are expected to continue the change towards shade tolerant species. Fuel loadings and values at risk are expected to increase, relative to the lands adjacent to sections 14 and 23.

Action Alternative

Across the Plains Unit, 430 acres of mixed conifer would be converted to 279 acres of ponderosa pine and 150 acres of western larch/Douglas-fir. Table 4 shows the resulting acreages of each cover type at the stand level. Harvest in the proposed project would change the age classes and cover types on 435 acres. The existing stand boundaries would change and new stands boundaries would be designated (see Existing Stand Map, Post Project Stand Map, and Table 5 Swamp Ridge Project Stand Analysis).

Within the second level of analysis, timber stands in section 36 would have fuel loading and ladder fuels reduced to a level similar to the fuel loading on adjacent private property. Tree spacing, insect and disease incidence, and weed occurrence would be at similar levels to adjacent property (see Swamp Ridge Timber Sale Vicinity map).

TABLE 2
SWAMP RIDGE PROJECT COVER TYPE COMPARATIVE TABLE

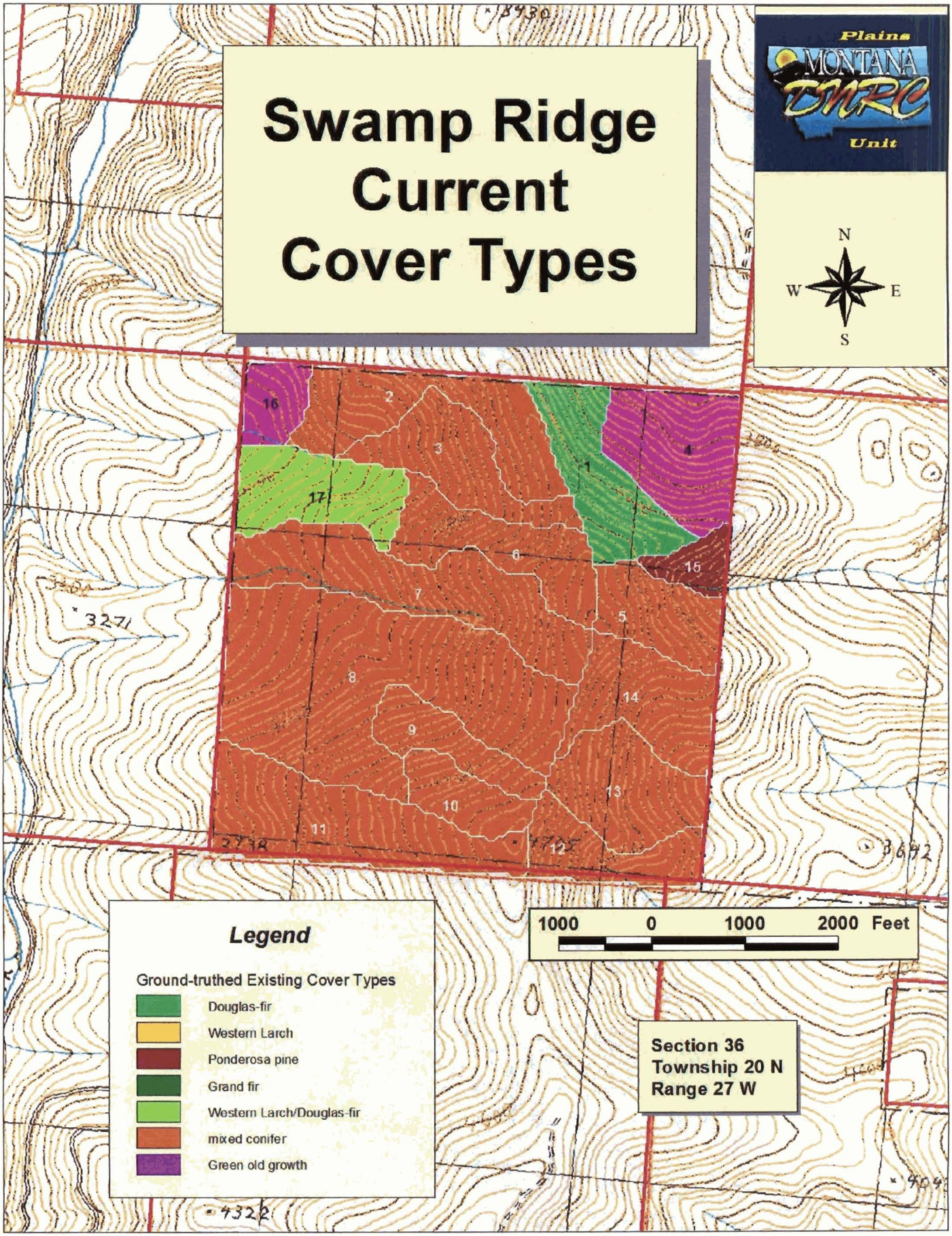
Cover Type	Estimated Historic Appropriate Acres	Current Acres	Post Project Acres	Net Change Acres
ALP	0	0	0	0
DF	0	88	88	0
HW	0	0	0	0
LPP	0	0	0	0
MC	0	547	117	-430
PP	552	10	286	+279
WL/DF	93	0	150	+150
WWP	0	0	0	0
NSTKD	0	0	0	0
TOTAL	645	645	645	

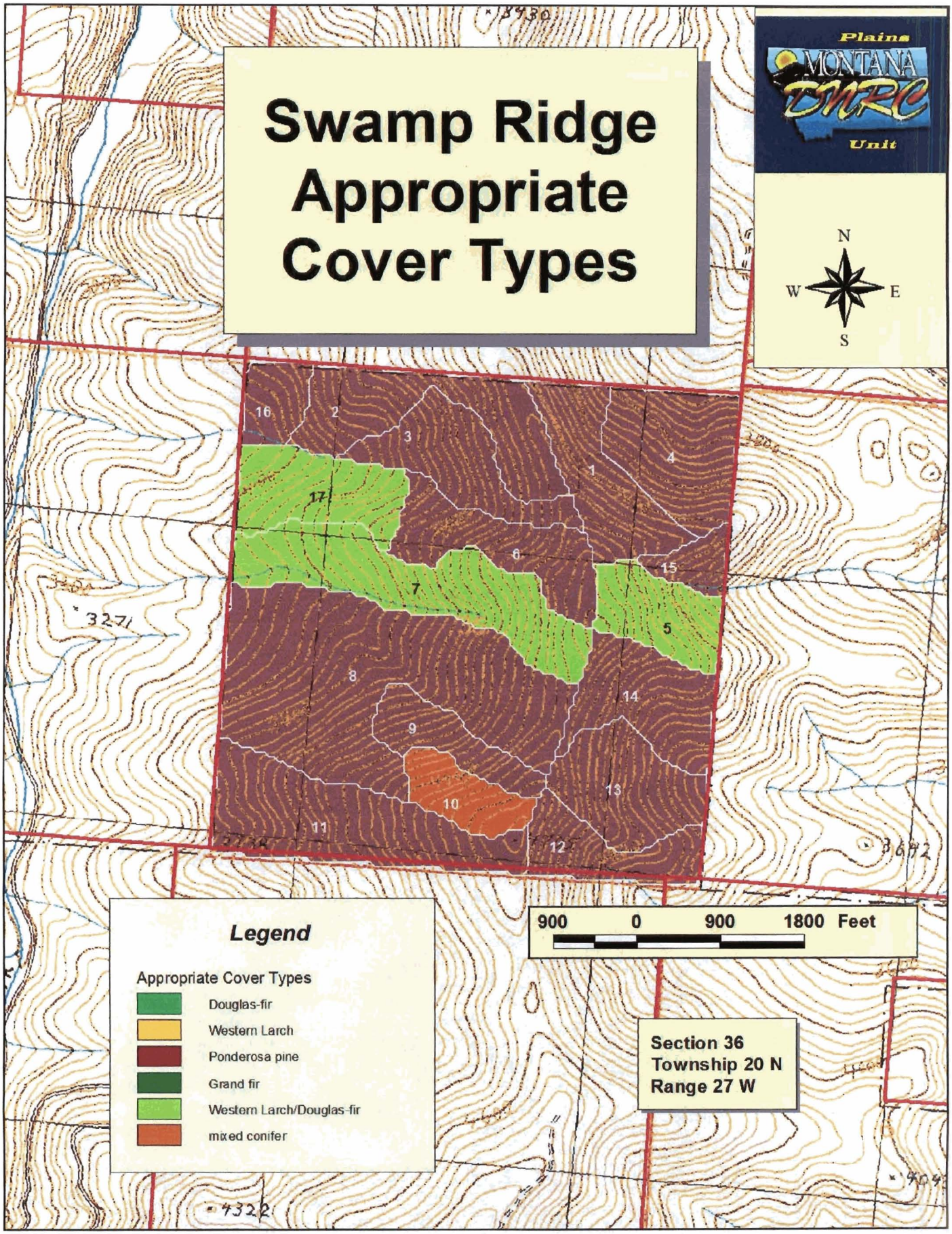
Updated 02/14/03

TABLE 3
PLAINS UNIT CUMULATIVE EFFECTS on COVERTYPES

Updated 02/14/03

Cover Type	Estimated Historic Appropriate Acres	Current Acres	Post Project Acres	Net Change Acres
ALP	179	692	692	0
DF	2,261	1,865	1,865	0
HW	110	110	110	0
LPP	2,763	3578	3578	0
MC	1.479	8429	8000	-429
PP	27,948	28238	28518	+279
WL/DF	17,686	9178	9328	+150
WWP	366	306	306	0
NSTKD	Evenly distributed by type	393	393	0
TOTAL	52,795	52,795	52,795	0


Swamp Ridge
Current
Cover Types
Plains
MONTANA
DNRC
Unit
N
W
E
S
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
1000 0 1000 2000 Feet
Legend
Ground-truthed Existing Cover Types
Douglas-fir
Western Larch
Ponderosa pine
Grand fir
Western Larch/Douglas-fir
mixed conifer
Green old growth
Section 36
Township 20 N
Range 27 W


Swamp Ridge
Appropriate
Cover Types
Plains
MONTANA
DNRC
Unit
N
W
E
S
16
2
3
4
1
17
6
15
7
5
8
14
9
13
10
11
12
Legend
Appropriate Cover Types
Douglas-fir
Western Larch
Ponderosa pine
Grand fir
Western Larch/Douglas-fir
mixed conifer
900 0 900 1800 Feet
Section 36
Township 20 N
Range 27 W

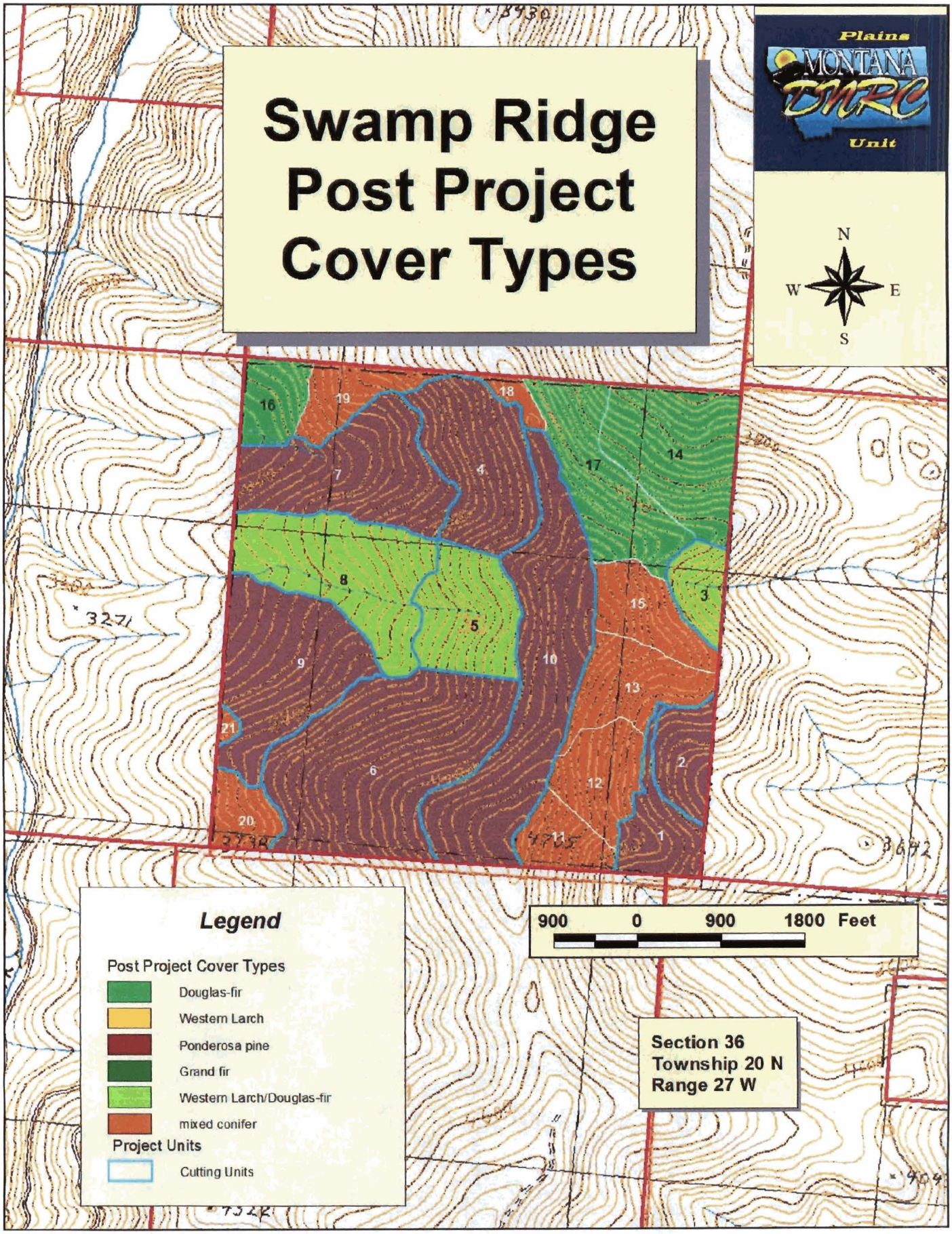
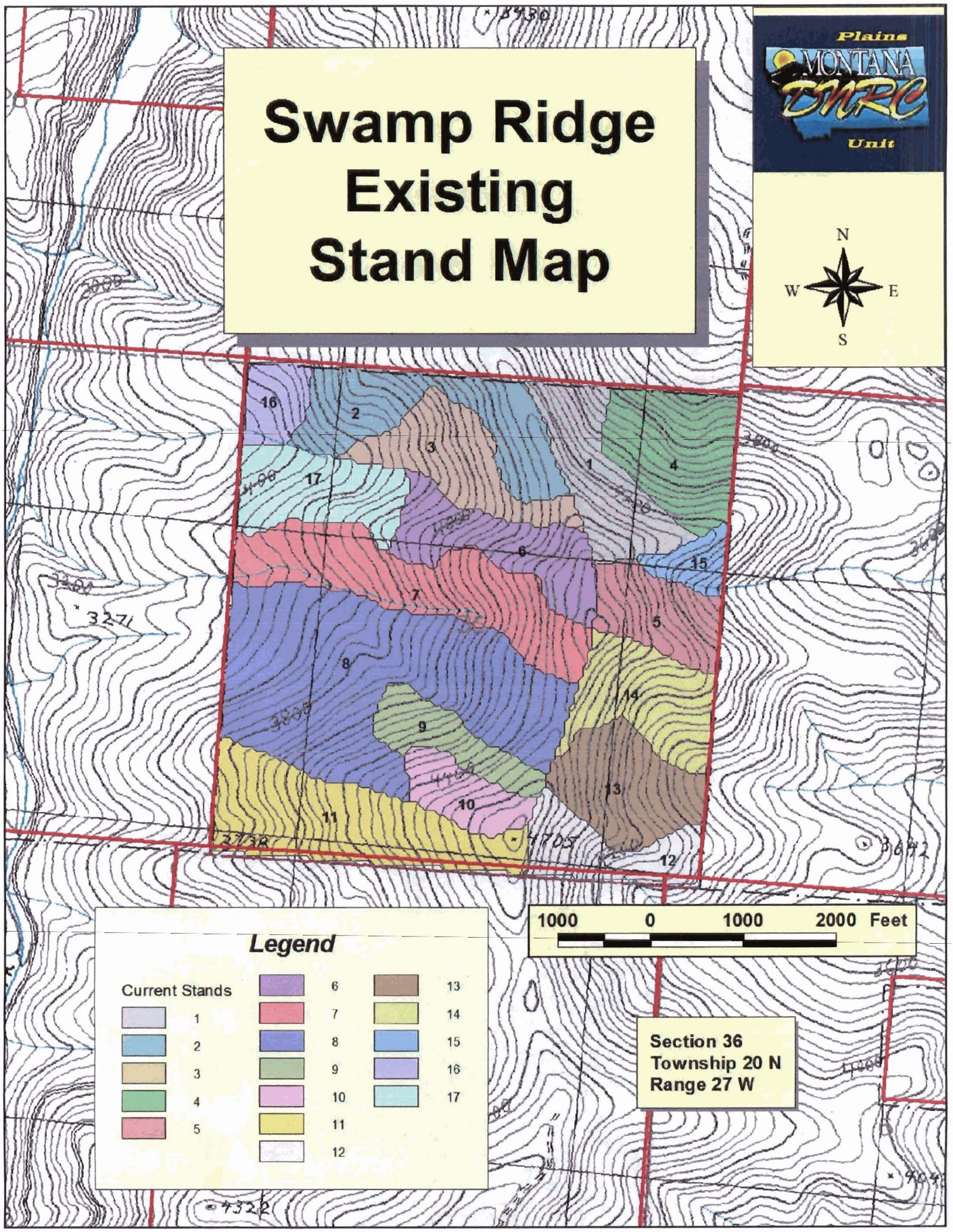

Swamp Ridge
Post Project
Cover Types
Plains
MONTANA
DNRC
Unit
N
W
E
S
Legend
Post Project Cover Types
Douglas-fir
Western Larch
Ponderosa pine
Grand fir
Western Larch/Douglas-fir
mixed conifer
Project Units
Cutting Units
900 0 900 1800 Feet
Section 36
Township 20 N
Range 27 W

TABLE 4
SWAMP RIDGE PRE-HARVEST AND POST-HARVEST COVER TYPES
FOR SECTION 36

Stand Number	Stand Acres	Treatment Acres	Appropriate Cover Type	Existing Stand Type	Existing Stand Age	Post Treatment Type	Post Treatment Age	Harvest Unit Number
1	34.9	0	PP	DF	OG	DF	OG	
2	43.9	25.2	PP	MC	140	PP	120	4,7,10
3	32.7	32.6	PP	MC	140	PP	0-10	4,7,10
4	40.1	0	PP	DF	140	DF	140	
5	25.1	5.3	PP	MC	110	WL/DF	110	3
6	34.4	34.1	PP	MC	80	PP	0-10	4,5,7,8,10
7	60.3	60.3	WL/DF	MC	140	WL/DF	0-10	5,8,9,10
8	124.7	124.7	PP	MC	140	PP	0-10	5,6,8,9,10
9	20.1	20.1	PP	MC	120	PP	0-10	6,10
10	17.7	17.7	PP	MC	90	PP	0-10	6,10
11	60.0	41.8	PP	MC	70	WL/DF	70	6,9,
12	24.3	10.2	PP	MC	140	PP	120	1,2
13	35.8	14.7	PP	MC	60	PP	60	1,2
14	35.0	10.2	PP	MC	70	WL/DF	70	1,2
15	9.6	6.4	PP	PP	130	PP	130	3
16	13.1	0	PP	DF	OG	DF	OG	
17	32.7	32.7	WL/DF	MC	130	WL/DF	130	7,8
Total	**644.4**	**436**						

= No Activity

*The above tables reflect Ground Truth Verification of SLI data.


Swamp Ridge
Existing
Stand Map
Plains
MONTANA
DNRC
Unit
N
W
E
S
1000 0 1000 2000 Feet
Legend
Current Stands
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
Section 36
Township 20 N
Range 27 W

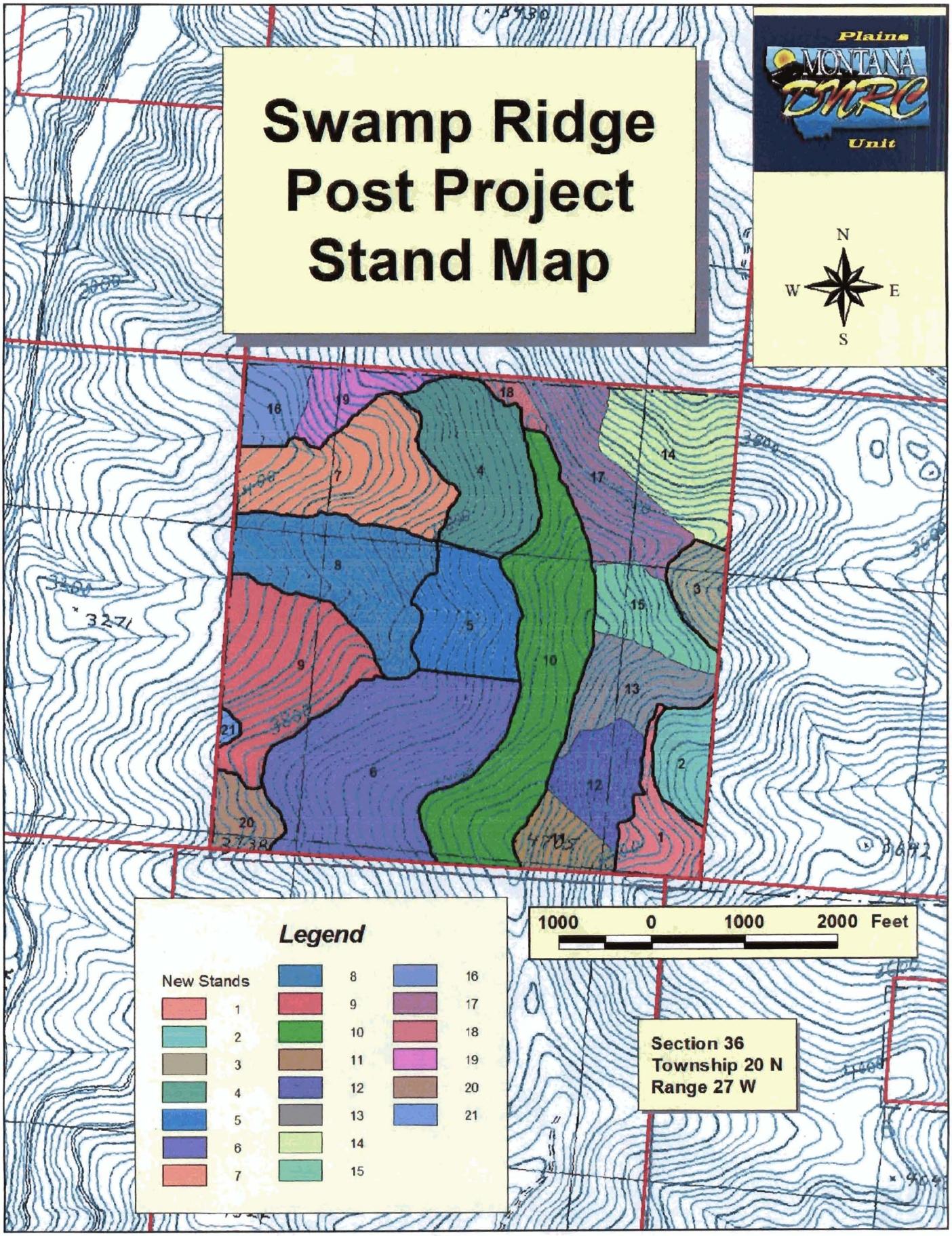

Swamp Ridge
Post Project
Stand Map
Plains
MONTANA
DNRC
Unit
N
W
E
S
Legend
New Stands
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
1000 0 1000 2000 Feet
Section 36
Township 20 N
Range 27 W

Table 5
SWAMP RIDGE PROJECT STAND ANALYSIS

New Stand Number	Existing Stand Number	Acres To be harvested	Total Stand Acres
1	12	8	18
	13	9	
	14	1	
2	12	1	16
	13	6	
	14	9	
3	5	6	12
	15	6	
4	2	13	42
	3	21	
	6	8	
5	6	2	31
	7	16	
	8	13	
6	8	37	87
	9	15	
	10	6	
	11	29	
7	2	7	50
	3	9	
	6	6	
	17	28	
8	6	4	50
	7	29	
	8	12	
	17	5	
9	7	1	52
	8	47	
	11	4	
10	2	5	77
	3	3	
	6	15	
	7	13	
	8	14	
	9	6	
	10	12	
Total Sale Acres			435

New Stand Number	Existing Stand Number	Acres Reassigned	Total Stand Acres
11	11	2	14
	12	12	
12	13	20	20
13	14	22	22
14	4	40	42
	15	2	
15	5	18	18
16	16	14	14
17	1	30	32
	15	2	
18	2	4	4
19	2	15	15
20	11	12	12
21	8	2	2
Total Reassigned acres			195
R/W			14
Total Section Acres			644

HYDROLOGY ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the hydrologic resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding water quality. The following issue statements were expressed from internal comments regarding the effects of proposed timber harvesting:

Timber harvesting and road construction has the potential to increase water yield which in turn may affect stream channel stability
Timber harvesting and road construction activities may increase sediment delivery into stream and affect water quality.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery and water yield on the water quality of streams in the project area.

Analysis Methods

Sediment Delivery

The methods applied to the project area to evaluate potential direct, indirect and cumulative effects include a site specific inventory to look at potential sediment sources from haul routes. Roads and stream crossings were evaluated to determine existing sources of introduced sediment.

Water Yield

The water-yield increase for the watershed in the project area was determined using the Equivalent Clearcut Acres (ECA) method as outlined in Forest Hydrology, Part II (Haupt et. al., 1976).

ECA is a function of total area roaded, harvested or burned, percent of crown removed during harvesting or wildfire, and amount of vegetative recovery that has occurred in the harvested or burned areas. As live trees are removed, the water that would have evaporated and transpired either saturates the soil or is translated to runoff. This method also calculates the recovery of these increases as new trees are established on to the site and move toward pre-harvest water use.

In order to evaluate the watershed risk of water yield increase effectively, a threshold of concern for each watershed was established. Thresholds were established based on evaluating the acceptable risk level, resources value, and watershed sensitivity.

Water yield will be disclosed as a cumulative effect in the 'Existing Conditions' portion of this report because the existing condition is a result of all past harvesting and associated activities. In the 'Environmental Effects' portion of this report, water yield increases as a result of this project will be disclosed as a direct effect. The cumulative water yield increase as predicted to include each alternative will be disclosed as a cumulative effect.

Analysis Area

Sediment Delivery

The analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes in-channel and upland sources of sediment that could result from this project.

Water Yield

The analysis areas for water yield are the East Fork Swamp Creek and unnamed tributaries to the Clark Fork River. Additional harvest is proposed outside of the East Fork Swamp Creek watershed, but due to the small scale of harvest proposed in other watersheds the risk of potential impacts would be low and will not be further discussed.

Cumulative Effects

The analysis for cumulative impacts, including sediment delivery and water yield, will be the East Fork Swamp Creek watershed, which is a 6,113-acre watershed. This is an appropriate scale of analysis due to the size of the project versus the watershed size and the low potential for impacts. Additional harvest is proposed outside of the East Fork Swamp Creek watershed, but due to the small scale of harvest proposed in other watersheds the risk of potential impacts would be low.

Water Uses and Regulatory Framework

Water Quality Standards

This portion of the Clark Fork River basin, including the Swamp Creek watershed is classified as B-1 by the State of Montana Department of Environmental Quality (DEQ), as stated in the Administrative Rules of Montana (ARM 17.30.607). The water quality standards for protecting beneficial uses in B-1 classified watersheds are located in ARM 17.30.623. Water in B-1 classified waterways is suitable for drinking, culinary and food processing purposes after conventional treatment, bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply.

State water quality regulations prohibit any increase in sediment above naturally occurring concentration in water classified B-1. Naturally occurring means condition or materials present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Reasonable land, soil and water conservation practices include methods, measures or practices that protect present and reasonably anticipated beneficial uses. The State of Montana has adopted Best Management Practices (BMPs) through its non-point source management plan as the principle means of meeting the Water Quality Standards.

Water Quality Limited Waterbodies

Swamp Creek is listed as a water quality limited water body in the 1996 and 2000 303(d) lists. Swamp Creek is not listed in the Draft 2002 303(d) list. The 303(d) list is compiled by the Montana Department of Environmental Quality as required by Section 303(d) of the Federal Clean Water Act and the Environmental Protection Agency Water Quality Planning and Management Regulations (40 CFR, Part 130). Under these laws, DEQ is required to identify water bodies that do no fully meet water quality standards, or where beneficial uses are threatened or impaired.

Streamside Management Zone Law (SMZ)

All rules and regulations pertaining to the Streamside Management Zone (SMZ) Law will be followed. An SMZ width of 100 feet is required on Class I and II streams when the slope is greater then 35%. An SMZ width of 50 feet is required when the slope is less than 35%.

Water Rights and Beneficial Uses
Water rights for surface water exist on East Fork Swamp Creek and Swamp Creek for stock watering and irrigation.

Existing Condition

The proposed Swamp Ridge Timber Sale is located approximately five miles west of Plains, Montana (T20N, R27W, Section 36). The majority of the section is within the immediate East Fork Swamp Creek drainage with the remaining portion drained by unnamed tributaries to the Clark Fork River.

Elevations in the East Fork Swamp watershed range from 2680 feet at the confluence with the West Fork Swamp Creek to 5560 feet at the watershed divide. Precipitation varies from 20 inches per year at the lowest point to near 50 inches at the higher elevations

The East Fork Swamp Creek watershed is a 6,113-acre tributary to the Swamp Creek and ultimately the Clark Fork River. Management of the drainage is mixed between US Forest Service (3998 acres), Plum Creek Timber Company (1186 acres), State of Montana (706 acres) and the remaining acreage owned by private non-industrial entities.

During field review, no streams were identified in the state section (T20N, R27W Section 36) although the USGS topography map indicates two intermittent tributaries to the East Fork Swamp Creek, one unnamed intermittent tributary to the Clark Fork River, and one unnamed intermittent discontinuous stream.

The East Fork of Swamp Creek is characterized by high flows during snow melt runoff with relatively low base flows. Water quality in the drainage has likely been impacted by sedimentation as described in the East Fork Swamp Creek Timber Sale Environmental Assessment (DNRC, 1993) and Swamp Buggy Environmental Assessment (USFS, 1996). The stream stability in the upper reaches is generally fair-to-good but degrades downstream. The reduced stability downstream is likely attributable to grazing encroachment, undesirable past harvesting methods and poor road locations.

During the sediment source inventory, potential sediment sources to streams were identified on the proposed haul road along the East Fork of Swamp Creek. The road is less than 50 feet from the stream at several locations. This proximity to the stream results in high potential for sediment delivery. Past upgrades on the haul route are evident from the drive through drain dips and stream crossing armor.

Cumulative Effects
Water yield in the East Fork of Swamp Creek was modeled in 1990 using the WATSED model. The estimated water yield increase was further described in the Swamp Buggy EA (USFS, 1996) values were further modeled using the Equivalent Clearcut Acre (ECA) method as described in Haupt et al. The projected 1995 water yield increase was 5%. Adding in the harvesting since 1995 and calculating the vegetation growth, the annual water yield increase is estimated at 6.6%. The threshold of concern is set at 11.5% after considering the watershed sensitivity; beneficial uses present and the acceptable level of risk.

Environmental Effects

This section discloses the anticipated indirect, direct and cumulative effects to water resources within the affected environment from proposed actions. Past, current, and future planned activities on all ownerships within the East Fork Swamp Creek watershed have been taken into account for the cumulative effects analysis.

The primary concerns relating to aquatic resources within the affected environment are potential impacts to water quality from sources outside the channel as well as inside the channel. In order to address these issues the following parameters are analyzed by alternative:

-Miles of new road construction and road improvements
-Potential for sediment delivery to streams
-Increases in ECA and annual water yield

Description of Alternatives

No Action Alternative

No timber harvest or associated activities would take place under this alternative.

Action Alternative

Approximately 396 acres of timber harvest would be implemented in the East Fork Swamp Creek watershed and 53 acres of harvest would occur in unnamed tributaries to the Clark Fork River for total harvest acreage of 449 acres. Associated activities include approximately:

1.1 miles of road construction in the East Fork of Swamp Creek,
1.6 miles of road construction in unnamed tributary watersheds;
4.2 miles of drainage improvements in East Fork Swamp Creek watershed (including one culvert replacement); and
2.0 miles of drainage improvements in unnamed tributary watersheds.

Direct and Indirect Effects

No Action Alternative

Sediment Delivery

No timber harvest or road construction is associated with this alternative. Changes in stream channel conditions and water quality would be dictated by natural events and future actions. Current sediment sources would likely continue to contribute sediment to surface waterbodies.

Water Yield

No timber harvest or road construction is associated with this alternative. Annual water yield increases would continue to decrease as vegetation increases or decreases due to natural and anthropogenic causes.

Action Alternative

Sediment Delivery

Approximately 396 acres of the state section would be treated with a silviculture prescription in the East Fork Swamp Creek watershed. In addition, approximately five acres of would be disturbed for road construction. The remaining 53 acres of harvest would be implemented in unnamed watersheds (14 acres of harvest in the intermittent tributary to the Clark Fork River and 50 acres of harvest in the discontinuous intermittent stream).

Due to the lack of streams on the state section, it is unlikely that sediment delivery to streams would occur. In addition, all forestry Best Management Practices (BMPs) would apply to limit the potential for sediment delivery to dry draws and swales. This would further limit the potential for sediment introduction.

Road drainage improvements would be implemented on approximately 6.2 miles of road to reduce the potential for sediment introduction from haul routes. The drainage improvements include:

Unnamed tributary (not fish-bearing) to the East Fork Swamp Creek
Replace existing 18" corrugated metal pipe (CMP) with a properly sized CMP to reduce instream scour and delivery. A short-term increase in sediment may occur during CMP installation. The potential for sediment input during installation would be minimized using erosion control techniques as required by stipulations in the 124 permit from Montana Fish, Wildlife and Parks and the 318 (short-term turbidity) permit from the Department of Environmental Quality. Timing of the culvert installation would be restricted to limit the potential impacts to fish habitat and life cycles.

Additional upgrades would result in reduced sediment delivery potential by filtering runoff from roads prior to streams, and increasing surface drainage features. Maintenance on the haul route would be required to maintain surface drainage structures and reduce the risk of sediment delivery to streams.

The haul route in one location crosses the East Fork of Swamp Creek. The existing CMP meets the requirements for passing a 25-year event. Through negotiations with the USDA Forest Service, it was determined that the Forest Service would upgrade this crossing in the future.

By implementing this alternative as presented and in accordance with the all applicable forestry BMPs, it is unlikely that adverse long-term impacts to water quality and beneficial uses, including cold-water fisheries, would result from the harvesting and road construction. Short-term impacts are possible during installation of the CMPs, however these impacts would be minimized with erosion control techniques and timing restrictions. A 318 permit (short term turbidity exemption) would be required if this alternative were selected.

Water Yield
Approximately 396 acres of timber harvest in the East Fork Swamp Creek watershed would be implemented under this alternative. The timber harvest and road construction combined results in approximately 367 ECA in East Fork Swamp Creek. Timber harvest and road construction activities would result in approximately a 2.4% increase in annual water yield for the East Fork Swamp Creek watershed.

Cumulative Watershed Effects

Sediment Delivery
No Action Alternative
No timber harvest or road construction is associated with this alternative. Existing sediment sources would continue to contribute sediment to streams until remedial action were implemented or natural healing occurs.

Action Alternative
Due to the harvest methods that would be employed on harvest, units this alternative would not likely result in adverse impacts to water quality. By implementing BMPs on all new and existing roads and harvest units, potential sediment introduction into surface waterbodies would likely reduce cumulative effects to water quality. Short-term impacts may result as described in the direct and indirect effects portion.

Water Yield

No Action Alternative

No timber harvest or road construction activities are proposed under this alternative; therefore no water yield increase would result from implementation of this alternative. Water yield would continue at or near the current level and would decline as past harvest units within the watershed regenerate and move closer to pre-disturbance levels.

Action Alternative

The cumulative annual water yield increase from this alternative would be about 9.0% over modeled pre-disturbance levels. This includes all actions on all ownerships within the watershed that contribute to water yield increase. The threshold of concern set at 11.5% annual water yield increase; this alternative would be within the recommended threshold.

As disclosed earlier, some ECA would be generated in other watersheds. The total ECA generated outside of the East Fork Swamp Creek watershed would be approximately 47 ECA. Due to the limited increase expected, no further cumulative effects analysis on water yield was deemed appropriate.

By keeping the annual water yield increases below the recommended threshold; it is unlikely that adverse impacts to beneficial uses would result from the implementation of this alternative.

FISHERIES ANALYSIS

Introduction

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

Timber harvesting and road construction activities may affect fish habitat by increasing sediment delivery to streams.

These issues can best be evaluated by analyzing the anticipated effects of sediment delivery on streams supporting fish habitat within the project area.

Analysis Area

Sediment Delivery

The analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes in-channel and upland sources of sediment within the proposed project area that could result from no action and the proposed action.

Cumulative Effects

The analysis area for sediment delivery is limited to the harvest units and roads used for hauling. This includes in-channel and upland sources of sediment within the proposed project area that could result from no action and the proposed action.

Analysis Methods

Expected effects to fisheries habitat will be addressed qualitatively using the current condition as a baseline and disclosing the expected changes due to the alternatives proposed.

Sediment Delivery

The analysis methods for sediment delivery will mimic those used in the Hydrology portion of this report.

Existing Condition

Information regarding existing fish populations in East Fork Swamp Creek is limited. According to the Montana Rivers Information System (MRIS), East Fork Swamp Creek contains resident populations of westslope cutthroat trout. Personal communication with MFWP fisheries biologist confirms that genetic sampling was completed on the westslope cutthroat trout. No evidence of hybridization was found, but due to a small sample size, genetic purity is not conclusive. Since no rainbow trout were identified in MRIS, the westslope cutthroat trout population may be genetically pure. Estimated abundance of westslope cutthroat trout are considered common based on extrapolated surveys.

During field review, no streams were identified in the state section (T20N, R27W Section 36) although the USGS topography map indicates two intermittent tributaries to the East Fork Swamp Creek, one unnamed intermittent tributary to the Clark Fork River, and one unnamed intermittent discontinuous stream. These drainage features were evaluated and found to consist of ephemeral draws with no discernable stream channels.

Sediment delivery
The East Fork of Swamp Creek is characterized by high flows during snowmelt runoff with relatively low base flows. Water quality in the drainage has likely been impacted by sedimentation as described in the East Fork Swamp Creek Timber Sale Environmental Assessment (DNRC, 1993) and Swamp Buggy Environmental Assessment (USFS, 1996). Stream channel stability was rated using the Pfankuch methodology (Pfankuch, 1975). The stream channel stability in the upper reaches is generally fair-to-good but degrades downstream. The reduced stability downstream is likely attributable to grazing encroachment, undesirable past harvesting methods and poor road locations.

During the sediment source inventory, potential sediment sources to streams were identified on the proposed haul road along the East Fork of Swamp Creek. The road is less than 50 feet from the stream at several locations. This proximity to the stream results in a high risk potential for sediment delivery. Past upgrades on the haul route are evident from the drive through drain dips and stream crossing armor.

Environmental Effects

This section discloses the anticipated indirect, direct and cumulative effects to fisheries within the affected environment from proposed actions. Past and current activities on all ownerships within the East Fork Swamp Creek watershed have been taken into account for the cumulative effects analysis as well as future planned state actions.

The primary concerns relating to fisheries within the affected environment are potential impacts to water quality from sources outside the channel as well as inside the channel. In order to address these issues the following parameters are analyzed by alternative:

-Miles of new road construction on fish bearing streams
-Potential for sediment delivery to streams

Description of Alternatives

No Action Alternative
No timber harvest or associated activities would take place under this alternative.

Action Alternative
Approximately 396 acres of timber harvest would be implemented in the East Fork Swamp Creek watershed and 53 acres of harvest would occur in unnamed tributaries to the Clark Fork River for total harvest acreage of 449 acres. Associated activities include approximately:

1.1 miles of road construction in the East Fork of Swamp Creek,
1.6 miles of road construction in unnamed tributary watersheds;
4.2 miles of drainage improvements in East Fork Swamp Creek watershed (including one culvert replacement); and
2.0 miles of drainage improvements in unnamed tributary watersheds.

Direct and Indirect Effects

No Action Alternative
Sediment Delivery
No timber harvest or road construction is associated with this alternative. Changes in stream channel conditions and water quality would be dictated by natural events and future actions. Current areas sediment sources would continue to contribute sediment to surface waterbodies.

Action Alternative

Sediment Delivery

Approximately 396 acres of the state section would be treated with a silviculture prescription in the East Fork Swamp Creek watershed. In addition, approximately five acres of would be disturbed for road construction. The remaining 53 acres of harvest would be implemented in unnamed watersheds (14 acres of harvest in the intermittent tributary to the Clark Fork River and 50 acres of harvest in the discontinuous intermittent stream).

Due to the lack of streams on the state section, it is unlikely that sediment delivery to streams would occur. In addition, all forestry Best Management Practices (BMPs) would apply to limit the potential for sediment delivery to dry draws and swales. This would further limit the potential for sediment introduction.

Road drainage improvements would be implemented on approximately 6.2 miles of road to reduce the potential for sediment introduction from haul routes. The drainage improvements include:

1) *Unnamed tributary (not fish-bearing) to the East Fork Swamp Creek*
Replace existing 18" corrugated metal pipe (CMP) with a properly sized CMP to reduce instream scour and delivery. A short-term increase in sediment may occur during CMP installation. The potential for sediment input during installation would be minimized using erosion control techniques as required by stipulations in the 124 permit from Montana Fish, Wildlife and Parks and the 318 (short-term turbidity) permit from the Department of Environmental Quality. Timing of the culvert installation would be restricted to limit the potential impacts to fish habitat and life cycles.

2) Additional upgrades would result in reduced sediment delivery potential by filtering runoff from roads prior to streams, and increasing surface drainage features. Maintenance on the haul route would be required to maintain surface drainage structures and reduce the risk of sediment delivery to streams.

The haul route in one location crosses the East Fork of Swamp Creek. The existing CMP meets the requirements for passing a 25-year event. Through negotiations with the USDA Forest Service, it was determined that the Forest Service would upgrade this crossing in the future.

Water yield increases in the East Fork Swamp Creek would remain below the threshold of concern for unacceptable channel scour and subsequent sediment inchannel sources as discussed in the Hydrology portion of this EA.

By implementing this alternative as presented and in accordance with the all applicable forestry BMPs, it is unlikely that adverse long-term impacts to water quality and beneficial uses, including cold-water fisheries, would result from the harvesting and road construction. Short-term impacts are possible during installation of the CMPs, however these impacts would be minimized with erosion control techniques and timing restrictions. A 318 permit (short term turbidity exemption) would be required if this alternative were selected. By minimizing the potential short-term impacts, DNRC does not expect measurable adverse effects to westslope cutthroat trout.

Cumulative Effects

No Action Alternative

No timber harvest or road construction is associated with this alternative. Existing sediment sources would continue to contribute sediment to streams until remedial action were implemented or natural stabilization occurs.

Action Alternative

Sediment Delivery

Due to the harvest methods that would be employed on harvest, units this alternative would not likely result in adverse cumulative impacts to water quality. By implementing BMPs on all new and existing roads and harvest units, potential sediment introduction into surface waterbodies would likely reduce cumulative effects to water quality. Short-term impacts may result as described in the direct and indirect effects portion.

Current fisheries habitat and populations would not likely be adversely affected with the implementation of this alternative due to the water yield increase as described in the Hydrology analysis and low potential for sediment introduction from harvest units. In order to ensure an acceptable level of risk for potential impacts, all applicable BMPs and mitigation measures would be implemented as described in the Hydrology and Soil analysis

REFERENCES

DNRC. 1993. Environmental Analysis for the East Fork Swamp Creek Timber Sale. Montana Department of Natural Resources and Conservation, Plains, MT.

Pfankuch, D.J. 1975. Stream reach inventory and channel stability evaluation. USDA Forest Service, R1-75-002. Government Printing Office #696-260/200, Washington D.C. 26 pp.

USFS, 1996. Swamp Buggy Salvage Timber Sale. USDA Forest Service. Plains, MT.

SOILS ANALYSIS

Introduction

This analysis is designed to disclose the existing condition of the soil resources and display the anticipated effects that may result from each alternative of this proposal. During the initial scoping, no issues were identified by the public regarding soil productivity. The following issue statement was expressed from internal comments regarding the effects of proposed timber harvesting:

- Timber harvest activities may result in reduced soil productivity due to compaction and displacement, depending on area and degree of harvest effects.

Analysis Area

The analysis area for soils is the state parcel (Section 36, T20N, R27W). This analysis area will adequately allow for disclosure of existing conditions, direct, indirect and cumulative impacts.

Analysis Methods

Soil productivity will be analyzed by evaluating the current levels of soils disturbance in the proposed project area.

Existing Conditions

Geology/Soils

Bedrock geology is mixed **U** argillites and siltites that are well fractured. No especially unique or unstable geology was note in the project area. This parcel has two basic soil units with varying vegetation characteristics dependent upon slope, aspect and elevation.

The map unit **30U** consists of deep gravelly soils forming in colluvium and residium. Slope shape is concave vertically on the lower one-third of slope and mid slope grading to convex near the ridgeline. This terrain is moderately dissected by ephemeral drainages that typically flow only during runoff periods. Wave sorting of gravel by glacial lake Missoula is apparent on protected slopes below 4200 feet.

Soils are deep and well drained. Typical soils range from 5 to 15 inches deep underlying organic layers 1 to 2 inches deep. Volcanic ash influence is intermittent throughout the section. Infiltration of precipitation is rapid and soil moisture retention is moderate.

Management Implications

Timber productivity is moderate to high on this soil type. Locations containing ash are more productive than areas without an ash cap most likely due to the nutrient and moisture holding capacity. Due the rapid infiltration capacity of the soils the season of use is long and equipment operations are limited for only the short wet period during spring runoff. Due to the droughtiness of the soils in this parcel, especially soils without an ash cap, conifer regeneration is a concern because of competition with grasses. Well distributed scarification of up to 30% of site can enhance establishment of serial conifers, yet maintain most of the duff which is important for moisture and nutrient retention.

Material is well suited to road construction. Rocky outcrops are generally limited to ridge locations. Road cut and fill slopes are difficult to revegetate due to the droughty soils. Reseeding immediately following construction activities can mitigate revegetation difficulty. Providing proper road drainage can mitigate moderate erosion and sediment delivery hazards.

The map unit **32U** consist of gravelly soils forming in frost churned residium of fragmented bedrock. Slope shape is convex on high elevation ridgetops. Soils are moderately deep (8-14 inches) and well drained with volcanic ash influence.

Management Implications
Timber productivity is moderate with the cold climate of ridgetops being the primary limiting factor to tree growth. Soil moisture does not limit regeneration although plant competition is a concern for tree regeneration. Soil moisture and nutrients are mainly in surface soils, therefore displacement or mixing of subsoils with surface soils should be avoided to maintain productivity.

Material is good for road construction with moderate erosion hazard potential that can be mitigated with proper surface drainage. Sediment delivery efficiency is low due to the general ridgetop location of this soil type.

Cumulative Effects
Past harvesting in this section (1943-1944) employed conventional ground based equipment for harvest activities. Estimated skid trail spacing used during the past entry ranged from 60 to more than 100 feet apart. All skid trail observed during field reconnaissance were vegetated with the same species as surrounding areas, however productivity of the skid trails was reduced compared to adjacent areas.

Environmental Effects

Description of Alternatives

No Action Alternative
No timber harvest or associated activities would occur under this alternative.

Action Alternative
Approximately 449 acres of timber harvest would be implemented under this alternative. Associated activities include approximately:

2.7 miles of road construction
6.2 miles of drainage improvements

Direct and Indirect Effects of Activities on Soil Productivity

No Action Alternative
No timber harvest or associated activities would occur under this alternative. Skid trails from past harvesting would continue to recover from compaction as freeze-thaw cycles continue and vegetation root mass increases.

Action Alternative
The majority of the area proposed for harvest under this alternative have been harvested in the past using ground based harvest methods. In order to limit cumulative impacts, existing skid trails would be used if they are properly located and adequately spaced. By reusing existing skid trails and mitigating the direct and indirect effects with soils moisture restrictions, season of use and method of harvest, the risk of detrimental long-term impacts to soil productivity would be low.

Under the action alternative cable yarding is required on 191 acres of the 449 total harvest areas. The remaining 258 acres would be harvested using conventional ground based yarding systems. Table SS exhibits the expected impacts to soil from compaction and displacement if:

1) Season of operation is during the summer and fall.
2) Trafficked areas of skid trails and landings are restricted to 20% of the harvest units
3) Summer harvest restricts harvest equipment operation to periods of 20% or less soil moisture at 6 inches below the soil surface.

Table SS: Expected acres of impact to soil from compaction and displacement

Harvest Method and Season	No Action Alternative	Action Alternative
Ground Based[1]	0	33
Cable[2]	0	5
Total (acres)	0	38
Total Harvest Acres	0	449
Percent Area Impacted	0	**8.9%**

[1] 75 percent of the summer ground-based skid trails may exhibit impacts
[2] 10 percent of the cable ground may exhibit impacts

In addition to the potential impacts from harvesting, approximately 8 acres would be removed from production and converted to roads.

Due to the compaction and displacement impacts to the soil as show in Table SS, DNRC would expect a reduction in soil productivity from the action alternative on the displayed acres. As vegetation begins to establish on the impacted areas, and freeze-thaw cycles occur, the area of reduced productivity would decrease. Therefore, direct effects to long-term soil productivity in the project area would be considered acceptable. Additional mitigation measures to maintain long-term soil productivity can be found at the end of this document.

Cumulative Soil Effects
Cumulative effects would be controlled by limiting the area of adverse soil impacts to less than 15% of harvest units through implementation of BMPs, skid trail planning on tractor units and limiting operations to dry or frozen conditions. Future harvest opportunities would likely use the same road system, skid trails and landing sites to reduce additional cumulative impacts. Large woody debris would be retained for nutrient cycling long-term soil productivity.

GENERAL MITIGATION MEASURES:

*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 logger and sale administrator will 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 40%. 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 40%.

* Slash Disposal- Limit disturbance and scarification to 30-40% of harvest units. No dozer piling on slopes over 35%; no excavator piling on slopes over 40% 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.

Wildlife Analysis

EXISTING CONDITION

INTRODUCTION

In the following sections, the existing environment is discussed. This description occurs on 2 scales. The first scale relates to the project area and/or the unit(s) proposed for harvest. Full descriptions for the project area and proposed harvest units are presented in Vegetative Analysis, and the Proposed Units and Transportation Plan Map. The second scale (cumulative effects) describes how the project relates to the surrounding landscape. This analysis area differs by species. If habitat does not exist in the project area or the project is not expected to affect a species, the analysis for that species was dropped from further analysis.

METHODS

To assess the existing condition of the project area and the surrounding landscape, a variety of techniques were used. Field visits, scientific literature, stand level inventory (SLI) data, aerial photography, Montana Natural Heritage Program data, and consultations with other professionals provided information for the following discussion and effects analysis. If specialized methodologies were used, they are discussed under the species section to which they apply.

COARSE FILTER ASSESSMENT

DNRC recognizes that it is an impossible and unnecessary task to assess an existing environment or the effects of proposed actions on all wildlife species. We assume that if landscape patterns and processes similar to those that species adapted to are maintained, then the full complement of species will be maintained across the landscape (DNRC 1996). This "coarse filter" approach supports diverse wildlife populations by managing for a variety of forest structures and compositions that approximate historic conditions across a landscape.

The project area ranges from 3,400' to 4800' elevation with a predominantly western aspect and 3,600' to 4800' with a predominantly eastern aspect. A north-south ridge divides the section. ponderosa pine cover types on Douglas-fir habitat types dominate the area. Most cases a mixed conifer cover type occupies a site where a ponderosa pine or western larch/Douglas-fir cover type would be expected under natural conditions. Basically, the project area provides habitats ranging from, relatively open ponderosa pine stands, to similar stands encroached by Douglas-fir, and more dense stands on the eastern slopes and in draws. These habitats provide wildlife species with a variety of habitats and edge.

Due to fire suppression, tree densities increased and shade tolerant species, such as DF and GF, become more prevalent than they were historically. This situation led to more habitats with closed canopy and limited understory than expected under natural conditions.

The vegetation analysis demonstrates that fire suppression led to current conditions that differ from historical conditions reported by Losensky (1997). Mixed-conifer (often shade-tolerant species) types increased at the expense of fire associated lodgepole pine and fire-resistant ponderosa pine and western larch. In the project area and on the Plains Unit, wildlife species that use forests dominated by Douglas fir, and grand fir probably benefited from this succession at the expense of species that require ponderosa pine, western larch, and unforested habitats. The shade tolerant tree species generally provide better snow intercept than shade intolerant species, thus favoring species that have trouble with deep snow. Conversely, shade intolerants are often well adapted to fire, having thick bark that allows the presence of heart-rot

without weakening the entire tree, thus providing excellent raw materials for snag users and cavity-dependent species.

FINE FILTER ASSESSMENT

Site-specific analyses were also conducted for individual species recognized to be sensitive or of special concern are evaluated (a "fine filter analysis"). They include wildlife species federally listed as "Threatened" or "Endangered", species listed as "Sensitive" by DNRC, and species managed as "big game" by Montana Fish, Wildlife, and Parks.

THREATENED AND ENDANGERED SPECIES

Four species indigenous to northwestern Montana are classified as "Threatened" under the Endangered Species Act of 1973. The bald eagle, Canada lynx, and grizzly bear are listed as "Threatened". The gray wolf was downlisted from "Endangered" to "Threatened" in April of 2003.

BALD EAGLE

The bald eagle is classified as "Threatened" and is protected under the Endangered Species Act. Strategies to protect the bald eagle are outlined in the Pacific States Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service 1986) and the Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group 1994). Management direction involves identifying and protecting nesting, feeding, perching, roosting, and wintering/migration areas (U.S. Fish and Wildlife Service 1986, Montana Bald Eagle Working Group 1994). Around each nest, a nest area (0.25 mile), a primary use area (0.5 mile), and a home range area (2.5 miles). Unit 3 (11 acres) falls just inside the home range area of a nest located approximately 2.1 miles to northeast of the project area. Bald eagle use of the project area is unlikely due to the lack of foraging sites (ponds, streams, open areas), the distance from suitable foraging sites, and the presence of densely timbered stands, therefore this species will not be discussed further.

CANADA LYNX

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

Lynx are associated with subalpine fir forests generally between 4,000 to 7,000' in elevation in the western Montana (Ruediger et. al 2000). Lynx habitat in western mountains consists primarily of coniferous forest with plentiful snowshoe hares, mature forest for denning and cover for kittens, and densely forested cover for travel and security. Additionally, the mature forests provide habitat for red squirrels, an alternative prey source. No subalpine habitat types occur in or adjacent to the project area. Since suitable habitat is unlikely in or adjacent to the project area, Canada lynx were dropped from further analysis.

GRIZZLY BEAR

Grizzly bears are listed as "Threatened" under the Endangered Species Act. The Grizzly Bear Recovery Plan defines 6 recovery areas (US Fish and Wildlife Service 1993). This project is not located in any of the identified recovery areas. The nearest subunit (Mount Headley) of the Cabinet/Yaak Ecosystem is over 5.5 miles away and is separated by Highway 200 and the Clark Fork River. These features could provide a barrier to bear dispersion. Due to the location of the project area, the potential barriers, and the surrounding land management, grizzly bear use in the area has not been documented (W.Kasworm, pers. Comm., 2/4/03) and is unlikely. Therefore, this species will not be discussed further in this document.

WOLF

The gray wolf is listed as "Threatened" under the Endangered Species Act.

The wolf is a wide-ranging species. Adequate habitat for wolves contains adequate vulnerable prey and minimal human disturbance. Primary prey species in northwest Montana are white-tailed deer, elk, moose, and mule deer. Distribution of wolves is strongly associated with white-tailed deer winter range.

Wolves in northwest Montana typically den in late April. Wolves choose elevated sites for denning and rendezvous in areas gentle terrain near a water source (valley bottoms), close to meadows or other openings, and near big game wintering areas. Wolves are most vulnerable to human disturbance at den and rendezvous sites.

No wolf activity has been documented south of Highway 200 (T.Meirer, pers. Comm., 1/03). Additionally, the project area is sloped and away from winter range, therefore denning and rendezvous sites are not expected in the area. To ensure compliance with the ESA, a contract stipulation is included to require DNRC to contact USFWS in the event an active den or rendezvous site is discovered within 1 mile of the project area to determine adequate mitigation measures to avoid adverse affects to these areas. Since wolves do not currently use the project area and this project is not expected to affect denning or rendezvous site habitat, this species will not be discussed further in this document.

SENSITIVE SPECIES

When conducting forest management activities, the SFLMP directs DNRC to give special consideration to the several "sensitive" species. These species are sensitive to human activities, have special habitat requirements that may be altered by timber management, or may become listed under the Federal Endangered Species Act if management activities result in continued adverse impacts. Because sensitive species usually have specific habitat requirements, consideration of their needs serves as a useful "fine filter" for ensuring that the primary goal of maintaining healthy and diverse forests is met.

A search of the Montana Natural Heritage Database did not return any sensitive species sightings in or within 1 mile of the project area. Pileated woodpecker sign (feeding holes) was observed in the project area. The following sensitive species were considered for analysis. Each sensitive species either was included in the following analysis or was dropped from further analysis for various reasons (Table 1).

Table 1. Listed sensitive species for the Northwest Land Office showing the status of these species in relation to this project.

Species	Determination - Basis
Black-backed woodpecker	No recently (<5 years) burned areas in the project area. No further analysis conducted
Boreal owl	No further analysis conducted– The project area occurs below 5,000 and does not provide boreal habitat types.
Coeur d'Alene Salamander	No further analysis conducted – no moist talus or streamside talus habitat occurs in the project area.
Columbian sharp-tailed grouse	No further analysis conducted – no suitable grassland communities occur in the project area.
Common loon	No further analysis conducted - no large lakes occur in the project area
Ferruginous hawk	No further analysis conducted – no suitable grassland communities occur in the project area.
Fisher	**Included** – No perennial streams occur, but some limit habitat occurs in the project area.
Flammulated owl	**Included** – Dry ponderosa pine habitats occur in the project area.
Harlequin duck	No further analysis conducted-no potential streams occur in the project area.
Mountain plover	No further analysis conducted – no suitable grassland communities occur in the project area.
Northern bog lemming	No further analysis conducted – no sphagnum or other fen/moss mats occur in the area.
Pileated woodpecker	**Included** – ponderosa pine, western larch/Douglas fir and mixed conifer habitats occur in the area.
Townsend's big-eared bat	No further analysis conducted – no caves or mine tunnels occur in the project area.

FLAMMULATED OWL

Flammulated owls are listed by DNRC as a sensitive species. This species uses of mature to old stands of open ponderosa pine/Douglas-fir habitats with a canopy closure of 35-65%, abundant large snags and understory thickets (Wright et al. 1997). Flammulated owls prefer old stands of open ponderosa pine and Douglas-fir. They usually nest in cavities of 12-25" dbh aspen, ponderosa pine, or Douglas-fir excavated by pileated woodpeckers or northern flickers.

The uplands in the project area mainly consist of densely stocked 10-24" dbh Douglas-fir and grand fir with mistletoe infestations and scattered large ponderosa pine, western larch, and Douglas-fir live trees and snags. Snags occur throughout the project area at varying densities. Presently, suitable nesting trees occur in the project area. Approximately, 471 acres of flammulated owl habitat occurs in the project area, of which 159 acres appears to be providing suitable flammulated owl habitat. The remaining 312 acres contains overstory too dense to provide valuable habitat to flammulated owls primarily due to fire suppression and lack of forest management.

For cumulative effects analysis, the project area and other lands within a ½ mile buffer were considered. This area (2,172 acres) would provide enough area for one or more pairs of flammulated owls. The cumulative effects analysis area encompasses 1,026 acres of Corporate Industrial, 709 acres of DNRC (includes the project area), 410 acres of Forest Service, and 27 acres of private lands. Approximately 471 acres of nesting habitat occur in the project area, with an additional 61 acres of habitat in unsuitable conditions on the adjacent DNRC section. Other nesting habitat could occur outside DNRC lands, however, the quantity and quality is largely unknown. Due to management practices and the lack of fire, habitat quality and quantity on adjacent lands is expected to be low. The potential for habitat is higher on the FS lands to the south of the project area, than for surrounding private timberlands.

FISHER

Fishers are listed by DNRC as a sensitive species due to their use of old growth habitats. Fishers are generalist predators and use a variety of habitat types, but are disproportionately found in stands with dense canopy. Fishers appear to be highly selective of resting and denning sites. In the Rocky Mountains, fishers appear to prefer late-successional coniferous forests for resting sites and tend to use areas within 155' of water. Such areas typically contain large live trees, snags, and logs, which are used for resting and denning sites and dense canopy cover, which is important for snow intercept. Resting and denning habitats were modeled using preferred cover types (Heinemeyer and Jones 1994), age class, and canopy closure.

Strategies that promote or maintain habitat elements important for fishers typically involve protection of valuable resting habitat near riparian areas and maintaining travel corridors with dense overhead canopy. The project area ranges from 3,600' and 4,800' in elevation with 2 intermittent streams on the western aspect. These areas are comprised of denser vegetation with grand fir. These riparian bottoms and some uplands could provide forage and travel corridors for fishers. However, these habitats are isolated from other potential habitats, are not near perennial water sources, and are intermixed with many drier habitat types making the project area unlikely to be used by fishers. Therefore, fisher use of the area is unlikely and the species will not be considered further in this document.

PILEATED WOODPECKER

The pileated woodpecker plays an important ecological role by excavating cavities that are used in subsequent years by many other species of birds and mammals. Due to their important role as a keystone species and their preference for forested habitats in latter stages of successional development, DNRC considers the pileated woodpecker as a sensitive species.

Pileated woodpeckers excavate the largest cavities of any woodpecker. Preferred nest trees are western larch, ponderosa pine, cottonwood, and 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 nesting habitat for pileated woodpeckers as "stands of 50-100 contiguous acres, generally below 5,000' in elevation with basal areas of 100-125 ft2/ac and a relatively closed canopy." The feeding and nesting habitat requirements, including large snags or decayed trees for nesting and large downed wood for feeding, closely tie these woodpeckers to mature forests with old growth characteristics. The density of pileated woodpeckers is positively correlated with the amount of dead and/or dying wood in a stand (McClelland 1979). Using SLI data, the above information was modeled to estimate pileated woodpecker habitat.

The project area contains 443 acres of contiguous potential nesting habitat. Nesting potential is dependent on availability of suitable snags needed for nesting substrate. During field surveys, pileated woodpeckers use the project area for foraging was documented. Snags occur throughout the area and will continue to develop, especially in Douglas-fir and grand fir, due to the present insect and disease infestations. Therefore, pileated woodpecker foraging substrate appears to be abundant in the area. Of the existing potential nesting habitat, approximately 301 acres is proposed for harvest.

For cumulative effects analysis, the project area and other lands within a ½ mile buffer were considered. This area (2,172 acres) would provide enough area for one or more pairs of pileated woodpeckers. The cumulative effects analysis area encompasses 1,026 acres of Corporate Industrial, 709 acres of DNRC (includes the project area), 410 acres of Forest Service, and 27 acres of private lands. Approximately 443 acres of nesting habitat occur in the project area, with an additional 31 acres in the adjacent DNRC section. Aerial photograph interpretation estimated an additional 317 acres of potential nesting habitat outside DNRC lands, however, the quality is largely unknown. Most of the other adjacent habitat is generally open with scattered trees that could provide some foraging habitat.

BIG GAME SPECIES

The project area provides nonwinter habitat primarily for white-tailed deer, mule deer, and elk. In milder winters and/or in pockets on south and west slopes, big game might winter in this area, but generally Fish, Wildlife and Parks did not delineated the project area as winter range. Henderson et al. (1993) determined that this area lies along an elk migration route and possibly provides elk calving habitat. The proposed project could affect big game species by altering summer habitat and decreasing security. Hiding cover and unrestricted motorized access contribute to big game security.

The project area is generally unroaded with an overstory of ponderosa pine, Douglas-fir, and/or western larch. The understory consists of Douglas-fir and grand fir seedling and saplings, with a variety of shrub species. These conditions provide hiding cover patches along with visual screening throughout the project area. Presently, all roads that access the edges of the project area are restricted to motorized use. These conditions provide a relatively secure area for big game throughout the summer and during the hunting season.

Cumulative effects analysis will generally consider the surrounding landscape within 1 mile of the project area, especially in relation to migration corridors.

SPECIAL AND UNIQUE HABITATS

No special or unique habitats were found in any harvest units or in the project area.

ENVIRONMENTAL CONSEQUENCES

Direct and Indirect Effects - Coarse Filter

No Action Alternative – Coarse Filter
Under this alternative, additional disturbance in the area would not occur. Continued disease and insect infestations would continue, and possibly increase, resulting in increased snag densities and low canopy cover. Succession would continue to trend towards shade tolerant species, such as Douglas-fir and grand fir. Shade-intolerant tree species, such as ponderosa pine and western larch would decline. These changes would favor species that use dead wood and shade tolerant dominated habitats. In the short-term cavity nesting species could benefit by the increase in snag densities for nesting and forage. In the longer term, nesting substrate in the form of shade-intolerant snags is expected to decline due to the lack of regeneration, while foraging sites in shade-tolerant trees are expected to increase.

Action Alternative – Coarse Filter
Under this alternative, 436 acres of habitat would be altered. These activities would increase human disturbance in the area. Wildlife species respond differently to these activities. These activities would be confined to the project area and 7.7 miles of access road for a period of 3 years or less, therefore direct effects to wildlife species would be relatively localized and short-term.

The proposed Action Alternative would convert 279 and 150 acres from mixed conifer cover types to ponderosa pine and western larch/Douglas-fir cover types, respectively. Within these areas, patches of advanced regeneration pockets would be retained to provide variation within the harvest units. All snags are planned for retention, however, some snags undoubtedly would be cut due to safety concerns, line unit corridors, or other logistic reasons. Most of this material would remain on site to provide coarse woody debris. Snag retention is expected to exceed 2 snags per acre, thereby providing habitat structure for cavity nesting species. These changes would modify habitats toward more historic habitats with deadwood structure, thereby native species are expected to benefit by this conversion.

Cumulative Effects - Coarse Filter

No Action Alternative – Coarse Filter
This alternative would not contribute to changes toward historical conditions. The stands proposed for harvests would continue to develop into shade-tolerant dominated species.

Action Alternative – Coarse Filter
This project would convert 436 acres of mixed conifer stands to stands that would be more expected in under historic conditions. These converted acres would be cumulative to other projects on the Plains Unit that similarly designed to convert state trust lands to more historic conditions, while retaining important deadwood structure. Overall, this alternative is expected to benefit native species by enhancing habitats that these species are adapted.

Direct and Indirect Effects to Flammulated Owls

No Action Alternative
Under the No Action Alternative, flammulated owls would not be disturbed by harvest activities and their habitat would be maintained in unsuitable condition on 312 acres and would continue to decline on the existing 159 acres of habitat as succession continues to increase the stand density. Within the next 100 years, all 471 acres are expected to be unsuitable barring natural disturbances. Currently, several pathogens are functioning in the area, primarily Douglas-fir beetle and rot root. These pathogens could aid in reducing tree density that result in positive effects to flammulated owls. These effects would be sporadic and unpredictable. Overall, this alternative is expected to result in a loss of flammulated owl habitat through time, resulting in negative effects to flammulated owls in the long-term (Table 2).

Table 2. The existing condition and expected effects to flammulated owl habitat under the Action Alternative.

Flammulated Owl Habitat	Existing Habitat	Unsuitable Habitat	Total
Existing Level	159	312	471
Proposed for harvest	0	0	0
Following Implementation of the Action Alternative	159	312	471
Expected in > 50 years	Near 0	Near 471	471

Action Alternative
Flammulated owls appear to tolerate human disturbance and rarely abandon a nest. If harvesting occurs during nesting and rearing periods (May-July), a nest tree could be inadvertently cut down. This risk would be low because most nest trees posses some rot, therefore, they have low merchantability and would likely not be harvested, but could still be lost due to safety concerns. Therefore, this alternative has a low potential to directly affect flammulated owls.

Under the Action Alternative, timber harvest would open the canopy of the forested areas by removing primarily suppressed or competing subdominant live trees over 292 acres of flammulated owl habitat. Large, dominant trees and scattered pockets of seedling/sapling thickets, would be retained in the harvest units. Due to reduced competition, the retention trees are expected to grow faster and live longer, especially younger trees. All snags are planned for retention, however, some snags undoubtedly would be cut due to safety concerns, line unit corridors, or other logistic reasons. Most of these snags would remain on site to provide coarse woody debris. After harvest, snag retention is expected to greatly exceed 2 snags per acre, thereby providing habitat structure for nesting flammulated owls.

This proposal would alter habitat quality on 79 acres of the flammulated owl habitat and 213 acres of currently unsuitable habitat. The proposed harvests would reduce overstory canopy closure to 5-15% (shelterwood) on 258 acres and 30-40% (commercial thin) on the remaining 34 acres. In the shelterwood units, this action could reduce flammulated owl habitat on 50 acres in the short-term by large reductions in canopy closure in those areas, however, structural components important to flammulated owl habitat (large ponderosa pine, Douglas-fir trees, snags, and understory thickets) would be retained. In the commercial thin units, harvest on 29 acres would retain flammulated owl habitat, while harvests on 5 acres would convert dense tree cover not used by flammulated owls to a less dense stand that could be used by owls. Therefore, short-term reductions in flammulated owl habitat could occur on 50 acres of currently suitable habitat, however important structure that requires a long time to develop would be retained. The reduction of habitat would last for approximately 30-50 years, until the overstory canopy cover recovers to >35%. On 5 acres, harvesting could convert unsuitable habitat to suitable habitat. On the remaining 238 acres of potential habitat, tree densities would be reduced below those typically used by flammulated owls. In 30-50 years, these stands are expected to be suitable for flammulated owls. Therefore, a 30-50 year reduction of flammulated owl habitat on 45 acres could occur. In 30-50 years, flammulated owl habitat is expected to develop in the harvest units, resulting in a 287 acre increase in owl habitat that is expected to last for approximately 50 years. The 5 acres that would be converted to suitable habitat is expected to continue to provide habitat over the next 50-100 years. Over the next 50-80 years, the existing 80 acres of untreated flammulated owl habitat is expected to advance into an unsuitable condition. Based on changes in habitat, flammulated owls are expected to negatively impacted in the short-term (30-50 years), but benefit more in the longer term (>50 years) (Table 3).

Table 3. The existing condition and expected effects to flammulated owl habitat under the Action Alternative.

Flammulated Owl Habitat	Existing Habitat	Unsuitable Habitat	Total
Existing Level	159	312	471
Proposed for harvest	79	213	292
Following Implementation of the Action Alternative	114	357	471
Expected in < 50 years	292	179	471

Cumulative Effects to Flammulated Owl

Effects Common to the No Action and Action Alternatives

The surrounding landscape is marked by historic and continued timber harvest. If these treatments retained large trees and snags, they could provide additional habitat outside of DNRC lands. However, the quantity and quality of this habitat is largely unknown. Due to management practices and the lack of fire, habitat quality and quantity on adjacent lands is expected to be low. The potential for current habitat is higher on the Forest Service lands to the south of the project area, than for surrounding private timber lands, due to the increased potential of retention of large trees and snags that offer important nesting and foraging substrate. In time, the existing harvested areas on adjacent lands could develop into flammulated owl habitat. The trees retained in the harvest units are expected to release and grow faster than in untreated areas. These areas could contribute to flammulated owl habitat in the future if canopy, large trees, and snags are allowed to develop over the next 50-100 years.

Action Alternative
The No Action Alternative would not alter the existing amount of habitat on the landscape. However, in the longer-term, this alternative is expected to result in reduced habitat over time. These losses could be offset if habitat develops on adjacent ownership. No additional projects are planned on the adjacent DNRC land, so the 61 acres of currently unsuitable flammulated owl habitat is expected to remain in an unsuitable condition. Overall, this alternative is expected to result in reduced habitat through time. These losses could be additive to those on adjacent lands or development of habitat on adjacent lands could offset these losses.

Action Alternative
The Action Alternative would reduce the existing amount of habitat on the landscape by 45 acres. However, in the longer-term, this alternative is expected to result in an additional 287 acres of habitat over time. The short-term losses could be offset if habitat develops on adjacent ownership in the near future. No additional projects are planned on the adjacent DNRC land, so the 61 acres of currently unsuitable flammulated owl habitat is expected to remain in an unsuitable condition. Overall, this alternative is expected to increase the amount of habitat in the analysis area in approximately 50 years. The increase in habitat could be additive to the development of habitat on adjacent lands or offset some of those loses.

Direct and Indirect Effects to Pileated Woodpecker

No Action Alternative
Under the No Action Alternative, timber harvest would not occur. In the short-term pileated nesting and feeding habitat would be retained. In the longer term, the area is expected to continue to undergo succession to shade tolerant Douglas-fir and grand fir cover types, baring any disturbances. During this time, the existing trees are expected to continue to grow to provide nesting and foraging substrate. Through time, these changes could lead to an increase in feeding substrate, but a reduction of shade-intolerant trees used for nesting. Presently, the area is experiencing insect and disease infestations that are mainly affecting Douglas-fir and grand fir, thereby reducing the speed of conversion to mixed conifer stands. However, substantial regeneration of shade-intolerant species is not expected to occur in openings created by the disease and insect infestations due to a lack of ground scarification. Therefore under this alternative, pileated woodpecker habitat would be retained in the short-term, while increasing through time, then declining as shade intolerant tree species are replaced by less-preferred shade tolerant species. Foraging habitat would increase as shade-tolerant trees gain in DBH. No short-term additional effects to pileated woodpeckers would occur under this alternative. However, in the longer-term, pileated woodpecker use of the area for nesting could decline, while foraging opportunities could increase.

Action Alternative
Under the action alternatives, pileated woodpeckers could be affected if harvests occurred during the nesting period. Nesting woodpeckers could be displaced by the harvest activities. The effects of harvest disturbance is unknown; however, *Bull et al. (1995)* observed a discernible woodpecker roosting near a harvest unit consistently throughout harvesting. Additionally, mortality of individual woodpeckers could occur if nest trees were inadvertently cut. The risk of this mortality source would be low because most nest trees posses some rot, therefore, they have low merchantability and would likely not be harvested. Therefore, this alternative is not expected to directly affect pileated woodpeckers.

Under the Action Alternatives, nesting and feeding substrate in snags, coarse woody debris, numerous leave trees, and snag recruits would be retained, but quality nesting habitat could decline on 284 acres due to the removal of the midlevel forest canopy layer and reduction of overstory canopy cover. On approximately 17 acres of commercially thinned stands, nesting habitat could be retained following harvests. On 142 acres, nesting habitat would be retained in its current condition. The resulting open canopy and broadcast burning scarification would allow for natural regeneration and growth of replacement shade-intolerant tree species to provide nesting structure in the distant future. The existing trees would increase in growth due to reduced competition, resulting in less time for potential recruitment of large snags provided from retention trees. All snags are planned for retention, however, some snags undoubtedly would be cut due to safety concerns, line unit corridors, or other logistic reasons. Most of these snags, butts, and cull material would remain on site to provide coarse woody debris for additional feeding substrate. After harvest, snag retention is expected to greatly exceed 2 snags per acre, thereby providing abundant habitat structure for nesting and feeding for pileated woodpeckers. Due to the road restrictions, firewood cutting of the retention trees and snags should be negligible to non-existent.

Based on the above discussion, pileated woodpecker habitat, especially nesting habitat, could be reduced in the harvest units. These reductions are expected to last for about 50-80 years until the regenerating conifers grow to contribute to the midlevel canopy. Structural components that require a long-time to develop (large trees, snags) would be retained in the harvest units, thereby reducing the amount of time needed for nesting habitat to redevelop. Additionally, the retention trees are expected to release and grow faster, thus reducing the time needed to grow large enough to provide feeding and nesting structure. Some reduction in potential feeding habitat could be removed by harvesting Douglas-fir and grand fir trees. In the long-term, regeneration of shade-intolerant trees are expected to provide nesting structure in 100+ years. Overall, pileated woodpeckers could be negatively affected by the reduction in nesting habitat for about 50-80 years. Since feeding structure would be retained, foraging use of the area is expected to continue. In the long-term, pileated woodpeckers are expected to benefit by regeneration of shade-intolerant tree species resulting from this project.

Cumulative Effects to Pileated Woodpecker

Effects Common to the No Action and Action Alternatives

The surrounding landscape is marked by historic and continued timber harvest. If these treatments retained large trees and snags, they could provide additional habitat outside of DNRC lands. Aerial photography interpretation estimated approximately 348 acres of habitat occurs adjacent to the project area. However, the quality of this habitat is largely unknown. The potential for current habitat is higher on the Forest Service lands to the south of the project area, than for surrounding private timber lands, due to the increased potential of retention of large trees and snags that offer important nesting and foraging substrate. In time, the existing harvested areas on adjacent lands could develop into pileated woodpecker habitat. The trees retained in the harvest units are expected to release and grow faster than in untreated areas. These areas could contribute to pileated woodpecker habitat in the future if canopy, large trees, and snags are allowed to develop over the next 50-100 years.

No Action Alternative
The No Action Alternative would not alter the existing amount of habitat on the landscape. However, in the longer-term, this alternative is expected to result in reduced habitat over time. These losses could be offset if habitat develops on adjacent ownership. No additional projects are planned on the adjacent DNRC land, so the 31 acres of pileated woodpecker habitat on DNRC lands is expected to remain unchanged in the near-term. Overall, this alternative is expected to result in reduced habitat through time. These losses could be additive to those on adjacent lands or development of habitat on adjacent lands could offset these losses.

Action Alternatives
The Action Alternative would reduce the existing amount of habitat on the landscape by 284 acres. However, in the longer-term, habitat is expected to redevelop in these areas and continue to provide habitat for a longer duration than if left untreated due to the regeneration of shade-intolerant tress. The short-term losses could be offset if habitat develops on adjacent ownership in the near future. No additional projects are planned on DNRC land, so the 31 acres of pileated woodpecker habitat outside the project area is expected to remain in its current condition. Overall, this alternative is expected to decrease the amount of nesting habitat in the general area for approximately 80 years, while providing foraging habitat and nesting structure. The short-term reduction of nesting habitat could be offset, to some degree, by developing habitat on adjacent lands.

Direct and Indirect Effects to Big Game

No Action Alternative
Under the No Action Alternative, big game deer habitat and security would not be altered in the short-term. In the longer term, succession would continue to occur resulting in increased thermal and possible hiding cover, while reducing forage.

Action Alternative
Under the Action Alternative, approximately 2.7 miles of road construction would occur. The newly constructed roads would be restricted during the harvest activities by a sign, while a gate would restrict access to the area when harvest activities are inactivated (evenings, weekends, shutdown periods, etc.). Following completion of harvesting and follow up treatments, a gate would restrict the road system approximately 2.5 road miles below where the new construction would start.

Within the proposed units (443 acres), timber harvests would reduce the overstory canopy cover from 50-70+% to 5-40%, while retaining pockets of regeneration conifer trees for hiding cover, visual screening, and parturition cover. Some of these pockets area expected to be lost during broadcast burning following harvest. Draws within the harvest units would be left with higher canopy closure and fire would be discouraged from entering these areas. Additionally, 197 acres would be retained in the current condition.

The effects of road building and use under this alternative could result in short-term negative effects to big game species. The new road construction could result in decreased big game security and increased avoidance of habitat if the road closure is not effective. This road closure is an existing closure and appears effective. Therefore, the additional road building and use is expected to decrease big game habitat for the duration of the project (up to 3 years). Increases in big game mortality are not expected because the public would not be allowed to use the restricted road for hunting purposes. However, some illegal use could occur, but this use is expected to be minor. The use of the road system could result in avoidance of habitat, especially bull elk. Again, this would be short-term and big game are expected to regain habitat in these areas when use of the road ceases. Harvest activities would occur primarily in the summer and autumn, thereby parturition areas are not expected to experience increased disturbance.

The effects of timber harvesting in the project area is expected to result in neutral to slightly positive effects, resulting in slight habitat shifts of big game species using the area. Reduction of canopy cover and subsequent burning could increase forage production in the project area. Conversely, retention areas and pockets of submerchantable conifer trees within the harvest units are expected to provide cover for big game species. These benefits are expected to last approximately 50 years, when the canopy cover reaches the existing closure percentage.

Cumulative Effects to Big Game

No Action Alternative

Under the No Action Alternative, forage production is expected to decrease as succession occurs in the forest and the abundance of cover would remain unchanged in the short term and increase in density over the long term. No changes in security are expected under this alternative. Therefore, no additional effects are expected under this alternative.

Action Alternative

Under the Action Alternative, cover would be removed and forage production would increase. Motorized access would remain similar to the existing situation following completion of this alternative. No activities are planned on the adjacent DNRC parcel. The effects of this project would be additive to the contributions of adjacent lands to forage production, while decreasing cover. Travel routes through the project area would be retained through unharvested areas, harvest strategies that retain patches of cover and lighter harvest areas throughout, especially along draws. Therefore, this alternative could result is some slight habitat shifts, but is not expected to result in substantial effects to big game.

LITERATURE CITED

Aney, W, 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. US Forest Service, Northern Region, Wildlife Habitat Relationships Program R1-90-42. 47pp.

Bull, E, T. Torgersen, A. Blumton, C. McKenzie, and D. Wyland. 1995. Treatment of an old-growth stand and its effects on birds, ants, and large woody debris: a case study. USDA For. Serv.. Gen. Tech. Rep. PNW-GTR-353. 12pp.

DNRC. 1996. State forest land management plan. Montana Department of Natural Resources and Conservation, Missoula, MT.

Heinemeyer, K and J. Jones. 1994. Fisher biology and management in the western United States: A literature review and adaptive management strategy. USDA For. Serv. Northern Region, Missoula, MT. 108pp.

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.

Ruediger, B, J Claar, Sl Mighton, B. Nanaey, T. Tinaldi, F. Wahl, N. Warren, D. Wenger, A. Williamson, L. Lewis, B. Holt, G. Patton, J. Trick, A. Vandehey, S. Gniadek. 2000. Canada lynx conservation assessment and strategy (2nd edition). USDA For. Serv., USDI Fish and Wildlife Serv., USDI Bureau of Land Management, and USDI National Park Serv. Missoula, MT. 122pp.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, et al. 2000. The scientific basis for lynx conservation: Qualified insights. Chapter 16 *In* Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, et al (Tech. Eds). 2000. Ecology and conservation of lynx in the United States. Univ. Press of CO, Boulder, CO. 480pp.

Losensky, BJ. 1997. Historical vegetation of Montana. Unpublished report. Montana Department of Natural Resources and Conservation. Missoula, MT

Montana Bald Eagle Working Group. 1994. Montana bald eagle plan. USDI. BLM, Billlings, MT. 61 pp.

USFWS. 1986. Recovery plan for the Pacific bald eagle. USFWS. Portland, OR. 160pp.

USFWS 1987. Northern Rocky Mountain wolf recovery plan. USFWS, Denver, CO. 119pp.

USFWS. 1993. Grizzly bear recovery plan. Missoula, MT. 181pp.

Wright, V., S. Hejl, R. Hutto. 1997. Conservation implications of a multi-scale study of flammulated owl habitat use in the northern Rocky Mountains, U.S.A *in* Proc. Symposium: Second International Symposium on Biology and Conservation of owls in the Northern Hemisphere. Winnipeg, Manitoba, Canada.

PROPOSED SWAMP RIDGE TIMBER SALE
TIMBER STAND/HARVEST UNIT PRESCRIPTIONS

Harvest Unit: 1 **Harvest Unit Acres:** 18

Elevation: 3960' - 4280' **Slope:** 40% **Aspect:** East

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Ponderosa pine

Habitat Type: PSME/PHMA, ABGR/LIBO

Soils Type: Mitten Gravely Silt Loam, Winkler Gravely Sandy Loam

Description of Existing Stand: This unit is located in the southeast corner of section 36. The unit is comprised of three identified stands. The overstory consists of Douglas-fir (50%), ponderosa pine (30%), western larch (10%), and grand fir (10%). Intermediate stand age averages 90 years, but scattered older trees remain as remnants of pre-1910 stands. DBH ranges from 10" to 24" in all species. Height of all tree species averages 45' to 90', with western larch occasionally reaching 100'. Overstory trees are evenly distributed and form a closed upper canopy layer. Regeneration is limited to scattered groupings of Douglas-fir and grand fir. Insect and disease activity is found in all species. The Douglas-fir is heavily affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding rapidly through the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in some of the ponderosa pine. Dwarf mistletoe is present at very high occurrence in the Douglas-fir, with lesser occurrences in western larch. Large snags (>14" DBH) are common, generally found at 10 to 12 per acre. Surface fuel loading of down material ranges from 20 to 40 tons per acre.

Treatment Objectives:

- Promote the stand components of ponderosa pine and western larch into a traditionally appearing open stand configuration.
- Reduce occurrence of insect and disease activity within this stand.

Prescribed Treatment:

- Reduce basal area to an average of 40 ft^2/acre. Retain large diameter Ponderosa pine and western larch to meet the basal area specifications.
- Reduce stocking in Douglas fir, and grand fir.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain all snags > 14" DBH, and all obvious large diameter disease free trees.
- Cut all non-merchantable decadent trees less than 6" DBH

Harvest Method:

- Tractor skidding is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Excavator pile and burn all slash in excess of retention requirements of 5 to 10 tons per acre.
- Burn landing piles following harvest activity.

Regeneration/Site Preparation:

- Spatial openings created by the proposed treatments should provide opportunities for establishment of natural regeneration.
- Excavator piling should provide exposed sites for the establishment of natural regeneration.
- Regeneration should be assessed five years after harvest, if to determine success of appropriate species and encroachment of undesirable species.

Anticipated Future Treatment:

- The proposed treatment progresses the area towards characteristics of an open ponderosa pine stand.
- Stand conditions would be monitored regular intervals following the project period. Salvage or sanitation operations associated with insect or disease occurrences, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 2 **Harvest Unit Acres:** 16

Elevation: 3840' - 4160' **Slope:** 50% **Aspect:** East

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Ponderosa pine

Habitat Type: PSME/PHMA, ABGR/LIBO

Soils Type: Mitten Gravely Silt Loam, Winkler Cool Rubble Land Complex

Description of Existing Stand: This unit is located in the southeast corner of section 36. The unit would lie below the new road construction. The unit is comprised of three identified stands. The overstory consists of Douglas-fir (50%), ponderosa pine (30%), western larch (10%), and grand fir (10%). Overstory age averages 90 years, but scattered older trees remain as remnants of pre-1910 stands. DBH ranges from 10" to 24" in all species. Height of all tree species averages 45' to 90', with western larch occasionally reaching 100'. Overstory trees are evenly distributed and form a closed upper canopy layer. The stand has a multi-storied structure. Regeneration is limited to scattered groupings of Douglas-fir and grand fir. Insect and disease activity is found in all species. The Douglas-fir is heavily affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding rapidly through the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in some of the ponderosa pine. Dwarf mistletoe is present at very high occurrence in the Douglas-fir, with lesser occurrences in western larch. Large snags (>14" DBH) are common, generally found at 10 to 12 per acre. Surface fuel loading of down material ranges from 20 to 40 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the overstory volume by 50% favoring appropriate dominant and co-dominant tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Commercially thin from below.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class.

Harvest Method:

- Skyline logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Lop and scatter slash up to 15 tons per acre.
- Whole tree yard harvested stems in excess of 15 tons per acre.

Regeneration/Site Preparation:

- Regeneration is not a primary objective for this unit. No specific site preparation activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. No future treatment is anticipated at this time.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 3 **Harvest Unit Acres:** 12

Elevation: 3960' - 4240' **Slope:** 50% **Aspect:** East

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Douglas-fir / western larch

Habitat Type: PSME/PHMA, ABGR/LIBO

Soils Type: Mitten Gravely Silt Loam, Winkler Gravely Sandy Loam

Description of Existing Stand: This unit lies below the new constructed road on the eastern boundary of section 36. The overstory is composed of Douglas-fir (60%), ponderosa pine (20%), western larch (10%) and grand fir (10%). The average overstory is 90 to 100+ years old. Overstory trees are evenly distributed and form a well-closed upper canopy layer. DBH ranges from 6" to 20" in all species. Height of all tree species averages 75' to 90', with scattered western larch reaching 100'. An intermediate canopy layer of suppressed and poorly formed Douglas-fir mixed with ponderosa pine is present. Advanced regeneration of Douglas-fir is found in small pockets scattered through the unit. New regeneration is rarely found and is limited to small pockets of Douglas-fir and grand fir. Very little ponderosa pine or western larch regeneration is present at this time. Insect and disease activity is found at low to moderate levels. Root diseases are active in Douglas-fir, dwarf mistletoes are present in Douglas-fir and western larch, and Douglas-fir beetle (Dendroctonus pseudotsugae) is active in the Douglas-fir. Large snags (> 14" DBH) are scattered throughout the stand, generally found 8 to 10 per acre. Surface fuel loading of down material averages 24 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Commercially thin from below to reduce the stand volume by 60% favoring appropriate dominant and co-dominant tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy Douglas-fir, western larch, and ponderosa pine as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class.

Harvest Method:

- Skyline logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Lop and scatter slash up to 15 tons per acre.
- Whole tree yard harvested stems in excess of 15 tons per acre.

Regeneration/Site Preparation:

- Regeneration is not a primary objective for this unit. No specific site preparation activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. No future treatment is anticipated at this time.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 4 **Harvest Unit Acres:** 42

Elevation: 3800' - 4280' **Slope:** 50% **Aspect:** West

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Ponderosa pine

Habitat Type: PSME/SYAL, PSME/PHMA

Soils Type: Mitten Gravely Silt Loam, Winkler Cool Rubble Land Complex, Courville Gravely Silt Loam, Winkler Cool Sharrott Cool Rock Outcrop Complex.

Description of Existing Stands: This unit lies in the north central part of section 36. The unit is comprised of portions from three stands. The overstory consists of Douglas-fir (80%), western larch (10%), and ponderosa pine (10%). Overstory ages average 90 to 120 years. The overstory DBH ranges from 10" to 24" in all species. Height of all tree species averages 75' to 110'. Overstory distribution is generally even and creates a moderately closed upper canopy layer. Stand structure is two to three layers. Lower structures tend to be dense suppressed trees the same age as middle layer co-dominants. Little regeneration of any species is found. Occurrence of insect and disease activity is low, but some Douglas-fir beetle (Dendroctonus pseudotsugae) is present in Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is evident in some of the ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch at high levels. Large snags (> 14" DBH) are found at an average of 4 to 6 per acre. Surface fuel loading of down material averages 25 to 35 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class.

Harvest Method:

- Skyline logging is applicable for this unit.
- Individual tree selection with trees marked to leave.
- Whole tree yard harvested stems in excess of 15 tons per acre.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Prescriptive underburning is planned.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Prescriptive underburning activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 5 **Harvest Unit Acres:** 31

Elevation: 3840' - 4350' **Slope:** 50% **Aspect:** West

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Douglas-fir / western larch

Habitat Type: PSME/VAGL, PSME/CARU, PSME/SYAL

Soils Type: Mitten Gravely Silt Loam, Winkler Cool Rubble Land Complex

Description of Existing Stand: This unit lies in the middle of section 36. Portions of three mixed conifer stands are included within this harvest unit. The overstory consists of Douglas-fir (65%), ponderosa pine (25%), and other conifer species (10%). Overstory age averages 100 to 130 years. The overstory DBH ranges from 12" to 24" in all species. Height of all tree species averages 75' to 100'. Overstory trees are generally evenly distributed and form a loosely closed upper canopy layer. An intermediate canopy layer of suppressed Douglas-fir and ponderosa pine are present in some areas, but not consistently found across the unit. Regeneration is limited to scattered groupings of lodgepole pine and Douglas-fir, but is not consistently found across the unit. Insect and disease activity is found at significant levels at this time. Douglas-fir are affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding rapidly through the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in both Douglas-fir and western larch. Large snags (>14" DBH) are common, generally found at 4 to 6 per acre. Surface fuel loading of down material ranges from 15 to 20 tons/acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy Douglas-fir, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class.

Harvest Method:

- Skyline logging is applicable for this unit.
- Individual tree selection with trees marked to leave.
- Whole tree yard harvested stems in excess of 15 tons per acre.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Prescriptive underburning is planned.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Prescriptive underburning activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit:	6	**Harvest Unit Acres:**	87		
Elevation:	3840' - 4480'	**Slope:**	35-50%	**Aspect:**	Northwest, West
Current Cover Type:	Mixed conifer	**Appropriate Cover Type:**	Ponderosa pine		
Habitat Type:	PSME/SYAL, PSME/LIBO				
Soils Type:	Mitten Gravely Silt Loam, Winkler Gravely Sandy Loam, Combest Gravely Silt Loam				

Description of Existing Stand: This Unit is located along the south boundary of section 36. The structure of the unit is two tiered. The overstory consists of Douglas-fir (70%), western larch (15%), and ponderosa pine (15%). Overstory age averages 100 to 140 years. DBH ranges from 10" to 20" in all species. Height of all tree species averages 75' to 90'. Overstory trees are evenly distributed and form a loosely closed canopy layer. A scattered intermediate layer of suppressed Douglas-fir and ponderosa pine is present. Regeneration is limited to scattered groupings of Douglas-fir and lodgepole pine. Insect and disease activity is found at moderate levels in all species. The Douglas-fir is affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding in the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch. Large snags (> 14" DBH) are found at an average of 6 to 10 per acre. Surface fuel loading of down material ranges from 15 to 25 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class.

Harvest Method:

- Skyline logging is applicable for this unit.
- Individual tree selection with trees marked to leave.
- Whole tree yard harvested stems in excess of 15 tons per acre.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Prescriptive underburning is planned.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Prescriptive underburning activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 7 **Harvest Unit Acres:** 50

Elevation: 3280' - 3880' **Slope:** 45% **Aspect:** Northwest, Southwest

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Ponderosa pine

Habitat Type: PSME/SYAL, PSME/PHMA

Soils Type: Mitten Gravely Silt Loam, Winkler Cool Rubble Complex, Courville Gravely Silt Loam, Winkler Cool Sharrot Cool Rock Outcrop, Macmont Winkler Complex.

Description of Existing Stand: This unit is located in the north-western portion of section 36. The structure of the unit is two tiered. The overstory consists of Douglas-fir (70%), western larch (15%), and ponderosa pine (15%). Overstory age averages 100 to 140 years. DBH ranges from 10" to 20" in all species. Height of all tree species averages 75' to 90'. Overstory trees are evenly distributed and form a loosely closed canopy layer. A scattered intermediate layer of suppressed Douglas-fir and ponderosa pine is present. Regeneration is limited to scattered groupings of Douglas-fir and lodgepole pine. Insect and disease activity is found at moderate levels in all species. The Douglas-fir is affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding in the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch. Large snags (> 14" DBH) are found at an average of 6 to 10 per acre. Surface fuel loading of down material ranges from 15 to 25 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class along gullies.

Harvest Method:

- Tractor logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Excavator pile fuels in excess of 10-15 tons per acre.
- Jackpot burn openings.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Excavator piling activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand. After five years assess regeneration for possible planting.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 8 **Harvest Unit Acres:** 50

Elevation: 3440' - 4040' **Slope:** 40% **Aspect:** West

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Douglas-fir / western larch

Habitat Type: PSME/VACL, PSME/ SYAL, PSME/PHMA

Soils Type: Yourame-Wildgen Gravely Loam, Winkler Cool Rubble Land Complex, Courville Gravely Silt Loam

Description of Existing Stand: This unit lies along the western boundary of section 36. The overstory consists of Douglas-fir (70%), ponderosa pine (25%), and other conifer species (5%). Overstory age averages 100 and 140 years. The average DBH of the overstory is 10" to 20" in all species. Height of all tree species averages 75' to 90'. The overstory canopy is very loosely formed at the lower elevations, but closes to a tight cover at the upper areas of the unit. A scattered intermediate layer of suppressed Douglas-fir and western larch is present. Regeneration is limited to scattered groupings of Douglas-fir and grand fir. Insect and disease activity is found at moderate levels in all species. The Douglas-fir is affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding in the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch. Large snags (> 14" DBH) are found at an average of 6 to 10 per acre. Surface fuel loading of down material ranges from 15 to 25 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy Douglas-fir, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class along gullies.

Harvest Method:

- Tractor logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Excavator pile fuels in excess of 10-15 tons per acre.
- Jackpot burn openings.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Excavator piling activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand. After five years assess regeneration for possible planting.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit: 9 **Harvest Unit Acres:** 52

Elevation: 3400' - 3880' **Slope:** 0-40% **Aspect:** Northwest

Current Cover Type: Mixed conifer **Appropriate Cover Type:** Ponderosa pine

Habitat Type: PSME/VAGL, PSME/SYAL, PSME/LIBO

Soils Type: Yourame-Wildgen Gravely Loam, Winkler Cool Rubble Land Complex, Courville Gravely Silt Loam, Mitten Gravely Silt Loam

Description of Existing Stand: This unit lies in the southwestern portion of section36. The overstory consists of Douglas-fir (70%), ponderosa pine (25%), and other conifer species (5%). Overstory age averages 100 and 140 years. The average DBH of the overstory is 10" to 20" in all species. Height of all tree species averages 75' to 90'. The overstory canopy is very loosely formed at the lower elevations, but closes to a tight cover at the upper areas of the unit. A scattered intermediate layer of suppressed Douglas-fir and western larch is present. Regeneration is limited to scattered groupings of Douglas-fir and grand fir. Insect and disease activity is found at moderate levels in all species. The Douglas-fir is affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding in the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch. Large snags (> 14" DBH) are found at an average of 6 to 10 per acre. Surface fuel loading of down material ranges from 15 to 25 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.
- Retain groupings and clumps of healthy re-generation in the 10 to 15 foot height class along gullies.

Harvest Method:

- Tractor logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Excavator pile fuels in excess of 10-15 tons per acre.
- Jackpot burn openings.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Excavator piling activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand. After five years assess regeneration for possible planting.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

Harvest Unit:	10	**Harvest Unit Acres:**	77
Elevation:	4280' - 4700'	**Slope:** 0-40%	**Aspect:** Northwest to Southwest
Current Cover Type:	Mixed conifer	**Appropriate Cover Type:**	Ponderosa pine
Habitat Type:	PSME/SYAL, PSME/ PHMA, PSME/VAGL, PSME/LIBO		
Soils Type:	Combest Gravely Silt Loam, Winkler Cool Rubble Land Complex, Mitten Gravely Silt Loam		

Description of Existing Stand: This unit lies along Swamp Ridge in the center portion of section 36. The overstory consists of Douglas-fir (70%), ponderosa pine (25%), and other conifer species (5%). Overstory age averages 100 and 140 years. The average DBH of the overstory is 10" to 20" in all species. Height of all tree species averages 75' to 90'. The overstory canopy is very loosely formed at the lower elevations, but closes to a tight cover at the upper areas of the unit. A scattered intermediate layer of suppressed Douglas-fir and western larch is present. Regeneration is limited to scattered groupings of Douglas-fir and grand fir. Insect and disease activity is found at moderate levels in all species. The Douglas-fir is affected by a variety of root diseases. Douglas-fir beetle (Dendroctonus pseudotsugae) is active and expanding in the Douglas-fir. Mountain pine beetle (Dendroctonus ponderosae) is present in lodgepole pine and ponderosa pine. Dwarf mistletoe is present in Douglas-fir and western larch. Large snags (> 14" DBH) are found at an average of 6 to 10 per acre. Surface fuel loading of down material ranges from 15 to 25 tons per acre.

Treatment Objectives:

- Reduce overstocking and promote productive growth in the residual stand.
- Reduce the stand volume by 50% to 75% favoring dominant and codominant appropriate tree species.
- Reduce the presence of insect and disease activity and the threat of expanding activity to surrounding timber stands.

Prescribed Treatment:

- Shelterwood silvicultural cutting system.
- Mark to leave 18 to 20 trees per acre > 11" DBH. Choose healthy ponderosa pine, and western larch as leave trees.
- Retain all snags > 14" DBH.
- Remove trees affected by insects, root rots, dwarf mistletoes, or other diseases.

Harvest Method:

- Tractor logging is applicable for this unit.
- Individual tree selection with trees marked to leave.

Hazard Reduction:

- Burn landing piles following harvest activity.
- Excavator pile fuels in excess of 10-15 tons per acre.
- Jackpot burn openings.

Regeneration/Site Preparation:

- Regeneration is a primary objective for this unit. Excavator piling activities are planned.
- Spatial openings created by proposed treatment should provide opportunities for regeneration of all tree species present in this stand. After five years assess regeneration for possible planting.

Anticipated Future Treatment:

- The proposed treatment moves this area toward its appropriate cover type, and advances a portion of the stand toward a more healthy and productive forest by retaining some of the older more productive trees. Future treatment would remove residual overstory after regeneration has been established.
- Stand conditions would be monitored at regular intervals following the project period. Salvage or sanitation operations associated with insect and disease outbreaks, extreme weather events, or other unexpected circumstances would be evaluated for action on a case-by-case basis.

MITIGATION

Roads: A transportation system minimizing road miles and meeting all BMPs has been designed by the DNRC. Roads constructed in conjunction with this project will total approximately 3.5 miles, and will remain in place following project activity. After activities have been completed the roads will be grass seeded and closed to use. Road drainage improvements would be implemented on approximately 5.3 miles of road to reduce the potential for sediment introduction from haul routes. A State 124 permit would be obtained from Fish Wildlife and Parks prior to road construction. Existing roads to be incorporated into the transportation system would be upgraded to meet all BMPs. During the project 9.36 miles of road would be open. Roads currently in place that do no meet BMP standards would be closed, upgraded, or obliterated during the construction phase of the project.

Wildlife: The following issues have been identified, with mitigation measures (italicized) incorporated into the proposed project:

Bald Eagle: Cease all operations and consult with a DNRC biologist for further mitigations should a nesting pair of eagles is observed within one mile of any project related activity. *This measure would be specified within the Timber Sale Contract and would be monitored by the Timber Sale Administrator.*

Grizzly Bear: Minimize number of roads (open and closed), and slashing old roads and skid trails to reduce the potential for foot and unauthorized motor vehicle traffic. *Open road mileage in the area would be minimized both through system design and the closure of existing roads. All roads on this and surrounding Plum Creek sections are closed to motorized use year round. Contract specifications would require the placement of slash on skid trails at the completion of use. Spacing of skid trails and line corridors would be minimized and approved by DNRC Sale Administrator prior to construction and use. Skid trail location and treatment would be monitored by the Timber Sale Administrator. Abandoned roads would be allowed to re-vegetate naturally.*

Gray Wolf: 1) Suspension of operations and temporary restriction of use of roads within a 1 mile radius of any known wolf den; 2) suspend operations and consult a DNRC biologist if a suspected rendezvous site is observed within ½ mile of any ongoing project activities. *These items would be specified in the Timber Sale Contract and monitored by the Timber Sale Administrator.* 3) Retain connective corridors of heavy forest cover when possible to minimize travel routes, visual screening, and partial security for elk and deer. *Unit location and harvest unit design has provided for these items.* 4) Minimize number of roads (open and closed), and slash old roads and skid trails to reduce the potential for foot and unauthorized motor vehicle traffic. *This item is identical in mitigation as listed under Grizzly Bear in the preceding paragraph.*

Fisher: Restrict public access to reduce potential for trapping pressure and loss of existing snags to firewood gathering. *All roads located on this section, as well as all roads accessing the area, are under yearlong closure to motorized use.*

Flammulated Owl: Favor ponderosa pine retention and regeneration decisions and restrict public access to reduce potential loss of existing snags to firewood gathering. *Harvest Unit and Timber stand prescriptions favor the retention of ponderosa pine and would convert 378 acres to appropriate historic cover types, of which 337 acres are ponderosa pine type. Year round road closure of the area would control losses of snags to firewood gatherers.*

Pileated Woodpecker: Favor ponderosa pine and western larch in retention and regeneration decisions, and restrict public access to reduce potential loss of existing snags to firewood gathering. *Mitigations identical with those listed under flammulated owl in preceding paragraph.*

Big Game Winter Range: In harvest units within winter range, retain patches of dense vegetation when possible to provide some thermal cover/snow intercept capacity, and 2) minimize number of roads (open and closed), and slash old roads and skid trails to reduce the potential for disturbance from foot and unauthorized motor vehicle traffic. *Naturally occurring patches of dense vegetation, varying in size and species composition, are found in all areas of this section. Marking guidelines have been designed to retain patches within units. Unit design and location would provide for retention of corridors and patches between units. Road and skid trail mitigation is identical with that listed under grizzly bear mitigation.*

Elk Security: 1) Retain connective corridors of heavy forest cover along riparian areas and on the ridge line when possible to maintain travel routes, visual screening, and security for elk and deer, and 2) minimize number of roads (open and closed) and slash old roads and skid trails to reduce the potential for foot and unauthorized motor vehicle traffic. *Other than one short ephemeral segment, riparian areas would not be included in harvest activity. Ridgeline to the east has been left out of harvest units, by design, to retain vegetation as it now exists. Road and skid trail mitigation is identical with those listed under grizzly bear mitigation.*

Soils: Equipment operations would be limited to periods when soils are relatively dry (less than 20% moisture content), frozen, or snow covered to minimize soil compaction and rutting, and to maintain drainage features. Soils moisture conditions would be measured prior to start up and during operations when deemed necessary by DNRC. All skid trails and line corridors would be identified and approved by DNRC prior to construction or use of said trails or corridors. Tractor skidding would be limited to slopes 40% or less. Slash retention would be contract specified to retain 10 to 15 tons of large woody debris and 30% of small diameter (<3") material. The Timber Sale Administrator would monitor all soil mitigation measures. Due to the lack of streams on the state section, it is unlikely that sediment delivery to streams would occur. In addition, all forestry Best Management Practices (BMPs) would apply to limit the potential for sediment delivery to dry draws and swales. This would further limit the potential for sediment introduction.

Road drainage improvements would be implemented on approximately 6.2 miles of road to reduce the potential for sediment introduction from haul routes. The drainage improvements include:

1) *Unnamed tributary (not fish-bearing) to the East Fork Swamp Creek*
Replace existing 18" corrugated metal pipe (CMP) with a properly sized CMP to reduce instream scour and delivery. A short-term increase in sediment may occur during CMP installation. The potential for sediment input during installation would be minimized using erosion control techniques as required by stipulations in the 124 permit from Montana Fish, Wildlife and Parks and the 318 permit (short-term turbidity), from the Department of Environmental Quality. Timing of the culvert installation would be restricted to limit the potential impacts to fish habitat and life cycles.

2) Additional upgrades would result in reduced sediment delivery potential by filtering runoff from roads prior to streams, and increasing surface drainage features. Maintenance on the haul route would be required to maintain surface drainage structures and reduce the risk of sediment delivery to streams.

By implementing this alternative as presented and in accordance with the all applicable forestry BMPs, it is unlikely that adverse long-term impacts to water quality and beneficial uses, including cold-water fisheries, would result from the harvesting and road construction. Short-term impacts are possible during installation of the CMPs, however these impacts would be minimized with erosion control techniques and timing restrictions. A 318 permit (short term turbidity exemption) would be required if this alternative were selected.

Hydrology: Due to the lack of streams on the state section, it is unlikely that sediment delivery to streams would occur. In addition, all forestry Best Management Practices (BMPs) would apply to limit the potential for sediment delivery to dry draws and swales. This would further limit the potential for sediment introduction. All operations to repair ephemeral channels would also be done in the late summer season, in the no flow period.

Noxious Weeds: Roads would be seeded and spot treated with chemicals following construction and project completion. Logging equipment would be cleaned and inspected through the timber sale contract to avoid seed migration. Roads would be closed following the sale to avoid migration of weed seed into the area.

Visual Impacts/ Aesthetic Values: Activities would be visible in cutting Units 1, 2 and 3 from the Town of Plains, portions of Hwy 200, as well as various properties and locations along River Road West and the Blackjack road. Visible impacts would be noticeable in the short term, but are not likely to have long term impacts. Use of skyline logging systems in units 2 and 3 would help reduce visual impacts. Unit boundaries on all units as well as marking prescriptions would limit these impacts. Lands adjacent to state land will have visible fuel clearings. Visual screening would be retained along constructed roads to reduce impacts when possible.

Fuel Hazards: Harvest treatments would reduce ladder fuels and trees susceptible to fire. Slash would be treated either through logging system design or excavator piling to reduce the available fuel following harvest to 10-15 tons per acre. Prescriptive underburning would be used in units 4 through 10 following timber harvest.

Proposed Swamp Ridge Timber Sale

Consultants and References

Individuals Consulted

Greg Archie; MT DNRC, Plains Unit, Plains, Montana

Randy Avery; Plum Creek Marketing Inc., Kalispell, Montana

Larry Ballantyne; MT DNRC, Plains Unit, Resource Program Manager, Plains, Montana

Eric Barkley; USFS, Lolo National Forest, Superior, Montana

Gary Hadlock; MT DNRC, Northwestern Lands Office, Kalispell, Montana

Jon Hayes; MT DNRC, Southwestern Lands Office, Missoula, Montana

Jack Issacs; MT DNRC, Kalispell/ Plains Unit, Plains, Montana (retired)

Laura Katzman; Montana Fish, Wildlife and Parks, Research Specialist, Thompson Falls, Montana

Norm Kuennan; MT DNRC, Northwestern Lands Office, Kalispell, Montana

Norman Merz; MT DNRC, Wildlife Biologist, Northwestern Lands Office, Kalispell, Montana

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Everett Young; MT DNRC, Plains Unit, Plains, Montana

Special References

Forestry Best Management Practices, Montana Department of Natural Resources and Conservation.

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, B. John. 1997. Historical Vegetation of Montana.

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